Dyscalculia is a learning disability in which students face difficulties in grasping and applying mathematical concepts. These difficulties then have a major impact on their further education and employment. ICT has proven to be a valuable tool to help students suffering from this condition. This paper aims to look at what types of difficulties these students face in general, the software available and what more is required to be done in order to facilitate learning for these students.

**ABSTRACT**

Dyscalculia is a learning disability in which students face difficulties in grasping and applying mathematical concepts. These difficulties then have a major impact on their further education and employment. ICT has proven to be a valuable tool to help students suffering from this condition. This paper aims to look at what types of difficulties these students face in general, the software available and what more is required to be done in order to facilitate learning for these students.

**Keywords:** Dyscalculia; ICT; Audio Software

**INTRODUCTION**

Learning disabilities are neurological disorders that make it difficult for individuals to acquire certain academic and social skills. Contrary to general assumptions, they are NOT the result of poor intelligence or laziness. These disabilities are classified into various types such as dyslexia, dyscalculia, dysgraphia, dyspraxia, etc. Dyslexia and dyscalculia may occur independently or together.

The Department for Education, UK, defines dyscalculia as ‘A condition that affects the ability to acquire arithmetical skills. Dyscalculic learners may have difficulty in understanding simple number concepts, lack an intuitive grasp of numbers, and have problems learning number facts and procedures. Even if they produce a correct answer or use a correct method, they may do so mechanically and without confidence.’

**Difficulties Faced**

According to the British Dyslexia Association, students suffering from dyscalculia have problems with counting, calculations, working with zeroes, measures and orientation. Having closely worked with students who suffer from dyslexia, I have observed that they face the following difficulties:

1. Determining which number is larger and which is smaller, especially if the numbers have decimal places. For example, is 1.5 larger or 5.1?
2. Difficulty with operators. They are able to read ‘5 + 6’, but do not realise that the numbers have to be added. However, they are able to give the correct answer when they are told that 5 and 6 have to be ‘added’.
3. Difficulty with mathematical symbols such as ‘sigma’, ‘pi’, etc.
4. In some cases, even understanding that have they arrived at the solution to the question or not is a problem.
5. Do not understand word problems. These are students who suffer from dyslexia as well to some extent.

6. Difficulty in memorising what steps have to be followed even after practicing multiple problems.

**How grave is the Problem?**

Although actual numbers are not known, about 4% to 6% of the population suffers from Dyscalculia. A study ‘Does Numeracy Matter’ by Bynner and Parsons at the Basic Skills Agency, London, showed that people with poor numeracy tended to leave full-time education at the earliest opportunity and usually without qualifications, followed by patchy employment with periods of casual work and unemployment. A further study by the two, ‘Does Numeracy Matter More?’ for NRDC showed that, both for men and for women, numeracy skills decline if they are not used and practised in employment. This creates a vicious circle: poor numeracy leads to limited employment, which leads to declining numeracy, which makes it harder to obtain and stay in employment. Poor numeracy skills also make it difficult to function effectively in all areas of modern life, particularly for women.

**Provisions for students with Dyscalculia**

Although there is no specific law in India for provision for students with Dyscalculia, different educational boards have their own provisions. For example, in ICSE schools, the students are given extra time, they are allowed use of calculators and writers, the question paper may be read out, etc.

**How can ICT help?**

Information and Communication Technology (ICT) in education is the use of electronic materials to provide information and facilitate learning. This may include use of radios, videos, internet and various educational software. Studies show that ICT helps a student to learn better and faster. Accordingly, various software have been designed to help students with learning disabilities. Particularly for dyscalculia, we have the following notable software:

1. The Number Race: Helps to improve number sense in dyscalculia.
2. Number Sense: Mathematical games to remediate dyscalculia
3. MathBase 1: Focuses on number concepts
4. Bubble Reef: Includes games to develop number concepts
5. Jump Math: For severe math learning disabilities
6. Knowsley Woods: Focuses on advanced number concepts
7. Number Bonds: A game to teach the relation between size and numbers
8. NumberShark : Contains games focusing on numeracy concepts

Some of these software are paid while some are free. Some are available as DVDs while some are online tools. ‘NumberBond’ is an application from the AppStore for iPad.

**INFERENCES AND RECOMMENDATIONS**

Based on my observations, I have the following recommendations:

- Studies show that infants learn a sense of quantity early on in their development. Also the ages from 2 to 5 are most crucial in developing mathematical ability. And these days children as small as 18 months old show an affinity towards playing games on mobile phones, tablets, laptops etc. So, children should be exposed to simple games involving mathematical operations and skill.
• There are various tests which help to determine whether a student is suffering from dyscalculia and most of these are free. So, if a child seems to be having problems with numbers, he/she should be tested for dyscalculia so that special measures can be taken to help the student.

• The software/games which exist are in English, they should be modified in local language for each state.

• Games/software should be developed keeping in mind the Indian mathematical curriculum. So the software can have various modules for each grade which progresses in level of difficulty as the student advances into the next grade.

• Free software should be developed which can be used even in municipal schools with a basic infrastructure.

• The software should also have audio which ‘tells’ the student what mathematical operation is to be performed.

• As the student progresses into higher level, the software should ‘tell’ the student what is the next step to be performed.

• The software should be able to breakdown ‘word problems’ into processes and steps and instruct the student what is to be done.

• Teachers teaching in schools should be given training to handle students with dyscalculia.

• Teachers should also be taught how to use software effectively in their classes in order to achieve maximum benefit.

CONCLUSION

Dyscalculia is a relatively new area of study and considering its long term effects, it is imperative that measures should be taken to help students suffering from dyscalculia. Creating and distributing free software which develops mathematical skills early on and which “grow” with the child is the need of the hour.

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