Assistive Digital Technology for Learning Disability

“Designers can recognise that, depending on the designed object and the context of use, we can all be rendered disabled; that disability can arise from functional loss or from contextual, social or cultural origins and, given the diversity of our user populations, this is highly likely to occur.”

From the book, Inclusive Design (Design for the whole population) by Clarkson, Coleman, Kates and Lebbon.

Like most of the people, I had no idea or awareness about Dyslexia.
It was only when my mother, a private tutor pointed out to me that she suspected one of her students was Dyslexic.That particular 10-year old boy had a tendency to flip characters,confuse between mathematical operation signs and had a very poor short term memory.

It was only after hearing the particular symptoms that I 'googled' the term 'Dyslexia'. What all came was something I found very interesting.Dyslexia and Learning disabilities presented itself as a condition where the affected person was said to be 'gifted' with this unique disability.

More research later I found out that a majority of designers and other creative people are said to be Dyslexic.

In fact it is said that 50% of NASA employees are
Dyslexic and 80% of Royal College of Arts(RCA) students are Dyslexic too.

Therefore I found this presented quite an interesting design problem where the user was suffering from this condition as well as said to be gifted with unique visual perspective that Dyslexia gives.

Hence I took it up as the topic for my 6 month thesis which was sponsored by Ford Foundation.

Acknowlegments

I would like to specially thank my guide Nina Sabnani for her valuable support and the direction she gave me for taking critical decisions in my project.

I would like to thank Mrs.Nutan Kasliwal,the project co-ordinator of Prerna Foundation, Delhi Public school,Ahmedabad,for giving me valuable guidance and for letting me interact with the teachers and students and even allowing me to attend classes with the children.

I would like to thank Mr.Milindo Taid for his valuable inputs on the document and guidance he had given all long as my discipline co-ordinator.

I would like to sincerely thank Dr.Vinod Vidwans for inspiring and guiding me all along and pushing me to think beyond.

I would like to thank Mr.Suresh Emmanuel,Abhinav Sircar,Chinmayee Kulkarni,Gayatri,Abhishek for their patience and their valuable inferences.

Thanks to Archana, Gaurang and Vikram for brain-washing,confusing and inspiring me and for being the best friends ever.

Thanks to Anjali,Ashim,Archana,Remya,Rahim,Preethi,Neha,Vikram for being the most mis-matched yet the perfect and the dearest bunch of classmates to work with.

Thanks a zillion to Ashim,Manish,Mayur,Meghna,Swati,Sitara,Shalini,Kshipra,Jerry and Devesh .

And last but not the least my family - Grandpa,Dad,Mum,my brother cum my best friend Vivek,who have all been my greatest support all along and with patience being trying to figure out since day one what is it that I am exactly wanting to do and will eventually end up doing.

Thanks to all who directly and indirectly helped me.

1
Project Synopsis

About NID

The National Institute of Design (NID) is internationally acclaimed as one of the foremost multi disciplinary institutions in the field of design education, applied research, training, design consultancy services and out reach programmes.

It has been the recipient of significant national and international awards since it was established in 1961 as an autonomous institution under the Ministry of Industry, now known as Ministry of Commerce & Industry, Government of India.

Government of India had invited the renowned design team of Charles and Ray Eames to recommend a programme of design to serve as an aid to small industry.

On the basis of their remarkable document, 'The India Report', the Government of India set up the National Institute of Design in 1961 as an autonomous national institution for research, service and training in Industrial Design and Visual Communication.

NID has been a pioneer in industrial design education after Bauhaus and Ulm in Germany and is known for its pursuit of design excellence to make Designed in India , Made for the World a reality.

NID's graduates have made a mark in key sectors of commerce,industry and social development by taking role of catalysts and through thought leadership.

NID has been recognised as a Science and Industrial Research Organisation by the Department of Science & Technology, Government of India.

About Ford foundation

The Ford Foundation is a resource for innovative people and institutions worldwide.

The Ford Foundation was established in 1936 by the legendary Henry Ford.

The foundation's charter stated that it was to "receive and administer funds for scientific,educational and charitable purposes, all for the public welfare."

The Ford Foundation is one source of support for these activities. It works mainly by making grants or loans that build knowledge and strengthen organizations and networks. The foundation focuses on a limited number of problem areas and program strategies within our broad goals.

Since its inception it has been an independent, non profit, non governmental organization. Ford foundation has provided more than $12 billion for grants,projects and loans.

The trustees of the foundation set policy and delegate authority to the president and senior staff for the foundation's grant making and operations. Program officers in the United States, Africa, the Middle East, Asia, Latin America and Russia explore opportunities to pursue the foundation's goals, formulate strategies and recommend proposals for funding.

Defining the problem

For most people, reading the newspaper, going to the bookstore, looking at a menu, comparing prices of daily groceries at market are stress-free experiences. For millions of other people, though, these experiences are filled with frustration, self-doubt, and confusion.

These people have a learning disorder(LD),which may be dyslexia or dyscalculia, which means they have difficulty reading and comparing numbers despite having “good intelligence, strong motivation, and adequate schooling”.

For a dyslexic, the seemingly simple task of ordering in a restaurant can be nearly impossible. Through their own efforts or through specialized education, these individuals learn how to look at words and eventually learn to read. Such methods are effective, but they aren’t foolproof.

The success or failure of helping a person with a disorder like dyslexia to read lies not only in how their brain works, but also in how information is presented. Essentially, the information must be accessible to the dyslexic’s way of reading.

Scope of research

Dyslexic are very gifted people.
They aren't poor learners but people who are a very different perspective of comprehending and processing information.Dyslexic learners are holistic, 3D thinkers.
They need to have the whole picture to see how the parts fit in.They always need to know an overview of an task's aim before they start something.

They are comfortable with multi-sensory teaching methods. They're often good with 3D and visual and spatial comprehension.Therefore I aim to keep these special abilities in mind while designing an effective assistive digital medium.

The goal of this research is to understand how people with dyslexia and other learning disabilities go about comprehending and analysing information presented to them.
My observations will focus on how they comprehend information, i.e. try to figure out what all goes on in their minds while they try to analyse and synthesize structured information.

The goal of this research will be to identify the patterns that were most recurrent in the study and apply the observations in conceptualizing the final idea.

2

Understanding Dyslexia

What Is a Learning Disability?

A learning disability affects the way a person of average to above average intelligence receives, processes, or expresses information,and lasts throughout life. It impacts the ability to learn the basic skills of reading, writing, or math.The Coordinated Campaign for Learning Disabilities (CCLD), a coalition of organizations within the learning disabilities community,defines LD as "a neurobiological disorder in which a person's brain works or is structured differently."

The World Federation of Neurology calls dyslexia 'a disorder manifested by difficulty in learning to read, despite conventional instruction, adequate intelligence and socio-cultural opportunity'. Early researchers believed that some people had a problem with reading and called this handicap dyslexia (dys in Greek means difficulty and lexia, words).

Though further research proved that dyslexia was only one of the learning disorders, the old nomenclature survived and it is often used to describe all or any one of the learning disorders. However, the term does not apply to children who have learning problems that are primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance or of environmental, cultural or economic disadvantages.

Dyslexia results from a different brain organization, which may cause a problem with reading, writing, spelling and/or speaking, despite average or superior intelligence, traditional reading instruction and socio-cultural opportunity. It is genetically inherited and its cause is biological.

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The previous pages were intentionally printed so in order to give the simulation of how printed materials appear to Dyslexics suffering from this problem.

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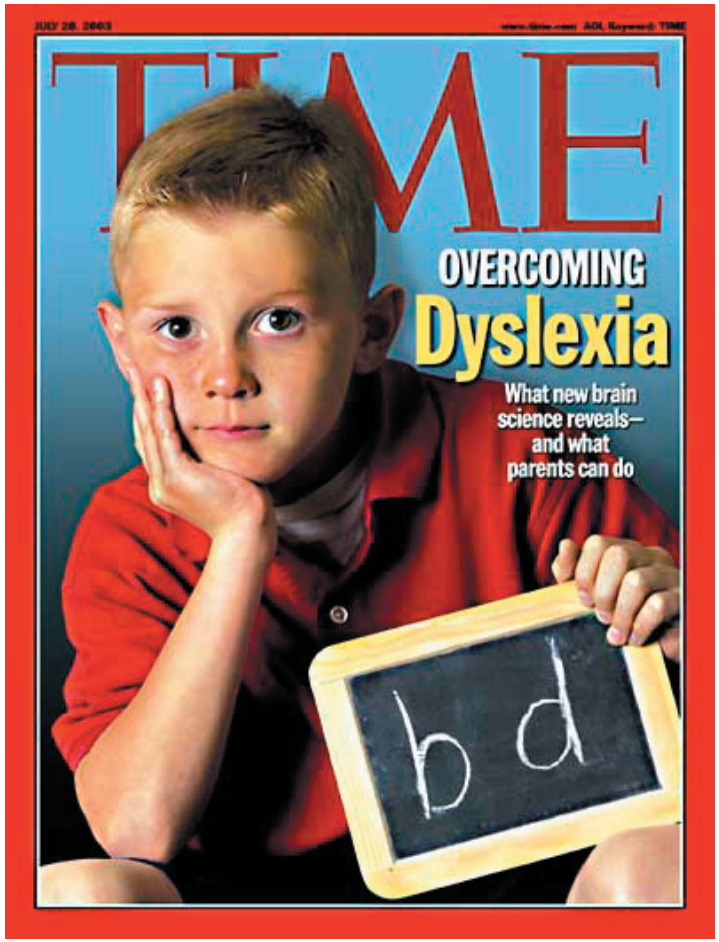
Common pattern of difficulties found in dyslexics :

- Memory recall
- Hearing and visual anomalies
- Directional difficulties
- Sequencing difficulties
- Organisational skills
- Motor co-ordination
- Writing difficulties
- Reading difficulties
- Numeric difficulties
- Speech difficulties
- Anxiety and confidence issues

Dyslexia in News



"Overcoming Dyslexia" was the cover story of the July 28, 2003 issue of Time magazine. The articles in this issue discusses the problem of dyslexia and new research about the brains of people with dyslexia.

Mapping the Dyslexic brain

How The Brain Reads Words

Using sophisticated imaging techniques to scan the brains of children and adults,researchers have identified three key regions that the brain uses to analyze the printed word,recognize its constituent sounds and automate the process of reading.

Seeing the Word

For thousands of years,the ears were the primary route by which language entered the human brain. Reading shifted the input to the eyes,requiring the brain to link written markings to spoken language.

The diagrams on the following pages illustrate what goes on in a dyslexic brain.

Images 1 2 3 show how a normal brain functions.

Image 4 shows what goes wrong in a dyslexic brain.

The above information and the following illustrations have been adapted from the July 2003 issue of Time Magazine.

1 The Phoneme Producer

Left inferior frontal gyrus

This section of the brain helps a person vocalize words - silently or out loud. It also starts to analyze phonemes,the smallest sounds that make up words. Cat, for example, contains three phonemes: /k/, /a/, /t/.

This section is especially active in the brains of beginning readers.

② The Word Analyzer

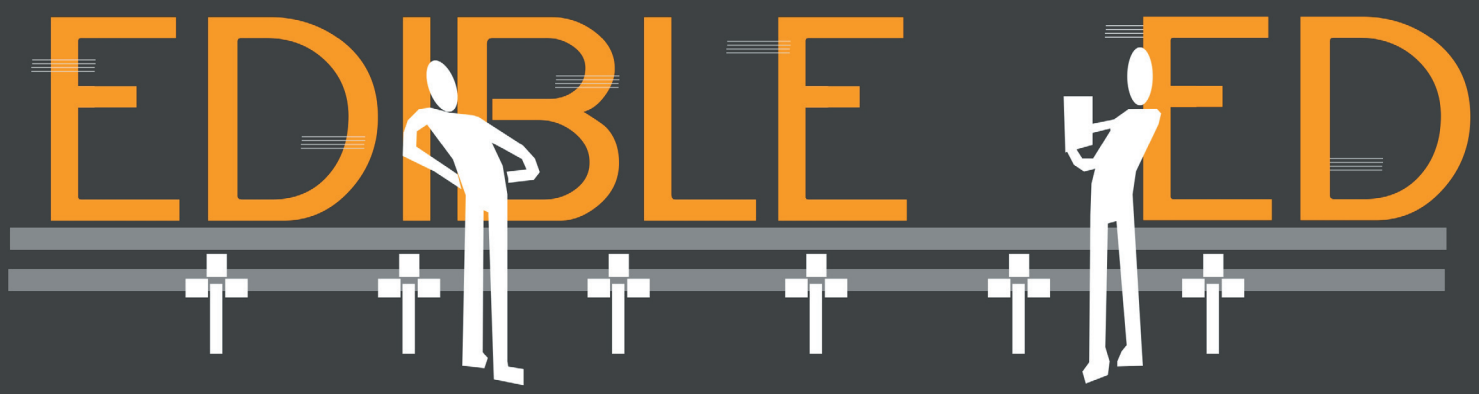
Left parieto-temporal area

This section of the brain does a more complete analysis of written words. Here they are pulled apart into their constituent syllables and phonemes, and letters are linked to the appropriate sounds.

③ The Automatic Detector

Left occipito-temporal area

The job of this part of the brain is to automate the process of recognizing words.The more the automatic detector is activated,the better it functions. Skilled readers can breeze through print with assembly-line-like speed.



④ WHAT GOES WRONG

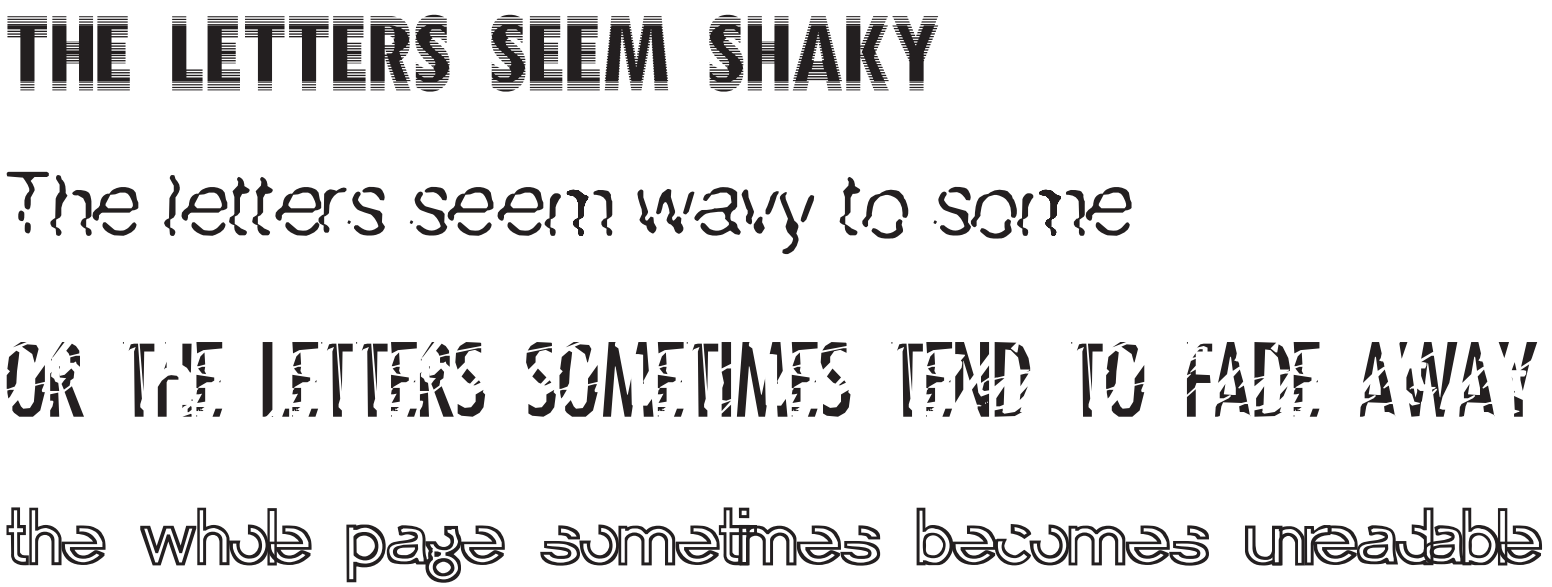
The high-speed assembly line breaks down in children with dyslexia. A neurological glitch prevents their brain from easily gaining access to both the word analyzer and the automatic detector.

Dyslexics appear to compensate by learning more heavily on the phoneme producer as well as by recruiting areas from the right side of the brain that process visual clues from, for example, accompanying pictures.

Dyslexia is **not** a vision problem.
The eyes do see words correctly,
but the brain apparently has difficulty
processing the visual information.

Dyslexia is diagnosed following psychological and educational tests that determine language and other academic abilities, IQ and problem solving skills, and is only diagnosed if the reading disability is not a result of another condition.

The following image shows how a normally written sentence may appear to a dyslexic :



Identifying Dyslexia in School kids

The Schwab Foundation publication "Bridges to Reading" lists the following symptoms that suggest a child may have a dyslexia-related reading problem.

Preschool Years

- Begins to speak later than most children.
- Has difficulty following a story or directions.
- Pronounces words incorrectly or chooses the wrong word.
- Has difficulty rhyming.

Class KG to 4

- Learns the alphabet later than classmates.
- Learns letter-sound relationships only with explicit instruction.
- Confuses basic sight words, such as run, eat, want.
- Makes consistent reading and spelling errors, including reversals (b/d), inversions (m/w) transpositions (left/felt), and substitutions (house/home).
- Transposes number sequences and confuses arithmetic signs.

Identifying Dyslexia in School kids

Class 5 to 8

- Continues to transpose letter sequences (reads “sacred” as “scared”).
- Reads below class level in stories and textbooks.
- Requires specific instruction to learn prefixes, suffixes, root words or other decoding/spelling strategies.
- Avoids reading aloud.
- Avoids writing compositions.

High School and Beyond

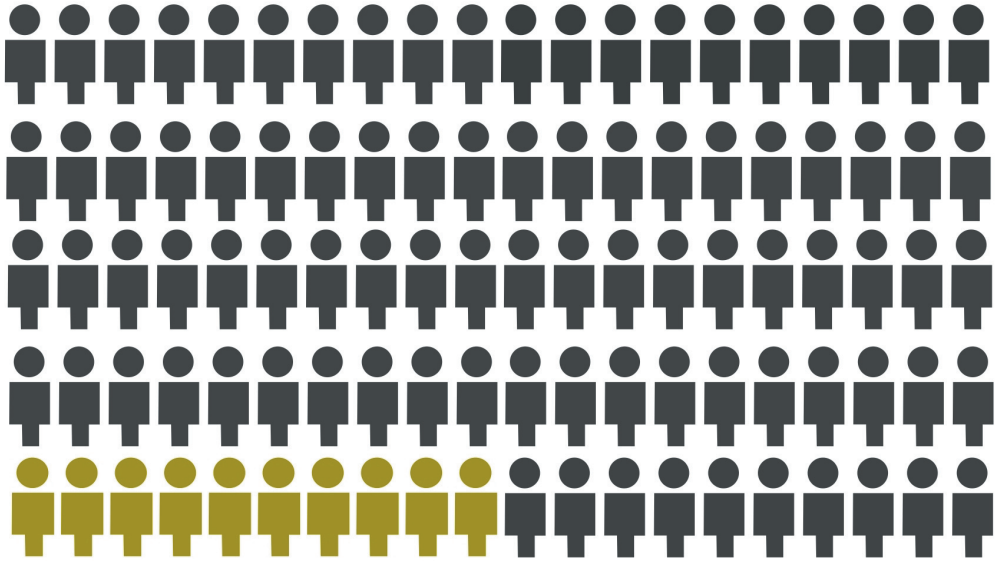
- Avoids reading books independently.
- Continues to spell incorrectly.
- Avoids writing whenever possible.
- Finds unique ways to cope with reading and writing tasks.

Dyslexia in India

Statistics in India show that about 10 per cent of the children in a regular classroom are dyslexic.

Is it not alarming that in a school of 4,000 children, at least 100 could be dyslexic ?

10 % of children in a classroom are dyslexic



Dyslexia in India

An estimated 30 million children are known to be dyslexic in India.

30,000,000

Dyslexia is an invisible handicap.

One cannot tell a dyslexic from a good reader by sight, and many are too embarrassed to admit to their problem because people still equate being unable to read, spell, and write with mental retardation.

Awareness in India

The LD movement in India is of a much more recent origin and is today comparable with that of the western LD movement nearly half a century ago.The apparently lower incidence of these types of difficulties resulted in a relative lack of concern about LD in Asian countries like India and China.

Reports of lower incidences of LD in the eastern world were attributed by western scholars to the general lack of awareness and sensitivity among educationists to the specific difficulties faced by children learning to read in overcrowded classrooms.

During the last decade or two, however, there has been an increasing awareness and identification of children with LD in India. Despite this growing interest we still have no clear idea about the incidence and prevalence of LD in India.Studies of LD have difficulties ranging from the very definition of LD, identification, assessment, to socio-cultural factors unique to India.

The multilingual social context in India, where children often have to learn to study through the medium of a language not their own, is an added complexity.The language issue is further compounded by factors such as age of enrolment in school, preschool exposure to literacy and literacy support at home during the school years.

Consequently, defining "adequate instruction" and "social opportunity" for children varying in backgrounds - from an urban Indian child enrolled in preschool at age $2^{1/2}$ years with early and sustained support from upwardly mobile, middle class parents, to a rural child attending school for the first time at age $6^{1/2}$ years with no additional literacy support of any kind - is a tremendous challenge.

From the writing of Pratibha Karanth from Nalanda Institute.

The gift of Dyslexia

Dyslexic are very gifted people. They aren't poor learners but people who are a very different perspective of comprehending and processing information.

Often, a person with dyslexia will also have special abilities and talents associated with superior visual-spatial skills. These abilities, contrasted with deficits in basic skills, make dyslexia very confusing.

There are many famous persons who, in spite (or because) of their dyslexia, contributed greatly to society.

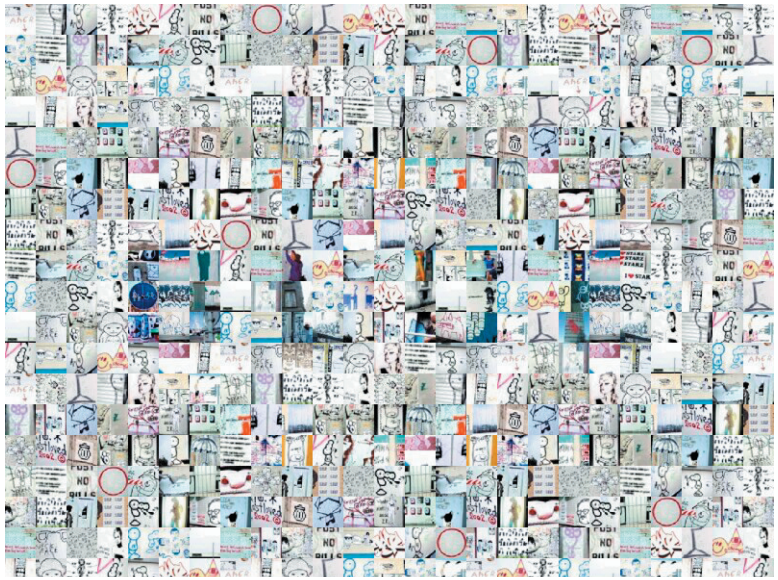
Albert Einstein, Thomas Edison,Alexander Graham Bell ,Bill Gates ,Jules Verne, Agatha Christie,Pablo Picasso, Vincent Van Gogh, Leonardo Da Vinci Sir Isaac Newton,Henry Ford are just a few of the famous dyslexics.

Over 50% of NASA employees are dyslexic.They are deliberately sought after because they have superb problem-solving skills and excellent 3D and spatial awareness.

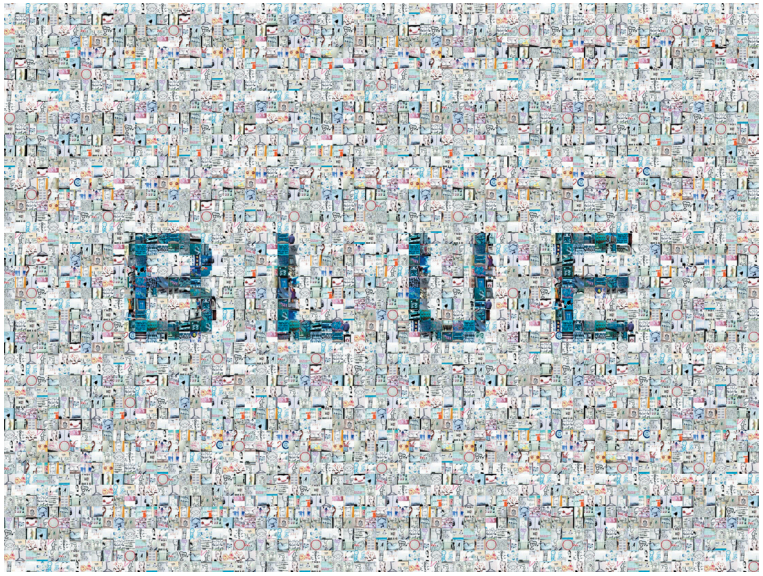
Dyslexics aren't slow learners. They simply learn differently.Their I.Q. usually ranges from the average to the gifted range. This brain difference often results in significant strengths in the areas controlled by the right side of the brain, such as visual-spatial skills, problem solving skills, creative skills and mechanical abilities.

Whereas the average person summons around 150 images per second, the dyslexic can muster from 1500 to 4000 images per second.

Therefore, faced with a veritable onslaught of visual imagery, selecting the right word to keep up with the flow of images can be extremely challenging for the dyslexic.



Normal person's visualization of a concept "Blue" for example.



A Dyslexic's visualization of the concept "Blue"

3
Research Methodology

Research Methodology

One of my prime objectives of taking this self- proposed project was to be able to try out research techniques which would otherwise not have been possible in a regular industry-sponsored due to lack of time/feasibility or opportunity.

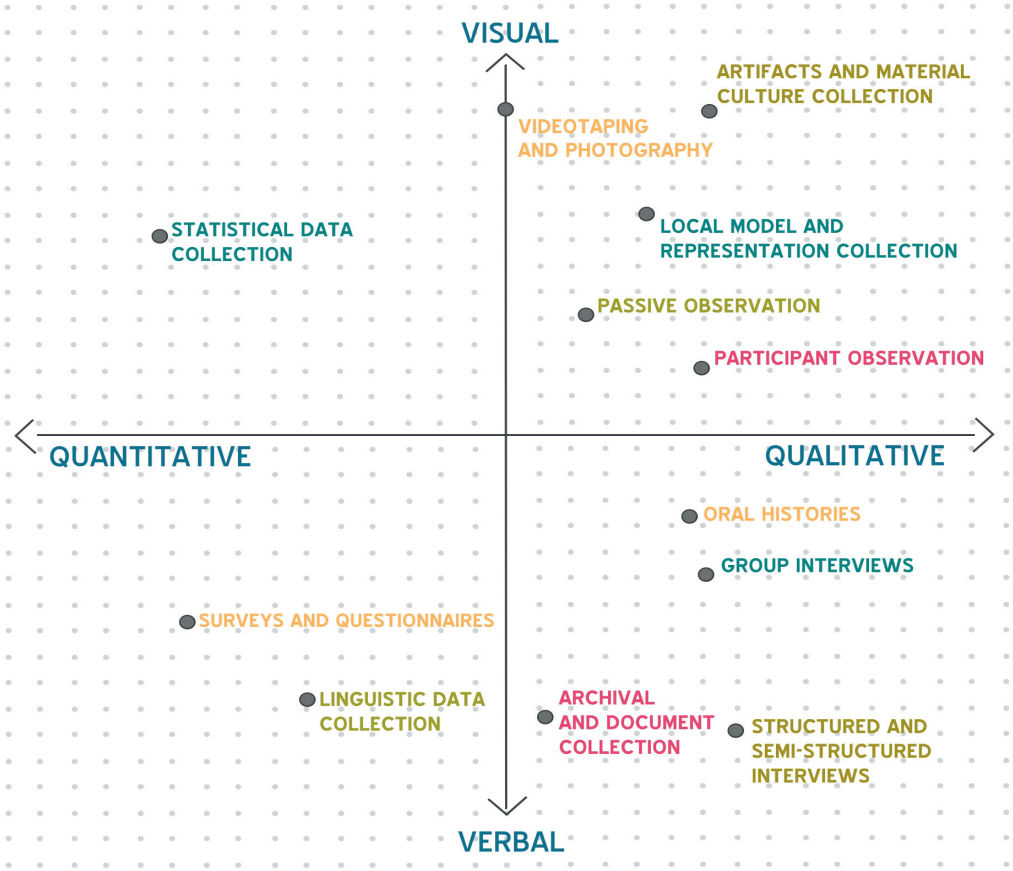
While working on this project I went through a lot of new research techniques and the old tried & tested ones.

The source of these techniques are from acclaimed design research books, projects, case studies research methodology of design firms and Interaction design websites and blogs of acclaimed designers.

The majority of my research tools used in the project are included in the diagram which I have rendered from the book “Design Research”, Brenda Laurel (MIT Press).
I have tried to use as many techniques, which were applicable and which time & opportunity allowed me to apply.

In the next few pages I have given a brief description of the various tools I have used and then in the “User Study” section, I have detailed out the outcomings and the conclusions of the studies.

Research Tools



Adapted from"Design Research", Brenda Laurel (MIT Press)

Statistical Data Collection

Dyslexia is a condition which is still hardly known in India, and, is therefore rarely identified in adults and children likewise.Therefore, it was quite difficult to find or collect latest data on the number and particular disorder occurrence.

But, I was fortunate since Prerna foundation, Ahmedabad, an organisation working on Dyslexia conducted a Ahmedabad city based identification program on Dyslexia.
Parents from all schools were invited and offered a chance to have their children undergo eye tests, IQ and LD tests to identify indications of various learning disorders in their children.

150 children participated and it was figured out that almost 10% kids have Dyslexia and similar learning disorders.

Being special

A city-based study to find out factors that affect students' academic performance revealed startling results. *AT* takes a look at the implications of the findings

NANDINI SHAH
Times News Network

If your child is having a hard time understanding fractions or just concentrating on one activity, don't write him off as a failure just yet. For, a recent survey conducted on schools of Ahmedabad revealed that there are various factors apart from IQ that affect children's academic performance. The study conducted at Mount Carmel School, saw 150 students taking part.

Commenting that the percentage of children with Attention Deficit and Hyperactivity Disorder (ADHD) and depression was alarmingly high, special educator **Nutan Kasliwal** says, "Identifying such problems is extremely important for schools to give students the right kind of academic environment and medical help. Even intelligent students need to be given a platform where their growth can be maximised."

However, child psychiatrist **Param Shukla**, one of the survey experts, puts the findings in different perspective. "The elevated results could be a result of the survey being about academic difficulties; so, parents attending were likely to be those facing problems with their child. However, it's also true that many parents probably did not participate due to the stigma associated with going to a psychiatrist," he says.

Digging deeper into the possible reasons for such high levels of depression and ADHD in school-going students, Shukla elaborates, "A lot has to do with pressure — high expectations of parents and competition amongst students. Parents should choose a school that provides the correct learning atmosphere according to their child's abilities rather than according to social and financial status."

THE SURVEY

- 150 students from the age group of five to 18 participated in the survey from different schools
- Students underwent IQ, vision, hearing, ADHD, depression and learning difficulty-related tests

THE FINDINGS

Learning disability	10%
Attention deficit and hyperactivity disorder	58%
Depression	39%
Hearing problems	10%
Vision problems	35%
Superiorly intelligent	12%

KID ZONE

It's important to know early on if your child is 'special'

Moreover, he advises parents to have their children take an IQ test soon after the age of six so that they can recognise problems, if any, at an early stage and adjust expectations accordingly.

And, if parents need to change, so do schools. As educator **Manjula Shroff** observes, parents and teachers need to put greater emphasis on psychological intervention. "They need to be sensitised to the various reasons for students' under-performance. Instead of putting pressure or telling them to work harder, they need to try and get to the root cause of under-performance," she says.

Ask teacher trainer **Harish Iyer**, whether any changes are necessary in classroom teaching methods, and he says, "Teachers need to be aware that a class may contain students with various learning barriers and accordingly make their teaching methods more inclusive." And, perhaps, we need more such surveys as well?

nandini.shah@timesgroup.com

Article specifying the fact that 10% of Children in Ahmedabad were identified with Learning disabilities.

This article appeared in "Ahmedabad Times" section of "The Times of India" on April 21,2006.

Surveys and Questionnaires

I had read that majority of creative people are Dyslexics. Many designers are said to be Dyslexics.
In the west, it is said that a majority of students in Design Institutes are Dyslexics.

Therefore in order to find out if we have an equal amount or at least a few Dyslexics in NID,
I group e-mailed everyone in NID describing and giving symptoms of learning disabilities.
The response was overwhelming, not only from the existing students, but from faculty and alumi as well.

I have detailed out the observations in the user study section.I also took out questionnair from time to time for Dyslexic school kids in Ahmedabad and Surat.I asked basic questions about learning at school and then specific questions pertaining to my final concept.

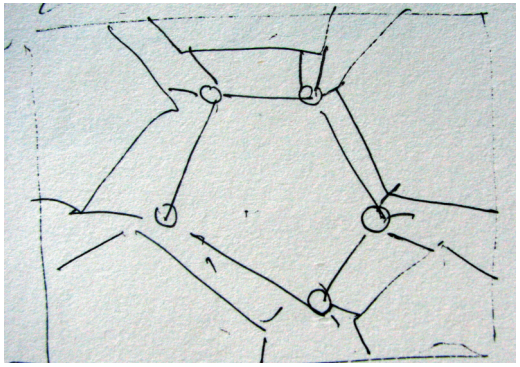
Although I must say taking surveys and questionnaire consisting of generic queries are difficult in case of LD, since each individual's condition are very unique from the others.

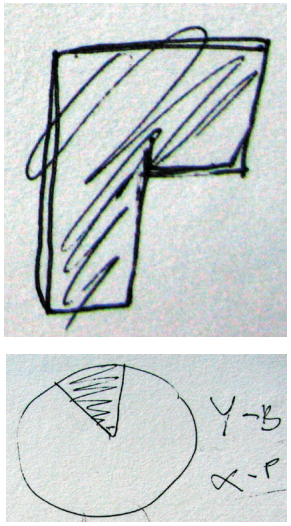
Hence, I had to alter questions depending on the individual taking the survey.

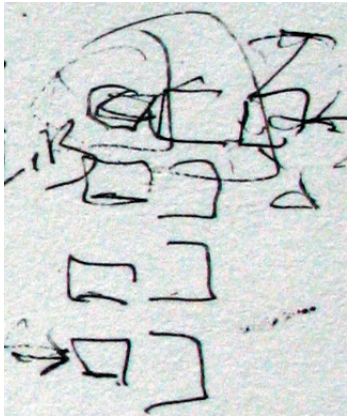
Artifacts and Material Culture Tools

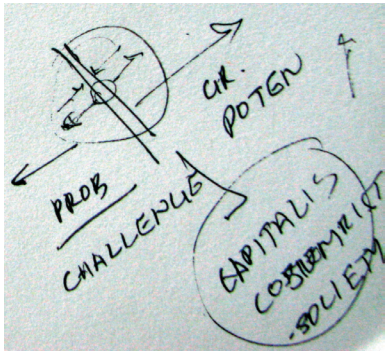
The most remarkable and interesting aspect found in Dyslexic is their unique way of writing words and representing their ideas and thoughts.Since Dyslexic have difficulty comprehending words and reproducing them hence they device their own unique way of reading them.

While observing Dyslexic kids in classroom as well as going through notes of adult Dyslexics, I found the common switching of m/n, b/d as well as mis-spelt words and omitted characters. What I found unique was the way in which they remembered things, which was mostly visual, consisting of geometric patterns to remember numbers, specific colors which mapped them to objects and hence forth.





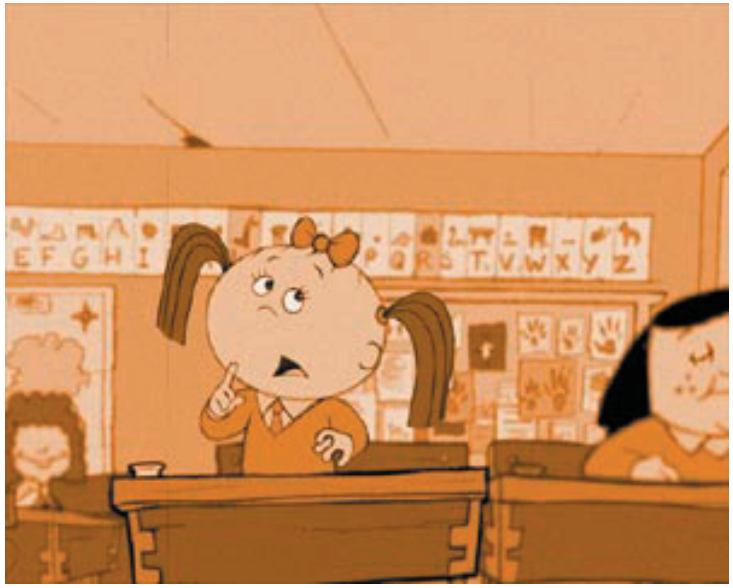




Doodlings and diagrams by Adult Dyslexics to express their thoughts.

Passive Observations

Back to School



Passive observations of users is very useful as, through the observations, you can identify and detect details and traits which sometimes the user themselves are not aware of.

I had the wonderful opportunity of attending a classroom section in DPS, Ahmedabad as a student. The project co-ordinator of DPS, Nutan Kasliwal allowed me to sit and attend a grammar class along with all the Dyslexic students.

Although excited at first , going back to School began to feel very odd when the students, who were in the age group 6 - 12 years started giving me confused and amused looks.

One of the student could’nt hold her curosity and asked me, for how many years I have been studying in School.

But in all it was a very enlighting experience since I came to know of the teaching styles and patience with which the teachers taught the students.

Structured and Semi-Structured Interviews

Group Interviews are insightful as through them we can infer lots of things which comes up through discussions and sometimes arguments which come with the participants.

I had the opportunity of having group discussion with the teachers and co-ordinators at DPS.

It was through the discussions that I came to exactly understand what Dyslexia is and what Dyslexic is NOT. I also conducted informal talks with Dyslexic students in NID where they discussed their troubles learning and coping at school.

I also had a discussion with a Dyslexic teenager and his parents to collectively understand their struggles.

All the observations and inferences have been used to build up the User Profiling and User Study Section.

4

User Study

Web research

SchwabLearning.org
A Parent's Guide to Helping Kids with Learning Difficulties

LD OnLine.org is the world's leading web site on learning disabilities and ADHD, serving more than 220,000 parents, teachers, and other professionals each month.

LD OnLine seeks to help children and adults reach their full potential by providing accurate and up-to-date information and advice about learning disabilities and ADHD.

The site features hundreds of helpful articles, monthly columns by noted experts, first person essays, children's writing and artwork, a comprehensive resource guide, a set of very active bulletin boards, and a Yellow Pages referral directory of professionals, schools, and products.

SchwabLearning.org is a "parent's guide to helping kids with learning difficulties" that emphasizes useful information and practical strategies."

Schwab Learning is a nonprofit program of the Charles and Helen Schwab Foundation, a private foundation.Its mission is to provide information and inspiration for families whose children struggle with learning and attention problems.

Schwab Learning's goal is to help given accurate information and support, throught which parents and kids can bring about positive and dramatic changes in their lives.

LD online
The world's leading website on learning disabilities and ADHD

Quoted from the respective Web Site

Organizational visits

DELHI PUBLIC SCHOOL - PRERNA

DPS-Prerna in Ahmedabad is a co-educational English medium program following the CBSE system.

DPS-Prerna offers an independent study program for students with Learning Difficulties.
These are children who perform poorly in academics despite having an I.Q. that is Average or above Average. The institute runs classes from III-XII. It is ideally suited to students with LD who wish to complete their 10th Std utilizing a flexible pace and/or alternative method of instructional delivery.

IEP (Individualized educational program) of courses, activities and learning packages ,allow students to work at their own pace.Students are taught through their preferred learning styles and modalities.

Learning is enhanced through field trips and hands-on activities.Alternative Assessment procedures are used to help motivate students to succeed and develop self-esteem.

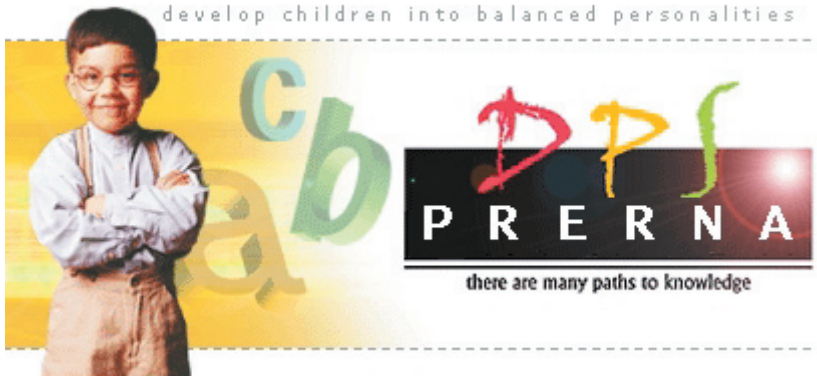
Students do independent/small group work, which, in addition to learning the required information, develops self-motivation, strong work ethics and individual responsibility.

Co-curricular activities are a part of DPS-Prerna where the children will get involved in different activities like Arts & crafts, cooking, drama, yoga, skating etc., along with DPS children of the respective class.

• **Assessment clinic :**

As a project of Prerna, they have set up a Centre for Assessment and Counselling for children and parents of Ahmedabad.

It will help in assessing the I.Q of children and assist children and parents in giving guidance about academic, social and overall development of the child.The centre,a centrally located campus in the city will cater to all the denizens of Ahmedabad.



• **National Dyslexic Forum :**

To promote nationwide awareness of Dyslexia, DPS are planning to set up a National Dyslexia Forum. The activities of the forum will be directed towards educating the community at large about Dyslexia and how children affected with dyslexia can be aided. To this end, they are planning to join hands with interested people all around India.

Organizational visits

EDUCARE, NEW DELHI

Sunita Sodhi's runs Educare, a school for dyslexic children. And she has been actively involved helping dyslexia-affected children for over 10 years now. Formal training followed, with five years at the Learning Centre Programme for children with learning disabilities in the American School.

On her early days, she says: "I started with a small group of parents, talking to schools, doing workshops and had to put up with a lot of resistance. My only motivation was that I was trained and people knew little about this disorder. I believe one should share knowledge, not just acquire it."

True, for many school teachers fail to recognise dyslexic children, which in turn puts pressure on the child and many simply drop out.Post-training, she set up the first learning centre in St Columba's School in New Delhi, and also an informal school from her home in Hauz Khas, New Delhi.Now, the school has over 80 children who work in groups of six to a teacher.

The level of hard work it takes with these children has meant that the school sees a 30 per cent burnout rate amongst the teachers.And the reason is easy to discern. While dyslexia does mean a difficulty in oral and writing abilities and sequencing problems which lead to low achievement in comparison to peers, dyslexic children also suffer from secondary trauma. Often, due to inept handling, the secondary problem gets aggravated, causing severe adjustment problems. Hence the high turnover of teachers.

The school offers the facility for diagnosis and remediation.The school's sustenance is based on a three-tier fee structure: well-to-do parents pay the full fee ,the not-so-well-off pay half of that and the poor study for free.

Seminars

A seminar was organized at Mount Carmel school, Ahmedabad by Prerna Organization to generate awareness among parents regarding Dyslexia and other Learning Disabilities.

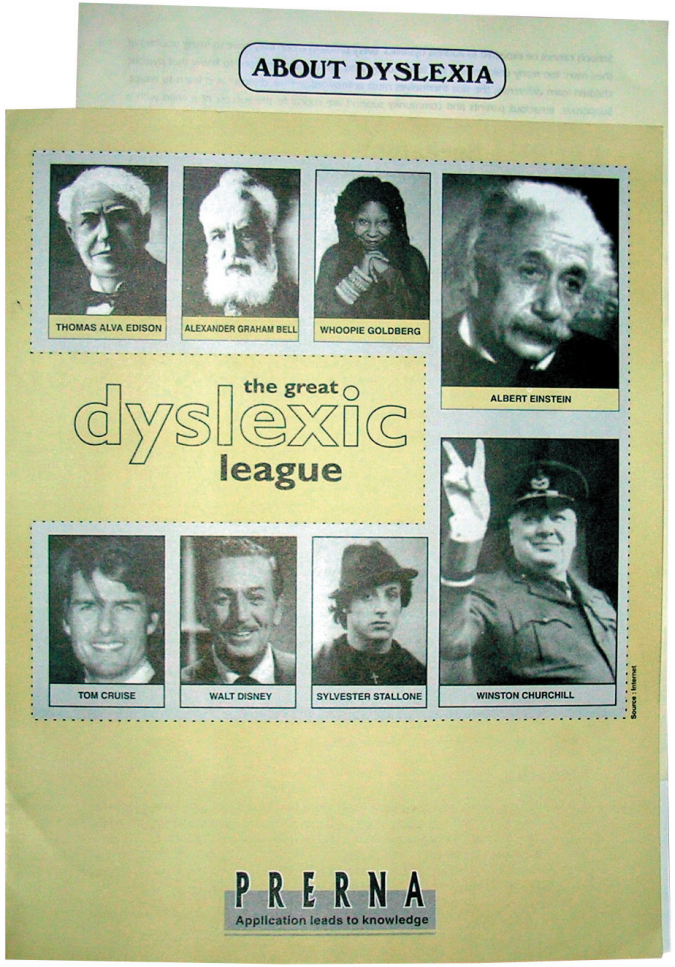
The seminar was free and open to parents of students studying in all the schools in Ahmedabad.

The seminar consists of presentations by Psychologists,Educators and people working in the area of Learning disorders.

A large number of parents turned up to attend the seminar proving that with an effective campaign and publicity the awareness of Dyslexia can be created.

The seminar ended with most of the parents signing up their children for IQ tests and LD tests to identify if they are Dyslexic.

Artifact from Seminar attended at Mount Carmel school,Ahmedabad



Persona’s

Persona’s is a tool used to synthesize the researched data into a form that can be used for product development. Persona’s are means to identify user needs which can then be used to develop, validate, prioritize new or proposed features and functions .

Personas-Dyslexic Adults

Name : Vikas Kulkarni

Age : 24 years

Profession : Graphic Designer

Background :

Vikas was born and did his schooling in KolKata.His teacher failed to understand that he was dyslexic and hence all his school life he was termed as a "slow learner", "lazy" and "underperformer".
With a lot of hard work and his parent's help ,he managed to pass off school with average grades.

After school,he got admission into a design school for studying Graphic design.It was there that one of his professors identified him as a Dyslexic .

Insights :

Vikas did not know anything about Dyslexia until his professor identified him as a dyslexic.After knowing about this he researched about dyslexia and was then able to get answers to a lot of his questions.

Vikas says,
" I had always considered myself as an under performer, the dumb ones in the class.
My failure at reading from books at a normal pace,coping down notes from the blackboard or the failure to acquire good marks always plagued me.

The very fact that I was always disappointing my parents pained me most."

Personas-Dyslexic Adults

"It was only after coming to the design school,where writing the correct words or reading precisely was the only goals ,but getting your ideas through was the ultimate goal."

"Moreover dealing with more visuals was fun.I was good at it and it boasted my confidence. Now I was respected and no longer the "slow,dumb,lazy ones of the class".

"But most of all the respect I have for myself has boosted."

Difficult experiences :

Poor short-term memory.He has confusion while reading menu in a restaurant
and especially when giving orders for many people as he has to remember the names of many dishes.

Difficulty reading books especially ones with small,compact lettering.

Difficulty in expressing himself verbally .

Concerns :

The awareness of Dyslexia at all levels.

The freedom of choosing his/her own mode of expression.

Personas-Dyslexic Adults

Name : Kaushal Sinha

Age : 25 years

Profession : Event organizer

Background :

Kaushal was a slow learner in his class.Whenever the chance for reading aloud in the class would come,Kaushal would freeze and fumble over simple words like ‘an’ or ‘the’.

He would always question things and would want to know why he was asked to do a particular assignment.The school, unable to identify Kaushal ‘s dyslexic characteristics, asked his parents to make him repeat the same class twice.

Thankfully Kaushal’s parents were confident that he did not need to repeat the whole academic year again.So they put him in another school.This time the teachers in the new school identified Kaushal’s special abilities and hence he was eventually given the right guidance to overcome his hurdles.

Inspired by his improved performance,Kaushal’s parents and teachers moved a petition to court requesting them to allow Dyslexics extra time in Board exam.

They were eventually successful in their mission and the State government awarded 15 mins extra time for Dyslexics and other considerations.

Difficult experiences :

Kaushal did his Bachelors in Architecture and was working as an architect for a year.
Eventually he got interested in Exhibition design and Event organization.
Now he runs his own Event Management company.

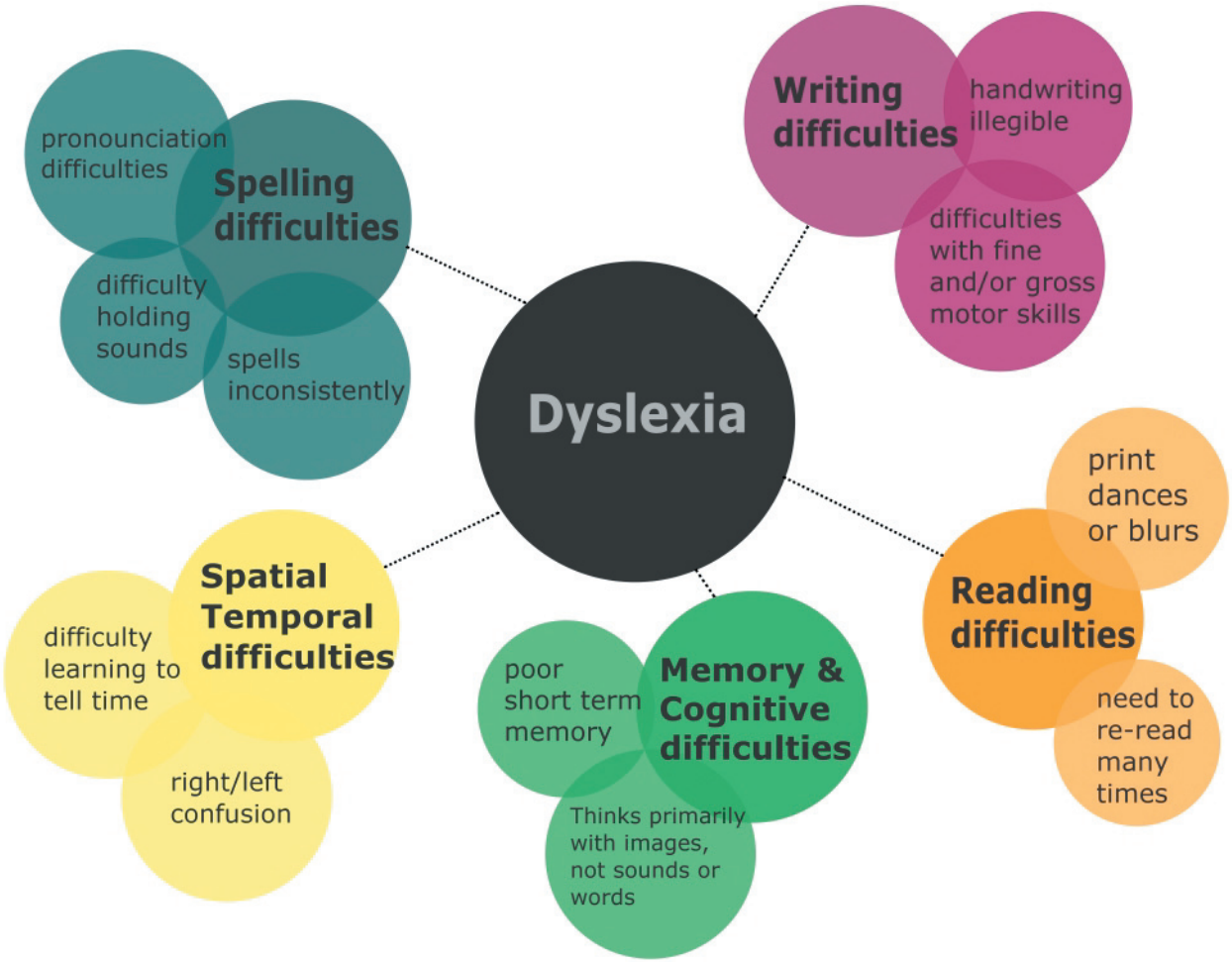
Kaushal says," Being a dyslexic brings its advantages like high visualization abilities but on the other hand I have a poor short term memory and hence have to depend on my PDA for jotting down important meeting timings.

Concerns :

He thinks that spreading of awareness about Dyslexia in India especially at schools should be carried out effectively.

Electronic aids should be developed to help dyslexics in their day to day tasks.

Mapping Dyslexia



5
Initial Concepts

Existing AT products

The term assistive technology usually applies to computer hardware and software, as well as other electronic devices. AT tools that support kids with learning disabilities include:

- Abbreviation expanders
- Alternative keyboards
- Audio books and publications
- Electronic math work sheets
- Free-form database software
- Graphic organizers and outlining
- Information/data managers
- Optical character recognition
- Personal FM Listening Systems
- Portable word processors
- Proofreading programs
- Speech recognition programs
- Speech synthesizers/Screen Readers
- Talking Calculators
- Talking spell-checkers and electronic dictionaries
- Variable speed tape recorders
- Word prediction programs

Existing AT products

Kurzweil 3000™

A few of the Assistive technology products available in market.

Existing AT products

- Most of the digital products for people are in the category of computer softwares.
- There are almost no significant digital devices made especially for people with learning disorders.
- There are a number of skills testing software as well as phonics based reading aids developed for people with learning disabilities.
- There are a number of screen reading (text to speech software) and voice recognition (speech to text software) programs.
- There are also packages for both diagnostic and remedial purposes, all of which require the skills of a person trained in their use.
- Although some of these software are effective but there are very few that have utilized the full potential of using effective visualization.

Based on age requirements and specification,
I have categorized my concepts into two sections -

Concepts for Adult Dyslexics and

Concepts for Children with Dyslexia

Mobile Enhancement and solutions

Handheld mobile devices, including personal digital assistants (PDAs) and cell phones, have become increasingly prevalent.

It is something that is always with the person, while at his job,or while he is travelling or shopping. Hence this device gives a lot of opportunity to alter and be made more functional to the dyslexics.

Therefore I came up with few features to make the mobile devices more usable and assistive to the dyslexics.

Features

Each Dyslexic is unique in himself/herself.Each one of them have their own shortcomings.

While traditional telephones and desktop computers can many times be shared among different users, a mobile device is usually carried and used by only one person. Therefore the device should provide lots of Dyslexia specific features in the mobile applications so that he/she may personalize the device and its applications to his or her preferences.

Dyslexics are visual people, often good with 3D and visual and spatial comprehension.

Provide as much as information as possible using visual aids,i.e large,clear icons for representing text information.Give the user the option of associating as much as text information to pictorial icons.
Color and graphic-rich content navigation are prefered over text based navigation.

Dyslexics have very poor short term memory.

Given the limitations of a Dyslexic's short-term memory, interfaces should be designed such that very little memorization is required during the performance of tasks.There should not be too many levels to navigate into.They also should not be required to remember any variables for inputting in the deeper levels.

Dyslexics have trouble with fine/gross motor skills.

Few of the dyslexics have trouble with fine/gross motor skills.They have trouble handling keys on keypads.Therefore they could be provided with larger keys or if possible customisable allocation of the keys by the specific user.
Moreover if made cost-effective,touch screen with stylus pen would be the prefered mode for interacting with the interface as it would be minimize the error rate.

Features

Dyslexics have trouble with spellings.

Dyslexics have trouble with spellings.Although they know the spelling,they tend to mis-spell words while typing them.Therefore word selection feature where ever possible should be provided instead of requiring text input.Effective T9 algorithm or similar predictive text features should be incorporated.

Dyslexics prefer interaction in auditory medium.

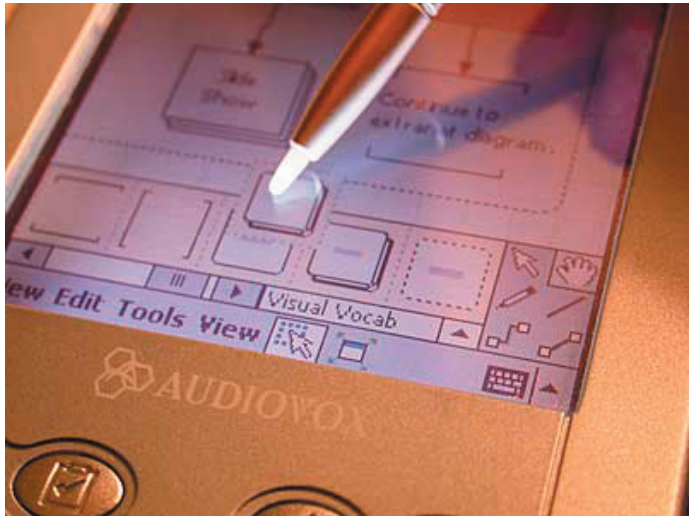
Dyslexics have trouble reading text as well as inputting text .When possible,it might work better to use sound or tactile output to present information instead of visual displays.Although it might not always be possible to give input in auditory format.For example, in the presence of strangers, users may feel uncomfortable speaking input aloud,and certain places (e.g.libraries) might restrict the use of voice input.

Using built-in camera for added features.

Dyslexics have trouble with reading text on hoardings and menus.Using the mobile's built-in camera the images can be captured and OCR can be applied to the text portion to help convert text into audio which can be read out to the user.

Another application for the Dyslexics could be the use of camera to capture images of things which they need to remember.For example there could be a built-in application on the mobile which would organize the captured images into categories and tags for easy retrieval.

Implementation



With the mobile device being more and more common in India it can well be feasible to develop mobiles with assistive technology features.

These features can not only be used by people suffering from Dyslexia, but also by people suffering from specific ailments like poor memory and vision disorders.

Moreover elderly people too have similar problems and hence features like customization of interface fonts and background color would be very helpful to them.

In the business sense, these features could either be available in a specialized mobile specifically made for Dyslexics. Or these utilities could be available as add-on programs which could be bought from the respective mobile company and installed on the device.

Conceptual Products for Dyslexic Kids

- Dyslexic learners are holistic, 3D thinkers.
- They need to have the whole picture to see how the parts fit in.
- They always need to know have an overview of the task's aim before they start something.
- They are comfortable with multi-sensory teaching methods.
- They're often good with 3D and visual and spatial comprehension.
- It is much better to teach to the visual strengths of a dyslexic.

CONCEPT - 1

Using Simulation to Facilitate Learning

Experiential simulations place the learner in a particular scenario and assign the user a role within that scenario. The user takes on the role and responsibilities in a virtual environment. As a result, the user gains valuable problem solving and decision making skills.

Researchers also studied how emerging technologies affect transfer of learning.
A ground-breaking study in 1991 indicated the great potential of emerging technologies to support the transfer of learning.

In the 1991 study, a computer microworld was used to simulate symbolic,physical phenomena in varying ways. When high school students interacted with this simulated environment for less than an hour, they were able to grasp key principles and their test performance improved.

Experiential learning

The game combines tangible interaction techniques with augmented reality in order to create an intuitive interaction method.The space is transported from the standard screen space into the existing physical surroundings.The project merges and create a seamless interface between digital objects and the physical environment.

To take part in the game, players sit or stand around a table, wearing a head mounted display with a small video camera attached.Through their HMD's they can see the real world in real-time.

On the table lies a game board and the players have one wand.When the players look at the game board they see the virtual game world spatially mapped over reality.

The objectives of the game implemented would be to either -

- use the wand to move around and locate hidden objects for example digging landscapes to unearth an ancient civilization like Harappa,

- use the wand to pin-point locations of places on the map,

- use it to assemble mechanical parts and then watch it animate and work etc.

It basically follows the concept of "Learning by doing", as well as the multisensory experience of holding something and making it work and watch it move with sound,will appeal to a dyslexic kid's prefered way of interacting and learning.

Augmented reality systems

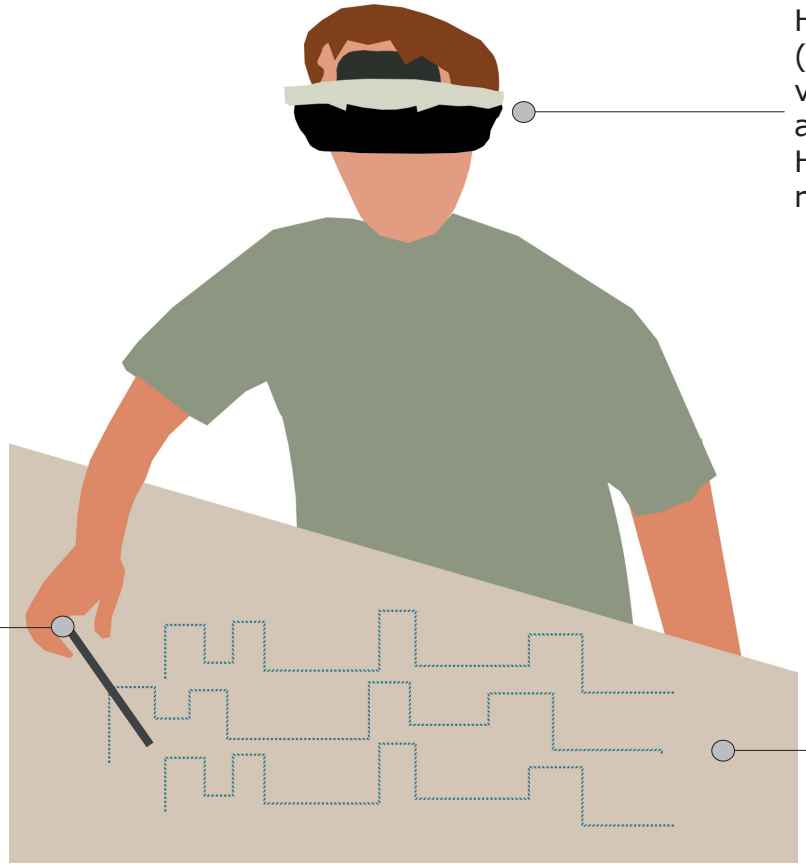
In general, when you want to create an AR experience, there are three main components required for the AR system.

First of all there has to be a scene generator, which produces all of the 3D virtual images and/or sounds that have to be blended with reality.

Secondly there has to be some sort of display device that enables the users to actually see the generated images on top of their normal world view. These virtual images need to be correctly aligned with real objects .

Thirdly, there has to be some sort of tracking and sensing hardware and/or software available, to measure the user's head position and orientation since without accurate registration, the illusion that the virtual objects exist in the real environment is severely compromised.

Conceptual Products for Dyslexic Kids



Head mounted display (HMD) with a small video camera attached.Through their HMD's they can see the real world in real-time.

The 'wand' which could be shaped as any object depending on the context of the game.The wand would help detecting the position of the game variables.

The board of the game would contain physical structures i.e. dunes and then the virtual terrains can be mapped on them

CONCEPT - ❷

An inclusive school is "structured to serve a wide range of students;
the environment is flexible and organized to meet the unique needs of all students.
In an inclusive school, everyone belongs, is accepted, supports and is supported
while having individual educational needs met".

(Barnes & Lehr, 1993,p. 82)

What is Universal Design for Learning ?

The term Universal Design for Learning (UDL) was coined by CAST (Center for Applied Special Technology) in 1999. CAST found that the principles of Universal Design in architecture and product development could be applied to developing useful educational tools.

"Universal" does not mean a single solution that is ideal for everyone.

UDL provides "a blueprint for creating flexible goals, methods, materials, and assessments that accommodate learner differences."

Conceptual Products for Dyslexic Kids

My concept for implementation of Universal Design for Learning basically specifies ways in which technology can be applied at school and how it can facilitate an effective method for gaining true education and knowledge and not merely memorizing and re-producing information.

The concept is basically about re-inventing the classroom to include technological aids where are needed to facilitate and enhance the learning experience for kids with Learning Disabilities.

The main emphasis would be on the medium of receiving and expressing information. Aspects like classroom setup, the nature and behaviour of devices, their setup cost will be looked into.

The materials like text books information and their effective representation and interface will be researched into.

Awareness Blog

As long as people know about Dyslexia,will they thus be able to identify their kids or their students as dyslexic.

Hence I have started a blog on Dyslexic through which I tend to spread awareness about Dyslexic in India.

Through this blog I plan to inform people all that I have researched, the trustworthy websites on the net, medical institutes and educational institutions in India working in this area as well as websites and views of Dyslexics themselves .

Zeroing down on Final Concept

I zeroed down on the concept of Universal Design for Learning based classroom environment. This study,in my opinion is very much required as there will always be lots of kids with different orientation of learning.Sticking to just one method of reading and writing is not logical or even fair.

The concept of Mobile device interface and application was also a very interesting and crucial study topic.But the lack of Adult dyslexics to conduct user studies and analysis dismissed this topic for further research.

The concept of Augmented reality based game is pretty interesting, but the lack of availability of the required technology discouraged the implementation.

6

Final Concept Ideation

Inspiration for the concept

The inspiration for the concept of an effective Universal Design for Learning implementation came to me while interviewing the Adult Dyslexics.
All of them said that their worst experience were at school where they were always labelled slow,dumb and retard.

It was only after joining their jobs and being at places where they had the freedom to express themselves in the format they pleased and actually be able to show their creativity that they gained confidence in themselves.

Many Nidians who are dyslexic stated that after coming to Nid and being exposed to its “Learning by doing” as well as the freedom that is given to complete the given task in any of the multiple mediums,that they really understood they had ability in them to do something.

Therefore I decided to device ways in which to enable Dyslexic kids to learn, as well as express themselves in multiple formats and not lose out on the precious time at school just trying to read and write “correctly”.

Universal Design for Learning

UDL stretches beyond accessibility for the disabled.

A teacher's goal is for students to learn skills and understand the subject.
Traditional curriculum materials tend to offer only limited flexibility for meeting that goal,
often requiring students to adapt to the curriculum.

Universally designed curriculum overcomes limitations by incorporating three principles of flexibility into the design:

- **Multiple methods of presentation**
- **Multiple options for participation**
- **Multiple means of expression**

This built-in flexibility provides into a wider range of options for students to choose
from — **meaning the curriculum adapts to the student, rather than the other way around.**

The concept for the Learning environment revolves around two main areas-

The physical devices to be used in the classroom,and

The software,that is the visualization,the information design and the interaction of the educational content.

I have therefore,made an attempt to ‘re-invent’ the classroom by proposing few technological implementations.

Story Boarding the user experience

Reinventing the classroom

Story Board

" 7'0 clock.It's time for school.

The digital scheduler displays a message reminding Swati that today is her history home work submission day.

Swati had set the scheduler to remind herself about the home work.

Swati is 11 years old and is dyslexic. She has a poor short-term memory but excellent long term memory. She takes her pen drive and heads off to school. "

Story Board

2

" She boards the school bus that comes near her house.

As she gets on the bus,the rfid reader with the bus driver reads her rdif tag on her badge.The rfid tag in her school badge store information about her special abilities, her house address, and contact person in case of emergency.

It will even keep a track of where and when Swati boarded the bus and if she has boarded the right school bus. "

Story Board

" The bus arrives at the school. Swati gets down from the school bus and heads off to her classroom.

She gets to the classroom and sits on any one of the electronic desks.

She inserts her pen drive in the tiny slot in the desk. It reads the drive and the screen displays her entire time table of each subject and the topics to be covered today.

Dyslexics like to have an overview of the tasks they are to handle. "

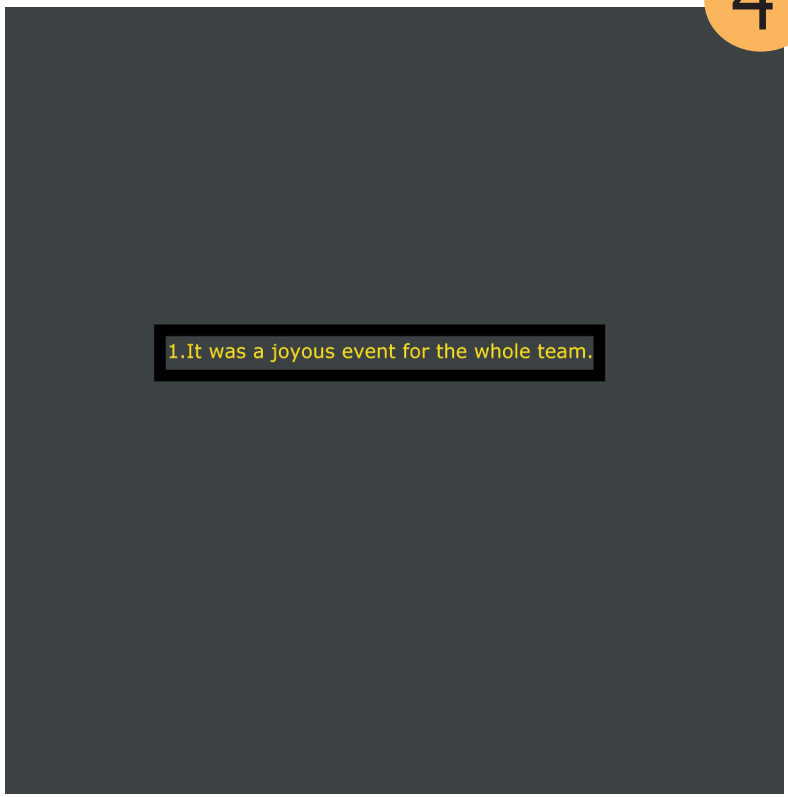
Story Board

4

" The first class is the grammar class. The teacher syncs everyone's desk with the grammar lesson material.

Swati checks out the lessons. The sentences seem a bit wavy and flying off the screen so she switches on her special dyslexia mode which converts the text into special dyslexic readable font type and in the particular readable colour.

Guidelines appear to help her read the lines straight. "



Story Board

5

" The teacher explains the grammar concepts to the students on the class room board .

She writes examples of sentences and changes the form to the correct tense.She then transmit the data from the board to each of the desks.

Swati goes through the sentences and is unable to comprehend a few sentences.She switches on the text to speech converter which reads out each word to her in the speed she desires. "

Story Board

6

"The next period is the mathematics. Karan is Swati's classmate who has Dyscalculia.Dyscalculia is a difficulty in quantitative thinking.He faces difficulty in understanding abstract concepts such as time, addition, after/before numbers, reversal of concepts or subtraction .

There are no logical patterns to his mistakes. A lot of them are in recording or in "seeing" one part of a problem in another. Sometimes he reads 6x(x+3) as 6(x+3) or sometimes he reads 9 as 4 or y as 4 and 3 as 8.

The desk therefore is set in the dyscalculia mode which automatically reverses the digits if Karan switches them over. "

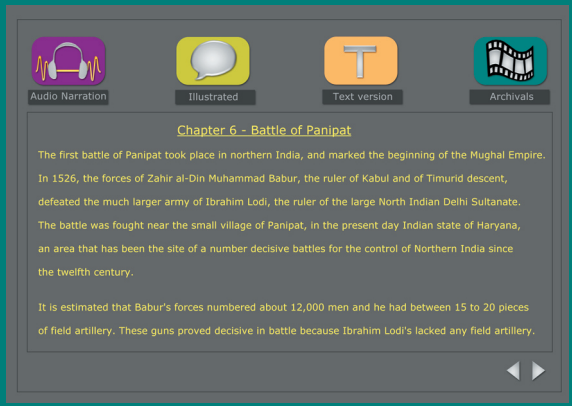
Story Board

7

"The next period is Swati's favourite period. History always interested her. The teacher explains about the battle of Panipat.

It is difficult for Swati to process information while trying to take notes, so she benefits greatly from reading the information that a note taker programs records for her.

She also enjoys reading history along with listening the lesson as an audio narration. Swati benefits from this because in this way she will have messages coming into their brain from two separate modalities - visual and auditory. This best reinforces the information that is being learned."



7
Software,interactions and behaviours

There are three principles of UDL:

- Multiple means of representation - to give learners various ways of acquiring information and knowledge.

- Multiple means of expression - to provide learners alternatives for demonstrating what they know.

- Multiple means of engagement - to tap into learner's interests, offer appropriate challenges, and increase motivation.

I have tried to incorporate these principles into the design of the course content and the devices for its access.

Inclusion and Technology

Technology also enables teachers to present the curriculum in different ways, so that students who have difficulties can participate in the learning process.

Access technology is necessary, but not sufficient for inclusion.

The degree of inclusion depends not only on access but also on the level of the engagement of the student in the learning process.To be fully included, the learner should have access to the appropriate technology and be actively involved in every learning and social activity of the classroom.

The creative and sensitive application of appropriate technology is a critical factor in enabling students with special needs to be included in schools and community.

Inclusive Technology can provide physical support and can facilitate understanding and engagement with knowledge and people. To use technology effectively, we should ensure both access and engagement.

The power and mobility of a multimedia laptop combined with the flexibility and creativity of a paper notebook, the desk is the convergence of traditional writing methods and modern technologies.

Features

- The Desk merges a multimedia laptop with the added functionality of pen-based markup of documents and digitally handwritten notes.The size of a large spiral notebook, students can use a stylus pen to write or draw on the display screen.

- Everything a student needs during a school day is available in the most user-friendly interface. Its method of input allow students a more natural interaction with the computer.

- Users can use the electronic stylus to take notes, write papers, or markup digital documents. Saved onto the main server hard drive, all of these course notes are contained in one digital source for easy access.

- It can also record audio files, such as a class lecture, to review later either on the desk or take it home, as well as allowing users to jump to any point in the recording by clicking the corresponding point in the notes.

- It takes traditional handwritten course notes to a new level with the ability to erase and add space, add multimedia elements to the notes, including audio and video files, add links to web resources, and the ability to digitally search all the handwritten notes for specific terms.

- Digital note pages can stretch on forever, and extra space can even be inserted at any place within the notes, making adding updates or extra information easy.

- The technology also allows students to “snip” information from any source on the screen and insert it into their notes. This is a great way to capture a relevant image, chart, graph or diagram from a web page or digital data from the instructor and insert it into the notes to aid in the comprehension of the subject.

Features

- With built-in wireless connectivity, students can download class notes, documents or slide shows from the Internet onto the desk and then mark them up, just as one would on paper.

- The ability to take a teachers prepared notes or slides and then add their own observations is a tremendous study aid for students.

- Research by Kiewra (1985) reports that students who had instructor-provided notes prior to a class lecture did better on fact-based tests than students who only reviewed their own notes. Having all their class notes and resources in one easily searchable place also makes reviewing for tests much easier and more organized for students.

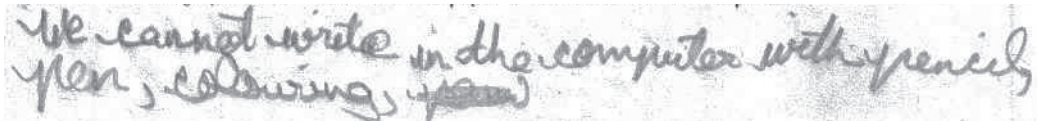
- Using the desk, classes can be organized into folders, with all digital notes and resources for each class stored in its own folder. Digital notes are flexible, and can be reorganized, highlighted and searched at a later date.
  By having all their notes with them, students are able to bring up any fact or detail with a simple search in class or while studying.

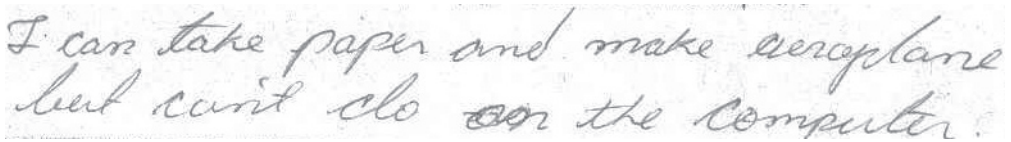
- Notes can also be shared easily with classmates or teachers by simply emailing the files or saving them to a network shared folder.

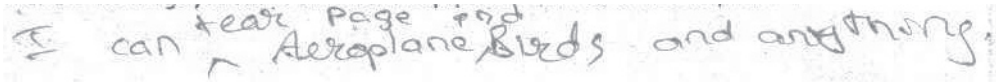
Would you prefer working with a computer or with a pen ?

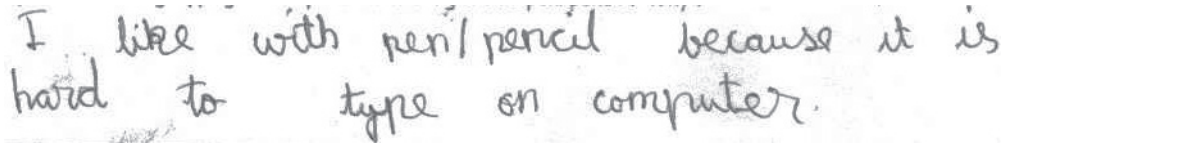
In order to know the preference of the input method,I asked kids to write down their preferences.Through the questionnaire as well as the discussions,I came to know of that for the kids 'working' with a pen/pencil is not just a method of input but it is also the interaction with paper and the freedom of scribbling.

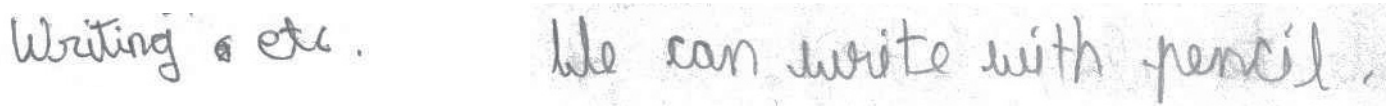
The pen or the PC ?

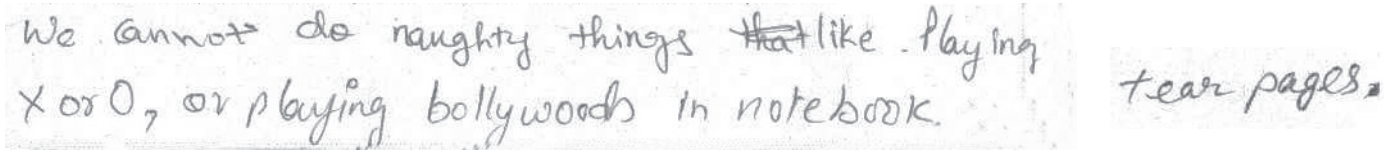












The mighty pen

In my research particularly in the discussion with the Dyslexic kids,the clear preference of the pen over the keyboard emerged.

The pen/pencil being a natural method of input was obviously preferred.

Therefore I incorporated the pen as an additional input device,if not the main one.

Another reason for including this method of input was that I did not want the students to get device dependent i.e. preferring the keyboard/touch screen for inputting.

Using the touch-pen would make using the ordinary pen/pencil a seamless transition.

Existing Touchscreens

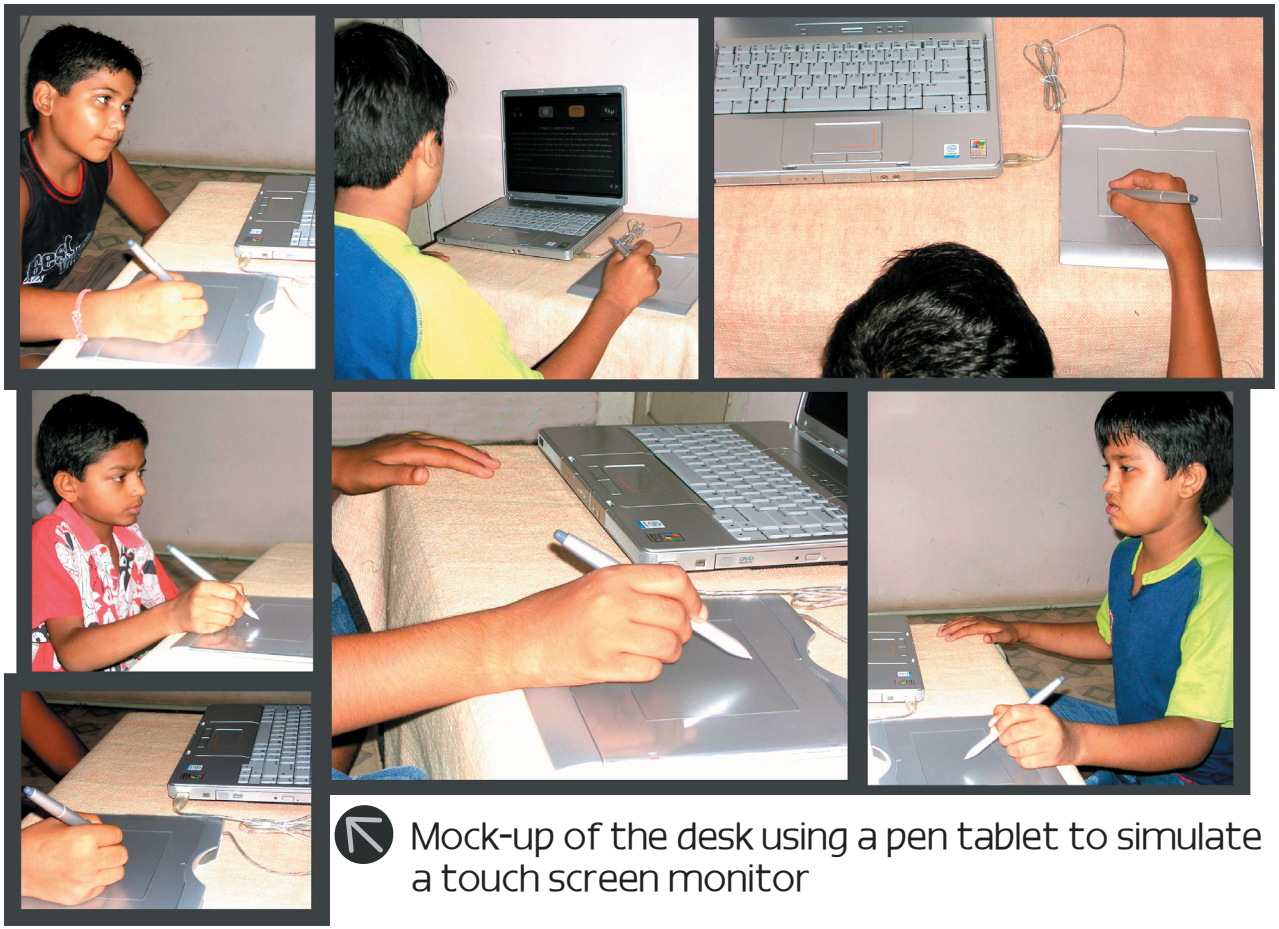
Existing touch screens available.
They are too expensive and used mostly at Design firms for CAD or 3D work.

User testing

I conducted the user-testing of my concept using a mock-up of the touch screen with stylus pen input.

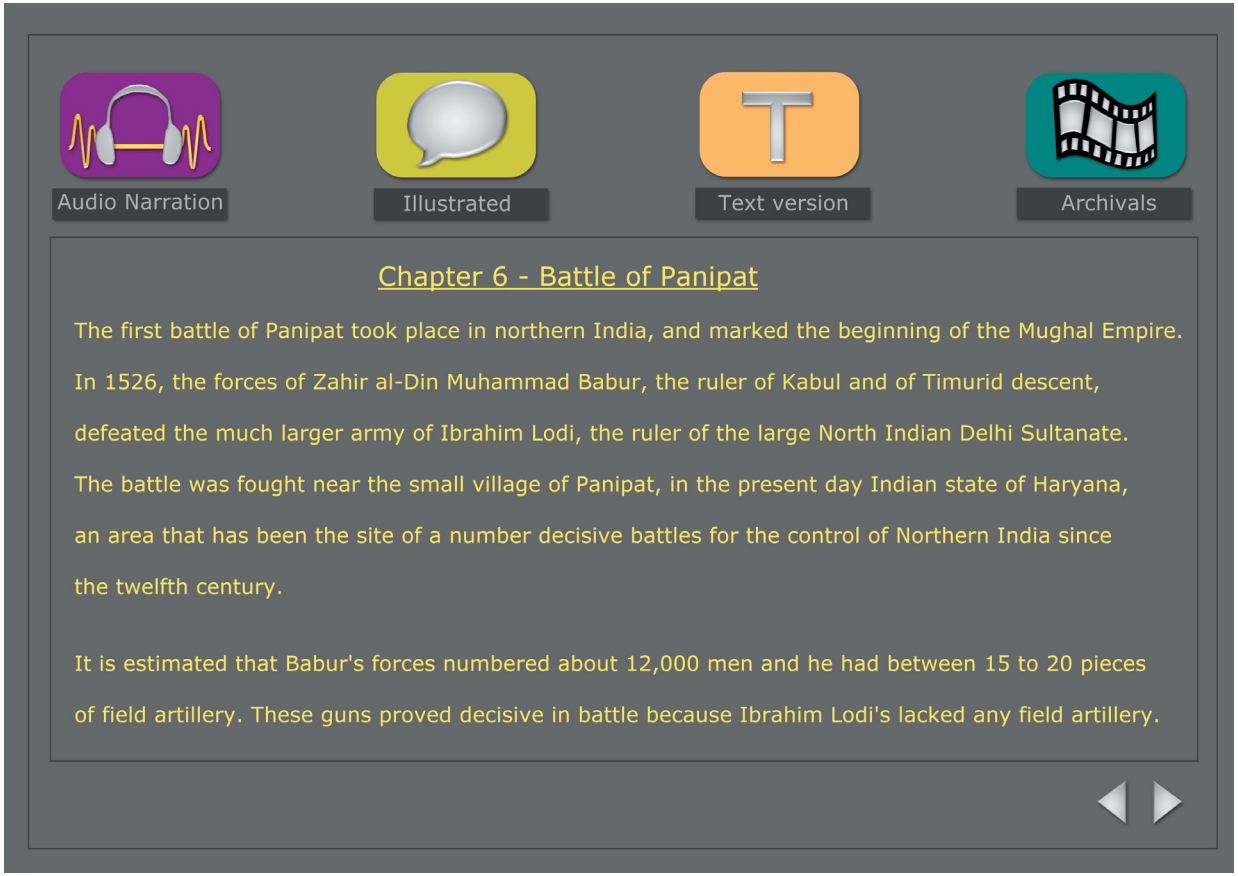
The simulation was achieved using a Wacom pen tablet connected to a laptop which had the educational content running on it.

Mock-up User testing



Mock-up of the desk using a pen tablet to simulate a touch screen monitor

Interface for testing



The application used for user testing.
It was basically a flash application of a chapter of History.

The chapter could be referred in any of the four representations, i.e. Audio,Illustration,Text and Videos

The Pros

If the students have all of Shakespeare's works loaded on their desk, the school doesn't need to go out and buy all of those books,"

And the real benefit is that it's all interactive and searchable.

IBM,for instance is working with their software partner to sell the bundled notebooks and content to schools in the US.

Anticipating a trend, textbook publishers are starting to sell digital versions of their products.

Other companies, such as Apex Learning, are making educational content available to schools over the internet.

A student's set of textbooks costs a lot. If the cost of digital textbooks figure out to be cheaper than the hard copy books then the whole system gets cost-effective.

The Cons

The cost of the technology will block more widespread use. It will be difficult to implement it in the middle sector and the low end school until and unless the technology cost will lower down.

The difficulty of curriculum differences from school to school,from one board to another board.

The desk has to be build very tough since they will get heavy use as well as abuse by the children.

8
Materials, technologies and processes

Existing Desks

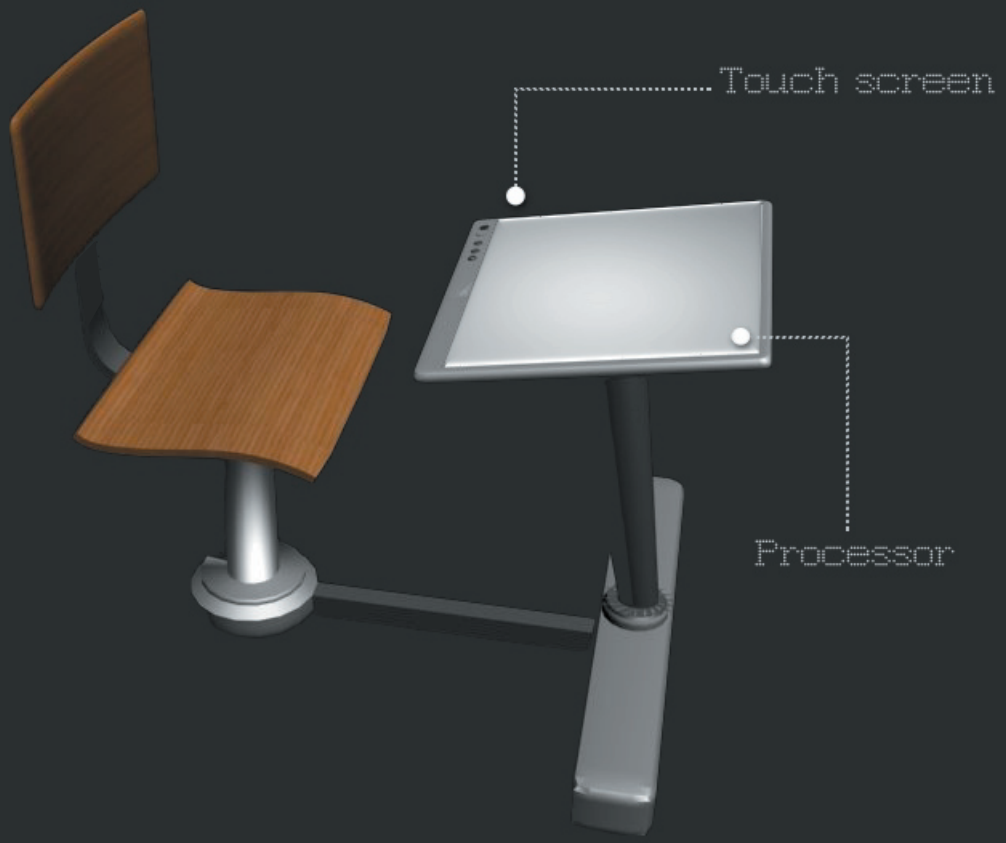








A few of the school desks available in market.


Touch screen
Processor

Ergonomics

- In actual practice, a viewing distance range between 20 and 28 inches from the computer monitor would probably be suitable for most situations. In order to achieve this it would be useful for instructors to note the average student's position in front of the screen and then adjust the location of the monitor on the desk accordingly.

- When facing the monitor the line of vision from the students' eyes should be about parallel with the top of the monitor screen.They should be looking at a slightly downward angle.

- This position can be achieved by all users with the provision of an adjustable height chair, which is highly recommended for all computer stations.

- A filter over the monitor screen to reduce glare is also suggested if glare cannot be eliminated by re-arrangement of lighting or furniture.

- An adjustable height chair allows users to achieve this proper arm position along with the proper eye level at the top of the monitor.

- It has been noted that the best position for computer use is an erect posture, which includes feet flat on floor or supporting surface. If most students' feet cannot reach the floor when their chairs are adjusted to the correct angle for vision and arms, then either the computer desk should be lowered or foot stools provided.

Classroom Lighting and Ventilation

- Glare on monitor screens can cause eye fatigue, strain, headaches and loss of concentration. To reduce glare it is recommended that rooms which are devoted to computer use be windowless or equipped with curtains or screens that can completely block out or control outside light.

- Indirect, wide dispersion lighting (bounced from ceiling and walls) has been found to be effective in eliminating screen glare.

- If overhead fluorescent lights are used they should be on a line parallel to the user's line of sight to the computer screen and to one side rather than directly above the user, and equipped with fixtures to direct light downward.

- When these conditions cannot be met or if glare persists, glare-reducing filters can be used as an effective substitute, though they may reduce readability.

- Because computers and peripherals generate heat, rooms which have no windows or in which screens are used to close the room off naturally tend to become overheated.Computer rooms therefore require air conditioning and ventilation systems that can offset this overheating effect. If windows are uncovered to provide ventilation or extra lighting, they should be to the user's side rather than in front or behind. Mesh blinds can provide light control while still allowing air flow and outside view.

Similar projects

The $100 laptop is an education project for creating an inexpensive laptop computer intended to provide every child in the world access to knowledge and modern forms of education.

The Laptop will be a Linux-based, full-color, full-screen laptop. It will initially have a flat LCD screen, but in later generations may use electronic paper (for example E-ink developed at the MIT Media Lab by Joseph Jacobson).The laptop will be rugged, use innovative power (possibly a pedal), be Wi-Fi- and VoIP-enabled and a touch screen (including a separate writing pad).

The pricing goal is currently expected to start at around US$135–140 not hitting the US$100 mark until 2008, if then.

The laptops will be sold to governments and issued to children by schools on a basis of one laptop per child.

9
Conclusions

How can we use technology to improve the quality of life of individuals with special needs?

How can we use technology not for the sake of technology itself but for what it can help learners do?

Technology is changing the role of instructors and teaching methods.

As in developed countries, instructors are seen almost as initiators of learning, with technology taking over the teaching role.

Instructors have the opportunity to become more creative with their teaching methods, as technology provides them with more visual and auditory options.

Additionally, students are becoming more accustomed to the use of technology in the classroom and so instructors must adjust their teaching methods accordingly.

Learning Vs Education

Our educational system with its overwhelming emphasis on knowing rather than learning, theory rather than application, is ill-suited for the child with LD.

The near total lack of alternate systems of education and the social premium for a handful of vocational courses with an utter disregard for all other vocational training are other major hurdles in the 'education' of the child with Learning Disabilities.

Why was Mohan punished ?

Umpteen children in villages in India are punished because they can't read and write properly.

How many of them are actually dyslexic and need alternate methods to learn ?

When will the Government make it mandatory for detection of Learning Disabilities in schools all over India ?

Technology in the Classroom

The use of technology in the classroom in developing countries has increased in recent years. This is due partially to the fact that technology is becoming more affordable and readily available. Because of this, technology is more accessible to instructors, which is one factor which increases their motivation for using it in the classroom. Technology has the capability of providing a wealth of information to students at the touch of a button.

There are still factors which hinder the use of technology in the classroom. Even instructors who have access to technology often fail to take advantage of it due to the fact that they are unfamiliar with the technology. Few instructors in the rural areas have received adequate training on how to operate various forms of technology.

In addition, an instructor's motivation for using technology may be low if he feels that the use of technology is not beneficial because the students themselves do not have access to the technology at home.

What is intelligence,anyways ?

I came across a very interesting essay by the renowned science fiction author Issac Asimov which questions -what is intelligence anyways ?

Asimov argues, " In a world where I could not use my academic training and my verbal talents but had to do something intricate or hard working with my hands,I would do poorly.

My intelligence, then, is not absolute but is a function of the society I live in and of the fact that a small subsection of that society has managed to foist itself on the rest as an arbiter of such matters.

Actually, though, don't such scores(Aptitude test scores) simply mean that I am very good at answering the type of academic questions that are considered worthy of answers by people who make up the intelligence tests - people with intellectual bents similar to mine ? "

Olny srmat poelpe can raed tihs.

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Amzanig huh? yaeh and I awlyas tghuhot slpeling was ipmorantt!

From the internet.One of the common forwarded emails doing rounds.

10
Appendix

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Glossary

Assistive Technology
Equipment that enhances the ability of students and employees to be more efficient and successful.

Attention Deficit / Hyperactivity Disorder (ADHD)
Developmentally inappropriate behavior, including poor attention skills, impulsivity, and hyperactivity. A person can be predominantly inattentive (often referred to as ADD), predominantly hyperactive-impulsive, or a combination of these two.

Auditory Memory
Ability to retain information which has been presented orally; may be short term memory, such as recalling information presented several seconds before; long term memory, such as recalling information presented more than a minute before; or sequential memory,such as recalling a series of information in proper order.

Bluetooth
A short range wireless connectivity protocol designed for moving information from hand-held computers (Palm OS), cell phones, to and from a computer.

Brain Imaging Techniques
Recently developed, noninvasive techniques for studying the activity of living brains. Includes brain electrical activity mapping (BEAM), computerized axial tomography (CAT), and magnetic resonance imaging (MRI).

FMRI (functional MRI) has been made famous by the work of Sally Shaywitz at Yale.

Central Nervous System
The brain and spinal cord.

Cerebral Cortex
The outer layer of the brain; controls thinking, feeling, and voluntary movement.

Child Psychiatrist
Medical doctor who specializes in the behavior and emotional aspects of infants, children, and adolescents and may prescribe medication as necessary.

Cognition
The act or process of knowing; the various thinking skills and processes are considered cognitive skills.

Dyscalcula
Difficulty in understanding or using mathematical symbols or functions. A child with dyscalculia may be able to read and write but have difficulty in performing mathematical calculations.

Dysgraphia
A severe difficulty in producing handwriting that is legible and written at an age-appropriate speed.

Dyslexia
A language-based disability that affects both oral and written language.
It may also be referred to as reading disability, reading difference, or reading disorder.

Eye-Hand Coordination

The ability of the eyes and hands to work together to complete a task. Examples are drawing and writing.

Fine Motor

The use of small muscles for precision tasks such as writing, tying bows, zipping a zipper, typing, doing puzzles.

Gross Motor

The use of large muscles for activities requiring strength and balance. Examples are walking, running, and jumping.

Learning Disability

A disorder that affects people's ability to either interpret what they see and hear or to link information from different parts of the brain. It may also be referred to as a learning disorder or a learning difference.

Multisensory

Involving more than one sense in presenting material. Teaching by talking and showing and moving simultaneously.

Phonemes

The smallest unit of speech that serves to distinguish one utterance from another in a language.

Sight Words

Words that a reader recognizes without having to sound them out. Some sight words are "irregular," or have letter-sound relationships that are uncommon. Some examples of sight words are you, are, have and said.

Spatial Orientation

Awareness of space around the person in terms of distance, form, direction, and position.

Spelling Checker

A feature of many word processors that compares the words that you type to a list of words that it has stored and words that you use that are not on its list are flagged and suggestions for correct spellings are offered.

The algorithm used to offer suggestions when words are not on its list. Some suggestion algorithms are more phonemically sensitive than others (they are aware of typical dyslexic mistakes in spelling).

Standardized Test

A test that compares a child's performance with the performance of a large group of similar children (usually children of the same age). Also called a norm-referenced test. IQ tests and most achievement tests are standardized.

Tactile

Having to do with the sense of touch.

USB

Universal Serial Bus; a way of connecting mice, keyboards, and other low power external devices to a computer.

Verbal Ability

Specific meaning of this term varies, depending upon the manner in which a given test measures this ability. Generally refers to oral or spoken language abilities.

Visual Perception

Ability to correctly interpret what is seen. For example, a child sees a triangle and identifies it as a triangle.

WiFi

Another term for an AirPort or 802.11b network.Like hifi (high fidelity).

Word Recognition

Ability to read or pronounce a word; usually implies that the word is recognized immediately by sight and that the child does not need to apply word analysis skills. Does not imply understanding of the word.

Written Language

Encompasses all facets of written expression, e.g., handwriting, capitalization, punctuation, spelling, format, ability to express one's thoughts in sentences and paragraphs, etc.