RAJ BHAVAN
BANGALORE
No. GS 63 MSG 2010
July 17, 2010

MESSAGE

I am glad to know that Karnataka is organising an International Conference on ‘Assistive Technology – A key to Inclusion – For a better quality of life for children and adults with special needs’ on July 23rd and 24th, 2010 at National Institute for Advanced Sciences.

The Society has been at the forefront of providing diagnostic and rehabilitation services to children and young persons with special needs. It has been innovatively using Assistive Technology to enhance their abilities and thereby promote their inclusion into the mainstream of the community. Through this conference the society aims to create awareness and opportunities amongst the various stakeholders to develop sustainable and affordable devices and techniques to benefit the Indian population.

I hope the Conference will be informative in understanding the vast benefits and applications of Assistive Technology. I wish the endeavour all success.

(H.R. Bhardwaj)
MESSAGE

I am happy to learn that the Spastics Society of Karnataka, Bangalore is organising a Conference on Assistive Technology and is bringing out an assistive technology compendium of speakers abstracts, articles from Assisted Technology specialists and resources for parents and teachers for their immediate reference and use, on this occasion.

It is commendable to note the key role being played by The Spastics Society of Karnataka for the welfare of persons with Neuro-Muscular and Developmental Disabilities and in providing a Comprehensive Package of Diagnostic and Intervention Services to persons with Cerebral Palsy, Autism, Mental Retardation, Multiple Disabilities and Learning Disabilities. I am sure the Society will continue to render yeoman’s service in its field in future also and I wish the Society a very bright and purposeful future.

(S.V. Ranganath)
Inclusion is not a strategy
Inclusion is not a policy
Inclusion is not just talking about mainstreaming
Inclusion is very much about human rights for every human being on earth to be included into the community.

Mrs. Rukmini Krishnaswamy
Director
Spastics Society of Karnataka
Bangalore
India
The painting according to her opens up doors of possibilities and potentials for persons like her and many other children in India.
We are delighted to welcome everyone to the Spastics Society of Karnataka's International Conference on Assistive Technology. We are excited to be a partner on this important Conference and the AT Center. You are helping children and families realize their dreams since Assistive Technology can open so many doors! You are leaders for AT in India for children and youth and we applaud the success of your center. PACER Center is honored to be a partner with you! Thank you for working so hard to make this important conference a reality. Thank you to everyone at the conference for helping to make a difference in the lives of children with disabilities.

Very sincerely,

Paula F. Goldberg
Executive Director and Founder
PACER Center
www.pacer.org
USA
July 16, 2010

My Dear Friends,

It is with much joy and pride that I congratulate you, the staff of CATLST, the family people that make up the Spastics Society of Karnataka, on your accomplishments. Your assistive technology (AT) conference is the result of a journey you began approximately four years ago with your vision for a model AT Center. In your own words you were ready to take things “to the next step”.

Your dedication and passion for the children, youth, adults and families that you work with paved the way for this thing called assistive technology. Your vision and your courage has brought you to where you are today. YOU are paving the way for potential and possibilities not only in Bangalore but in all of India.

Assistive technology is a relatively young field pioneered by people who have a passion for using technology to make a difference in the life of a child or adult with a disability. Assistive technology specialists around the world have benefited from over 25 years of collective and collaborative experiences. We learn from each other and continue to grow as a field. It was in this spirit of collaboration that your vision has grown to where you are no longer the students. You are now the teachers.

In 2007 you embraced both me and assistive technology. You eagerly opened your minds and your hearts and learned so much in the short amount of time I spent with you. We remained connected via conference calls, list-serves and emails but YOU decisively moved forward in developing how you would use and implement assistive technology with your students.

It is my dream that some day we will live in a world where “disability” is not a word. We will all of us, all of mankind, use technology to help us reach our full potential and utilize all of our abilities. I still remember the impact of introducing programs with features such as word prediction and text-to-speech to some of your students. It brought tears to my eyes to experience their excitement and to know that the future was so bright with possibilities. That is the whole point of assistive technology, making a positive difference in the life of someone who has a need. In your very capable hands assistive technology has the potential to change the landscape of possibilities for people with disabilities not only in Bangalore but in all of India.

Most Warmly and Sincerely,

Bridget Gilormini, Director
PACER Center’s Simon Technology Center
The world around us is changing, and information and communication technology (ICT) is central to this change. ICT has the potential to bring huge advances both economically and socially, and all of us should be able to participate and enjoy these benefits. However, digital inclusion is not something that will happen on its own as has been clearly demonstrated in the last couple of decades. Although ICT use is gradually increasing, the divide between people engaged in the digital revolution and those who are not is unfortunately not significantly diminishing. Access to the information revolution is limited due to a number of reasons ranging from absence of physical infrastructure to literacy and language.

The gap is in many ways further pronounced for persons with disability as many of them are unable to participate in the knowledge economy. And this we know is due to the lack of assistive technologies that help overcome the physical barrier, that are available in local languages and at affordable costs. For people with disabilities, such access has the potential to maximize independence, productivity and participation in employment and other activities that were once unavailable or inaccessible.

However, more concerted and cohesive effort is required in order to bring about equality of opportunities for persons with disability in our country. The development of accessible software and hardware, in particular, is key to this process. It is clear that its development is driven by one or a combination of factors, namely demographics and advocacy, technology, legal, and CSR. With increased awareness and recognition of the rights of people with disabilities, civil society bodies have been instrumental in bringing about awareness and changes in attitudes and behaviour of society in general and governments and corporations in particular. The ICT industry too has an important role to play in the research, development and commercialization of assistive devices. The Department of Information Technology, Ministry of Communications & Information Technology in 2009 initiated the National Policy on Electronic Accessibility recognising the need to eliminate discrimination on the basis of disabilities and to facilitate equal access to information communication technology and electronics (ICTE). The Policy covers accessibility requirements in the area of ICTE and aims to recognize the need for ensuring that accessibility standards, guidelines and universal design concepts are adopted and adhered to.

While a regulatory framework is important corporate citizens can do much more by being proactive. By providing an accessible workplace, which includes accessible information and assistive computer technology, businesses can provide viable work opportunities for all citizens. ICT companies can view this field from a legal, economic, or moral lens. By developing or supporting development of assistive technology, businesses help broaden their markets, promote the employment prospects of a disadvantaged minority and expand are prove to be pioneers in the sector. One could also look at investing in assistive technology as an integral part of CSR in demonstrating an organization’s commitment to providing equal opportunities.

Recognising the need and importance of concerted effort in this field, NASSCOM Foundation (NF) aims to create a platform to empower people with disabilities using the collective strength of the IT-BPO industry. NF is a leading Indian development organization that works towards galvanizing the corporate social responsibility (CSR) space in the IT industry in India. NF is the social development
arm of NASSCOM (National Association of Software and Service Companies), the premier trade body of the IT-BPO industry in India. NF builds capacities of under-served communities, works with non-profits to help build their ICT competencies, and IT companies to help them grow their corporate social responsibility programs. NF’s intervention will be in the areas of Accessibility, Employability and Assistive Technologies.

The Indian IT and BPO industry with its progressive outlook was one of the first to recognize and adopt diversity and inclusivity as a key business focus. The IT and BPO industry is receptive of the idea of building capacities of the disabled to enable them to get employment – both competitive and sheltered. Many NASSCOM members have played a proactive role in this space and this is reflected in the Helen Keller Awards where several awards in the last few years went to NASSCOM members such as IBM, Mphasis and Wipro to recognize their contribution to this space. NASSCOM Foundation, on behalf of the IT-BPO industry in India, stands fully committed to this cause. With the help of our civil society partners and member companies, we hope to be able to demonstrate these two sectors can effectively collaborate to bring about change in society.

We congratulate the Spastics Society of Karnataka in putting together this valuable and useful document. In supporting this Compendium, NF’s aim is to help spread the word on the importance of assistive technologies. We hope that this document will be useful for individuals and organizations alike, will increase awareness on this issue and further encourage research and development.

Rufina Fernandes  
CEO  
NASSCOM Foundation
SSK-CATELST

Priya Rao, Associate Director, Technical Services
Spastics Society of Karnataka – Center for Assistive Technology for Education and Life Skill Training

Spastics Society of Karnataka, since 1982, has been rehabilitating children with neuromuscular and developmental disabilities. Our service growth has been need based, with the recent Center for Assistive Technology and Life Skills Training providing technology support for learning, communication and activities of daily living for persons with disabilities.

The Centre for Assistive Technology for Life Skills Training (CATELST) was set up in 2007 in collaboration with PACER CENTER and is sculpted after its Simon Technology Centre (STC) situated at Minnesota, USA. CATELST caters to the Assistive Technology needs of children and adults with various disabilities.

The SSK Assistive Technology Centre was first envisioned as a possibility by PACER Center Executive Director Paula Goldberg, following a trip to India in 2005. Collaborating with PACER Center Advisory Board members from IBM and Target Corporation, Goldberg and Paul Ackerman, international consultant, worked with the National Institute for the Mentally Handicapped (Ministry of Social Justice & Empowerment, Government of India) to organize the first national assistive technology conference in India in December 2006. It was sponsored by the Indo-US Science and Technology Forum, New Delhi.

An outcome of the conference was an alliance among PACER Center, the SSK, and IBM. Shortly thereafter, work began in earnest to develop an innovative technology center in India at the SSK.

An affiliation with PACER Center’ Simon Technology Center and supported with hardware from IBM Corporation, the new center christened, Spastics Society of Karnataka - Center for Assistive Technology for Education and Life Skills Training (SSK-CATELST) started taking shape. Donations in the form of software and interfaces were received through PACER Center from corporate and assistive technology vendors in USA.

Training (2 training programmes at SSK and 2 modules at STC, USA) was conducted, by the then Coordinator and now Director, Bridget Gilorimini of Simon Technology Center for the CATELST staff of SSK.

A scientific advisory committee was constituted with the aim –

- To aid people with disabilities in communication, learning and regular everyday activities.
- To make the benefits of technology more accessible and affordable to children and adults with disabilities and their families.
- To develop and design indigenous aids to suit our Indian conditions – culture, languages and affordability to as many persons with disabilities as possible.

The CATELST activities include -

- Orientation for parents / teachers and schools;
- Consultations for parents of children with special needs;
- Evaluation, assessment and trial training for persons with special needs;
- Collecting and recording data for research purposes;
- Developing low tech and mid tech solutions within SSK;
- Collaboration with technologists & volunteers, to explore possibilities of developing & field-testing indigenous AT solutions.
**Advisory Committee**

- **Vivek Kulkarni**, BE Karnataka University, MBA, Wharton School, University of Pennsylvania, USA.
  Chairman, AT Advisory Committee, CATELYST
  Chairman and CEO of Brickwork India Pvt. Ltd, Founder Managing Director of Brickwork Ratings, Visiting faculty at IIM and IISc, Bangalore.

  Director, Spastics Society of Karnataka, Bangalore

- **Raja Shanmugam**, BE Bharathidasan University; MBA, Bharathidasan Institute of Management.
  CEO MindTree Foundation, Senior Vice President at MindTree.

- **Sunil Raghavan**, IIT Chennai; IIM Calcutta.
  Program Manager - IBM, Focussed on Strategies for India/South Asia.

  Guest faculty and Research Scholar, Center for Product Design and Manufacture (CPDM),
  Indian Institute of Science, Bangalore,

- **Dr. Nalini Menon**, M.sc. (Physics), Ph. D. Ilsc. Bangalore
  Head, Rainbow Center for Autism Spectrum Disorders, Spastics Society of Karnataka.
  Bangalore

- **Priya Rao**, BA, MA, PGD in Teaching Children with Multiple Disabilities, Mumbai University;
  B Ed, IGNOU.
  Associate Director-Technical Services, Spastics Society of Karnataka.

- **Rabindran Isaac**, B.Sc., Bangalore University, B.OT., Christian Medical College, Vellore,
  Tamilnadu
  Occupational Therapist Associate Director, DRC- CBR, Spastics Society of Karnataka,
  Bangalore

- **Kavita Sharma**, M. Sc. Chemistry, B. Ed, Rani Durgavati Vishwavidyalaya, Jabalpur (MP);
  Dip in Special Education (MR), Dilkush Special School, Mumbai
  Coordinator - Foundation for Prevention of Disability, Bangalore.

- **Shobha Sundar**, MA Social Work, Stella Maris, Chennai
  Head of Dept-Family Support Services, Spastics Society of Karnataka.

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**For information on Consultation and Assessments contact:**

Ms. Supriya V. (Coordinator – CATELST)

Days – Monday to Friday (Time – 10 am – 3.30 pm Saturday – 10 am – 12.30 pm)

Off. Phone – 080-41718585
Student – Teacher and Technology in the Class Room

Mrs. Rukmini Krishnaswamy, Director
Spastics Society of Karnataka, Bangalore 560 038

Introduction:
In recent years, the Internet has become an application-based tool that allows users to create content, post ideas, and share experiences. We are not changing fast enough to keep up with these changing students is one that is echoed in many different educational spheres. Students have evolved, the educational tools have evolved, and now it is time for the curriculum to evolve.

Changing Class Rooms:
Just as technology has become a more integral part of our students’ lives outside of the classroom, the same thing must happen inside the classroom. Now wireless Internet access is the norm vs. the exception and the increase of accessible computers and handheld devices such as PDAs, cell phones, and portable gaming systems have bonded with the everyday world of our students.

At the 2008 meeting of the National Educational Computing Conference (NECC), the International society for Technology in Education (ISTE) issued new technology standards for teaching by categorizing it as basic operations and concepts; social, ethical and human issues, technology productivity; technology communication tools, technology research tools; and technology problem-solving and decision-making tools. Under each of these headings, one identifies proficiencies that the students will be able to complete by each grade level. Not only are classrooms now more technologically advanced, but the teachers are expected to be as well.

Promise of Technology:
Certainly, technology has proliferated the classroom and changed the landscape of educational contexts forever, but many of us still struggle with how to effectively and efficiently incorporate this new medium in ways that enhance student learning and promote critical thinking skills. Norris and Soloway (2003) highlighted the range of positive impact that computers in the classroom has had on teaching and learning. For example, it was found that computers have shown an increased time on task, higher test scores, and increased motivation to explore.

Student User Friendly:
Student user friendly Technology tools to be considered are:
- Blogs
- Digital Media
- Digital Diaries/Storytelling
- Podcasting
- Probeware
- Really Simple Syndication (RSS) Feeds
- Screencasting
- Second Life/Virtual Worlds
- Student Response Systems
- Web 2.0 Technologies

Let us look at what is not technology.

**Technology is not:**

- Reiteration of the information from a textbook through a software presentation program
- Using a word processing program to write a paper
- Projecting a document using a document projector
- Using the Internet as a reward for completing class work early
- Plugging students into a software program during free time
- Substituting a CD-ROM for teacher instruction or
- Watching a video through a computer's streaming application

**Podcasting:**

Podcasting, which is a way of distributing types of media called podcasts (made up of audio or visual content) over the Internet. The term podcasting originally came from the words “iPod” and “broadcasting”, as the first podcasts were essentially audio content distributed over the Internet onto iPods. Despite the fact that iPod is a part of the actual name, having an iPod is not a requirement to accessing a podcast. Although a portable media device would be useful for accessing podcasts, only access to a computer is necessary.

Over time, as more devices were able to access podcasts, the term podcasting came to stand for Portable on Demand Broadcasting. Listening to a podcast is similar to listening to a radio broadcast or watching a television show, except that the user does not have to tune in at a set time in order to watch or listen.

A user can watch or listen at whatever time or day he or she prefers. The difference between a podcast and a simple audio or video file saved on the Internet is that, through the use of another technology called Really Simple Syndication (RSS), you can subscribe to a particular podcast and receive any newly posted content without having to go out and get it.

The way that podcasting normally works is that the person creating the podcast (known as the podcaster) first creates the podcast. Once the podcaster has completed the creation and editing of his podcast, he must publish the podcast to the Internet. This is done by uploading the file to a Website that allows for RSS technology to create a feed. This feed, in turn, allows users to subscribe to the podcast. Once users subscribe to the podcast, new content is pushed out to them and they are able to listen to or watch the podcast.

**Educational Suggestions for Podcasting:**

Here are just some of the uses of podcasting in the KG-12 classroom:

- Audio or visual recordings of classroom lessons can be accessible for students outside of the classroom
Recorded interviews with classroom guest speakers can be accessible for students online.

Screencasts where information from the screen can be captured and overlaid with audio. One example where this might be useful is if a teacher is showing some useful Web resources for students to use for a Project. The teacher actually can give a tour of the site and capture the audio while browsing the sites. This captured visual content then becomes a podcast.

Video podcasts (also known as VODCasts) can capture video such as student performances or presentations.

Student work such as presentations or group projects can make use of the podcasts.

Younger students can use podcasts to assist them in a variety of learning activities such as learning vocabulary.

Educational Benefits of Podcasting:

Here are just some of the benefits of using teacher-created podcasts in the KG-12 classroom:

- In a traditional classroom setting, if a student misses something the teacher said, he or she is limited to options like asking a neighbour (potentially disruptive to the class) or relying on another student’s notes (not necessarily an accurate interpretation of the teacher’s statements). With podcasting, students receive unlimited access to a lesson and can replay it an unlimited number of times.

- Not only can podcasts be replayed an unlimited number of times, but they can be replayed at any time or place depending on a student’s access to a portable media device. Students also can multitask and listen to podcasts while conducting other work as well.

- Students with disabilities find significant value in having access to both audio and visual podcasts. These help students to better gain and retain a greater understanding of the material presented during lessons.

- The presence of podcasting can reduce the amount of time that students spend during class taking notes. This is particularly true if the teacher creates visual podcasts containing the teacher’s presentation as well as the audio to go with it. The reduction in time needed to take notes will allow students to focus more on trying to comprehend and absorb the material contained in the teacher’s lesson. This also can lead to greater interaction between the student and the teacher.

- The podcasts themselves not only reduce the amount of time needed to take notes in class but become an excellent supplement to traditional class notes.

- Students who benefit from auditory learning may get more value from podcasts than from traditional class notes or handouts.

Let us look at the Traditional classroom’s characteristic way of working at the students:

- Students are viewed as “blank slates” onto which information is etched by the teacher.
- Teachers generally behave in a didactic manner, disseminating information to students.
- Teachers seek the correct answer to validate student learning.
- Assessment of student learning is viewed as separate from teaching: observation and routine testing.
Let us analyze the principles of characteristics of constructive class rooms:

- Pursuit of the students’ questions is highly valued
- Curricular activities rely heavily on primary sources of data and manipulative materials
- Teachers seek the students’ point of view in order to understand students’ present conceptions for use in subsequent lessons
- Assessment of student learning is interwoven with teaching and occurs through the teacher’s observations of students’ work and through student exhibitions and portfolios.

**Pre-requisites to teach with Technology:**

Is the purpose of school to teach students about technology or to enhance academic achievement through the use of technology? Our answer is all too simple: Why not both?

The understanding associated with how technology works is referred to as technological literacy, while one’s ability to manipulate a technology is referred to as technological competency. In fact, the National Academy of Engineering (Pearson & Young, 2002) defined technological literacy as the capacity to understand the broader technical world, and technological competency as the ability to work with specific pieces of technology. The relationship between technological literacy and technological competency is not a dichotomous one. In order to use technology as a tool capable of enhancing the educational experiences of each student, the students must be able to manipulate the technologies in efficient and effective ways. Whether you are designing lessons with specific technology objectives in mind or lessons that incorporate technology as a learning tool, always remember to include activities and discussions geared toward technological literacy and competency.

**Does just putting a Computer in a Classroom increase Student achievement?**

A common myth that seems to be prevalent suggests that simply putting technology into schools will directly improve student achievement; in other words, more technology will result in more achievement (Kleiman, 2000). Certainly when used appropriately, technology is a flexible and powerful tool that can potentially increase depth of understanding and overall student achievement. In order to effectively integrate technology, there are two approaches to follow:

Select a technology that best fits your lesson, or

Design the lesson to fit the technology

In the first approach, technology is used as a tool that requires you to adapt the technology to fit the lesson. For many teachers, this is more appealing because they are simply using technology to enhance lessons that they have previously taught. In essence, they are building upon the work that they have already completed.

The second approach focuses on the technology, requiring you to adapt the lesson to fit the technology. Teachers are a little less motivated to follow this path because it requires that they completely revamp their lessons. As such, there is less certainty that students will be able to meet stated objectives. However, over time, the second approach tends to yield better results because it requires teachers to update lessons that are intended to take advantage of new technologies.
Criteria for Positive Educational experiences:

If you plan on having your students interact with the technology, the following criteria are necessary for positive educational experiences:

- Assess technical knowledge before implementing the technology (don’t assume)
- Utilize technology in a way that requires students to interact and think. Do not use the technology as a means of just copying procedures. A good question to ask is: Who is doing the thinking, the student or the technology?
- Utilize the technology to provide multiple representations of the content
- Provide a means for students to self-monitor progress.

One size does not fit all:

In fact, technology is your tool and you are the classroom expert. As such, the particular tool should be used in a manner that enhances the educational experiences of your students. If the tool has no instructional value, then it should not be integrated into the curriculum.

Summary of thoughts:

Unfortunately, technology is not one-size-fits-all solution to education. Without proper guidance, technology can do as much harm as it can do good. It is unreasonable to think that providing every student access to technology is sufficient enough to enhance their understanding and motivation. Access to technology is only part of the equation. In order to implement any technology is only part of the equation. In order to implement any technology tool in a way that promotes digital literacy, teachers must be trained in how to design effective activities and lessons.

Teaching is a dynamic profession that employs insightful and imaginative professionals. These experts attempt to provide every student a relevant education that prepares them to meet the demands of contemporary society. The first step in becoming the type of teacher who embraces technology is to not just delegate technology, but to educate oneself.

References:

- Global Source book on Information Technology – Volume-I & II by Ved Prakash Gandhi Mrudula Menon
- Jummy Wales & Richard B Araniuk – Bringing Open Source Resources to Text Book Teaching
- Jay Cross Informal Learning Re-discovering Natural Path ways That inspite innovation and performance (Sanfransisco Piffer 2007).

“If WE TEACH TODAY HOW WE TAUGHT YESTERDAY, WE ROB OUR CHILDREN OF TOMORROW”

~ JOHN DEWEY
Universal Design for Learning

Mr. Jonathan Campbell
Assistive Technology Specialist, Pacer Center, Minnesota, Minneapolis, USA

Schools have always struggled trying to meet the learning needs of their diverse student body. Students with learning disabilities and different learning styles can often face challenges in these environments.

In an attempt to meet the needs of as many students as possible in the same classroom the concept of Universal Design for Learning was created. The idea behind “Universal Design” is to create an environment that meets the needs of as many different students as possible. By universal, it is not meant that there is a single solution but rather designing multiple approaches to meet the needs of these diverse learners.

In this session we will learn what universal design in learning is, how it is being implemented in classrooms, and why all classrooms can benefit from its use.
The ARM project - Making Accessible Reading Materials for children to develop early literacy skills

Prof. Anil Prabhakar
Professor, Department of Electrical Engineering, Indian Institute of Technology, Chennai

Most of our brain growth and development happens during the first five years of our lives. Since sensory impairment can affect this process, intervention started early is most effective in preparing children for further education.

But, we must pause and consider that a lot of the children’s books available in bookstores are not friendly towards all children. Although there are many quality publications for our children, what if you or your young one is visually impaired?

What if the book is written in a language alien to you?

Chetana, along with the National Association for the Blind and Vidya Sagar, augmented five titles in Tamil and English from Tulika Publishers, and the technique has now been adapted by Sarva Shiksha Abhiyan, Tamilnadu for their own books.

Although the books are designed keeping disabilities in mind, the adaptations build literacy in all children. Children can feel the pictures, listen to clear spoken stories, dramatize the story with the props provided and even read along with the tape. Decoding Braille helps develop reasoning and attention skills, the raised drawings helps develop sensory awareness and perspective and the props build language and imagination in all children.

So, how can we mass produce such books and yet keep them affordable?

What are the alternatives to tactile printed books and can assistive technologies help in early literacy?
IBM philosophy on Diversity & Inclusion of varied constituents in the workplace.

Ms. Kalpana Veeraraghavan
IBM, Workforce Diversity Manager, Human Resources, India

IBM hired its first employee with a disability in 1914 - 76 years before the signing of the Americans with Disabilities Act (ADA) in the United States. Today, our Company’s leadership in integrating People with Disabilities (PWD) in the workplace and marketplace continues as a key Global Workforce Diversity imperative.

This imperative is not a social program that makes everyone feel good. It’s about attracting and hiring talented people to help IBM meet its business objectives and remain competitive in the marketplace. IBM’s focus on PWD (Persons with Disabilities) as a distinct talent pool is therefore, grounded in the belief that as part of IBM’s focus to be an innovation partner to our clients, the organization needs to attract and harness the best talent around the world through an open and diverse workforce. People with Disabilities (PWD) contribute equally to this innovation.

Following on the footsteps of our parent company globally, IBM India’s approach to PWD revolves around 3 As - Accessibility, Accommodation & Attitude.

The presentation will showcase a plethora of initiatives IBM is leading which impact the PWD constituency internally as well as in the marketplace.
Abstract

Accessibility Technologies at IBM Research (Human Ability & Accessibility Centre)

Anil U Joshi
Program Director India HA&AC

Anil Joshi has worked in the field of IT for over two decades and is also devoted to the disability sector for over fifteen years. He is a Board Member of National Trust for the third term, now and is actively associated with Parents movement in India. He is the General Secretary of PARIVAAR – the National Confederation of Parents’ Associations. He did his Engineering from Vishveswaraiah National Institute of Technology, Nagpur and holds MBA in Finance and Marketing. He is working as a Program Director, Human Ability & Accessibility Centre at IBM Research India, for the past three years.

The IBM India Accessibility Centre was launched with the goal of showcasing solutions developed at IBM Research that make Information Systems accessible for Persons with Disabilities.

In today’s fast changing economic scenario, technology plays a very important role in our day to day life. Information Technology not only enables one to be at the forefront of knowledge, but empowers us to be more productive.

In India more than 70 percent of the population lives in rural areas and may not have an access to technology. Similarly, persons with disabilities face difficulties in reaping the benefits of Information Technology. Accessibility is about making the technology usable by all, by overcoming limiting condition, thereby taking the benefits to everybody in society.

The presentation will be on Accessible Technologies developed at IBM and how these can help people with disabilities to be active contributors to the economy, by participating in mainstream activities viz. education, banking, industry, entertainment, travel and tourism and so on.

The presentation will include examples and facts on how Accessibility has a business value, rather than being just ‘nice to do’. It is this Business Value, which will drive further advancements in Accessibility, rather than the traditional charity approach.
A key aspect for a person with disability to be effective at the workplace is the solution they will use to do their job. The solution has to be practical, feasible, acceptable to the company and should help the individual to be efficient, productive, take care of risks which may occur while dispensing their responsibilities. While technology and assistive aids play a key role in making up the solution, there are other aspects such as appropriate usage of tool, correct configuration, customization and usage of different processes or methods which are required to accomplish the work.

Objectives of presentation and benefits for the audience (bullet points):

• Understanding the role of technology in workplace solutions
• Understanding of the other important factors that make up workplace solutions
• Understanding in depth via use cases
• Benefit for companies - understand how the disabled can work effectively
• Benefit for the disabled individual and institution is to seek solutions which enable the disabled individual at the workplace
Abstract

Assistive technology -
A deafblind perspective

Zamir Dhale

What does it mean?
- Technology for differently abled

What does it mean for a deafblind person?
- Introduction to deafblindness and role of technology (personal experience sharing)

Where do we stand?
- Status of deafblindness in India and challenges ahead

What is required?
- Accessibility challenges faced and possible solutions for the same
How technology can help a child discover his potential/creativity

Senthil Kumaran is associated with Spastics Society of Karnataka as a volunteer, teacher and webmaster. He is interested in technologies that are helpful to people. He is currently working as Senior Software Engineer at Akamai technologies and prior to that was working with Dell.

In this presentation, I would like to focus on the different assistive technologies that I have tried in order for Avinash to use his computer independently. There are a lot of freely available assistive technology devices, some would be suitable and some would not be.

What kind of a mind set we adopted while searching for the suitable assistive device?

What is the discovery process?

How that technology can help your child to discover his potential and be a creative individual?

What have we been trying with Pooja, whose interests are different and what kind of technologies could be suitable to her?

In the same lines, we would also like to share the story of Robotics club, were many students found the immense joy of creativity, learning and finding their interesting engineering, building robotics and programming.

We have the Robotics club at Spastics Society of Karnataka running for 2 years now and would like to share the instances of how students like Leo and Nivedita have found immense joy in building and programming.
Abstract

Development of Affordable, Sustainable and Indigenous Technology

Raja Shanmugam

In India, the concept of Assistive Technologies has been limited to mostly hearing aids, prosthetics and wheelchairs. More sophisticated AT is needed to help the person with special needs to perform many of the tasks required to function independently, communicate and be productive in today’s world.

Such technologies have been around in the western world for almost 40 years. However, these are out of reach to those who need them in India. Since 70% of our people with disabilities are from the rural areas the high price of imported equipment is a huge hurdle. Then there are issues of availability, training, localization, service etc even for those who can afford them. With numbers ranging from 70-100 million people with special needs, pure philanthropic means of distribution are not viable. Considering the business models for these devices in the Insurance driven western world, it will be very difficult to for international makers to either sell current devices at the required price points or invest in research to make devices targeted to our needs.

Hence the case for affordable, sustainable and indigenous technologies for our needs. However, in a country where basic data on disabilities is still not reliable and where the community of the disabled is yet to be perceived as a viable buying force, this is a challenging goal.

As the CEO of MindTree Foundation, Raja has spent the past two years trying to productize appropriate and affordable assistive technologies for the Indian market by leveraging MindTree’s technology and leadership capabilities. He will discuss some of the challenges mentioned above and the relevance of involvement of Corporate India in this process to overcome them. The talk will use some real examples of indigenous technologies under various stages of maturity in the product lifecycle to discuss these challenges and more importantly, the opportunities for India.
Challenges and Innovative Solutions in Using Assistive Technology in India.

Dr. Arun Mehta
Co-Founder, Radio Phony, Delhi, India

According to US figures, since reliable numbers are not available for India, 1 in 90 children suffers from autism -- just one of many mental challenges. These children are often denied education, health services, and are the poorest among the poor (WHO, 1 April 2005). The challenge therefore, is not only the uniqueness of the condition of each child, but also in that any technological support needs to be very inexpensive.

Our approach is based on “Brain Behavior Connections in Autism”, by Minshew and Williams, which states that information perception and memory are typically not affected, but fewer or atypical interconnections between different parts of the brain create problems in higher brain functions, such as skilled motor movements involved in handwriting and speech, flexibility, concept formation, and information filtering.

The free and open source Skid software (skid.org.in) seeks to address this by breaking complex tasks into tiny modules with a standardized interface, thus allowing easy learning, and adaptation to individual needs, including through the development of fresh modules, which student programmers write within a few days. Skid attracts such students as it provides a platform for hands-on learning in web programming.

Child-friendly input devices such as joysticks, touch screens, mouse, etc. are used. For those with limited motor skills, two button input is sufficient to control most modules. Extensive use is made of pictures for learning. These pictures can reflect the actual environment of the child, and be changed depending on what the child is currently learning. Text to speech provides audio feedback to the child as well. In case one kind of inputs works better or worse than some other for a specific child, appropriate changes are easy to make in Skid.

Skid promotes functional literacy through modules that allow the child to find and recognize pictures, use them, where appropriate to construct sentences, and learn categories through games such as “odd man out.” Simple games and photo-editing tools make the software well suited to pre-literate children as well. We are working towards integration of Skid into actual classroom teaching in two special schools in Delhi.
ASSISTECH:
Assistive Devices for the Visually Impaired

Prof. M. Balakrishnan
Department of Computer Science & Engineering at I.I.T. Delhi.

In this presentation we describe the technical activities of a group named ASSISTECH formed at IIT Delhi to design and develop assistive devices for the visually impaired. ASSISTECH was formed more than two years back with the clear objective of “Making a difference in the lives of million plus visually impaired people by the year 2015”. At any one time it is an active association of 12 to 15 students who contribute both through academic projects as well as other activities.

Specifically the group is working on the following four projects for the visually impaired:

- Smart Cane: An aid for assisting safe mobility
- Bus Identification Device: An aid for assisting use of public buses
- Braille Tutor: A Braille and language learning device
- Disha – Indoor Navigation Device: An aid for independent mobility within the public buildings

These projects are in various stages of prototyping and testing. This seminar would be accompanied by a demo of the prototypes of the first three devices and a poster describing the fourth. Please visit www.cse.iitd.ac.in/assistech for details.
A simple EMG Biofeedback for Improvement of Voluntary Muscle Control

Suresh Devasahayam
Professor of Bioengineering, Christian Medical College, Vellore

Biofeedback is a simple and effective tool to strengthen excitatory or inhibitory control over physiological processes. Among the most successful uses of biofeedback is in the control and strengthening of voluntary muscles. Any one of the parameters effected by muscle contraction can be used for biofeedback, namely, joint angle, muscle force and myoelectric signals. The use of myoelectric or electromyographic (EMG) signals is the easiest in terms of use, as it requires no elaborate physical apparatus to be connected to the body.

Electromyographic signals can be picked up using small metal discs or electrodes placed over the skin. These signals can then be presented in a suitable form to encourage the subject to voluntarily control either relaxation or strengthening exercise. Taking advantage of the fact that personal computers are ubiquitous, a simple biofeedback system can be constructed with minimal electronics connecting to a computer. Such a system is presented here. The analysis, visual display and auditory feedback are all be implemented in software. The raw EMG as well as the average EMG waveforms are made available to the therapist to ensure the quality of the electrode placement and EMG acquisition. In order to encourage young subjects to use the biofeedback system a simple game has been incorporated that shows a rocketship moving across the screen. Either muscle relaxation or muscle contraction can be used as the feedback parameter, depending on whether spasticity must be reduced or weak muscles must be strengthened. In the system we present here, two channels of EMG can be used, and any combination of contraction/relaxation of the two can be used.

The system that is presented here is simple enough to be built with a few hundred rupees for the electronics for two channels of EMG. The rest of the system comprises a standard computer and software. The software has been tested on Windows and Linux, and is expected to also run on other systems like Apple/Mac.
The following figure shows a screenshot of the biofeedback system.

![Biofeedback System Screenshot](image)

**References**


Instrumentation for assessing Hand Function

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Our group is particularly interested in developing instruments for assessing hand function. Our objective is to be able to develop non-invasive instruments. The tasks that are required for using these instruments should be simple enough that even illiterates should be able to perform them comfortably. Here we describe four instruments that were designed and developed by our laboratories for the purpose of assessing hand function in patients with hand dysfunction.

Precision grip instrument: In this task the subject is required to grip an object with thumb and index finger and lift it and hold it for a few seconds and place it back. The parameters that can be measured are onset of grip (time), peak grip force applied (N), object lifting time, rate of grip force application, rate of lift and steady grip force that is applied. This instrument is also capable of generating ramp loads, sinusoidal load forces and random loads. All these can be controlled through a computer and the data can collected on to a computer for further analysis.

Skin friction measurement: Our studies have shown that the amount of grip force that is generated to lift an object can depend on one's own skin friction. The skin friction in an individual can also change due to moisture. In this regard we developed another instrument to measure coefficient of skin friction. In this instrument the subject is required to place a finger under a rotating Plexiglas drum. The subject's finger is gradually lowered till the point where slip occurs which is taken as the coefficient of skin friction of that subject. Our data shows that the coefficient of skin friction varies from one subject to other and there seems to be a relation between the coefficients of skin friction of an individual to the grip force that they generate.

Assessing spasticity in the forearm: Patients with cervical compressive myelopathy often have upper limb spasticity. To assess these patients clinicians holds their hand and rotates the patients forearm in clockwise and anticlockwise direction. If they sense any resistance to this passive rotation then they conclude that the patient has spasticity. At present they do not have a method to quantify changes that may occur after surgery. In order to address this we have developed another instrument where the subject is required to place the forearm in a cast and the forearm can be passively or actively rotated. EMG is recorded preoperatively and postoperatively from the agonist and antagonist muscles and changes in the EMG activity can be documented.

Quantitative assessment of strength of interosseous muscles of hand: This instrument was designed to measure abduction and adduction strength of fingers.

These instruments are developed with a view to understand hand function in a way that they can be quantified. However, these instruments can also be modified with a few additions so that they can be used for therapeutic purpose in patients having hand dysfunctions.
Abstract

The Need for Reinvention: Learnings about Making AAC Devices for Developing Countries

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AAC devices have had a relatively young history in India, and commercial devices have only recently started appearing in the Indian market.

AVAZ, from Invention Labs, represents one of the first indigenous AAC products in India. Following the launch of AVAZ in February 2010, the device was used by children in a number of schools around the country, and the feedback received from these ‘first users’ has shattered many myths about AAC in India. Feedback from the launch of AVAZ has also shed new light on the priorities for different features amongst different stake-holders, such as children, educators and parents.

This talk highlights the most important learning that we have obtained from the field, and indicates directions of future research that will be needed to increase penetration of AAC devices in India and other developing countries around the world.
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Assistive Technology: Frequently Asked Questions

What is Assistive Technology?

Assistive technology (AT) includes a variety of devices and equipment that help a person maximize his or her abilities, thus minimizing the effects or challenges of a disability or the aging process. Many people benefit from technology like remote controls, garage door openers, speakerphones or Velcro strips that replace buttons. Assistive technology can help people with disabilities get around more easily, communicate better, live independently and become more active in their communities. Assistive technology can also help prevent the worsening of a condition and improve a person’s capacity to learn. For most people, technology makes things easier. For people with disabilities, technology makes things possible.

What are some examples of “low tech” AT?

- Eating utensils or toothbrushes with weighted handles to help a person with limited hand control
- Communication boards with pictures to help people communicate basic needs
- Pencil grippers to help someone hold a pencil or pen
- Easy-grip doorknobs, or car door openers to help people with weak hands
- Big button phones to aid people with limited vision or hand control
- Tape recorders to help students who have trouble with note taking
- Text telephones or phone amplifiers to help people with hearing impairments
- Sandwich holders to help people with a weak grip
- A mouth stick to help a person turn the pages of a book
- Computer screen magnifiers to help people with visual impairments

What are some examples of “high tech” AT?

- Computers that are operated by voice command instead of a keyboard
- Environmental controls to operate several appliances from a remote control
- Special lifts that help someone get in and out of the bathtub or in and out of bed
- Computer software that gives immediate feedback to a student with learning disabilities
- Talking calculators that “speak” math operations as they are performed
- Special computer software that helps people compensate for motor disturbances, organize behavior, or communicate with a minimum of stress, fatigue and misunderstanding
- Talking software that helps a child see and hear as he or she learns
- Reading machines that convert printed material into synthesized speech
What kind of AT helps people at work?

- Workplace accommodations help a wheelchair user access the necessary equipment around the workplace, such as bookshelves, computers or worktables.
- Headset phones and telephone amplifiers help a person use the phone.
- A motorized lift help a farmer get into the tractor.
- Tape players and headphones help someone with attention deficit disorder drown out noises.

How can a person find out what assistive technology he or she needs?
Finding the “best fit” between a person, his or her environment, and available technology is a process. It should involve the consumer, family members, educational and medical professionals, caretakers, and anyone who often works with the person using the technology. A wrong or hasty decision can cause wasted time, money and patience. Finding the right agency to help with an assessment begins by determining what the person needs technology to do for her or him. If technology is medically necessary, Medicaid or Medicare might be the first contact. If it is necessary for employment, Vocational Rehabilitation or the Commission for the Blind might be contacted to see if the person meets eligibility requirements. If it is needed for education, the school district or school itself would be the place to begin.

How does the use of AT save money?
By allowing a person to function more independently at home, families and governments can save on the cost of attendant care or residential facility placement. When assistive technology helps keep a condition from worsening, the further medical expenses are reduced. For example, proper technology for seating and positioning creates less strain on muscles and joints, reducing the number of necessary visits to physicians, therapists or hospitals. A national study on disability showed that assistive technology saved the government significant money in the amounts of SSI and SSDI payments.

Where do people find the money to pay for AT?
Private insurance companies may pay for technology, especially if it will help improve a condition or prevent it from getting worse. State agencies are a major funding source. The school or school district may fund assistive technology necessary to provide a free and appropriate public education (FAPE) for a student. If the person meets eligibility requirements, technology to help a person in a job may be funded by agencies like Vocational Rehabilitation, Commission for the Blind, or the Department of Disabilities and Special Needs. Medicaid and Medicare may fund “medically necessary” assistive technology. Technology for young children may be funded by Children’s Rehabilitative Services of the Department of Health and Human Services. Local and state charities, foundations and service clubs are often funding sources.

In India, we have to yet work with such companies and funding agencies who can understand the need of AT and provide help.
Breaking The Barriers –
Free Software And Human Rights

Dr. Julius Deutsch, www.kommhelp.de, Berlin, Germany.

Introduction

Personal computers have been changing many aspects of our lives over the last decades since the first IBM PC arrived at the market. Without the need to leave our home or office we can access our bank, search encyclopaedias, watch movies, order goods from shops and communicate with friends all over the world.

A universe of communication is at our fingertips, given that we can use a keyboard and a mouse. However, those of us who might benefit most of these wonderful new technologies - physically impaired people - are mostly excluded. There are millions of people with neuro-motoric deficiencies, but they are not regarded as target group of interest by the big global manufacturers of hardware and software.

It is true that there are companies offering hardware and software for people with special needs. But don’t look at the price tags! Even worse, many of the sophisticated products that allow, for example, speech-impaired people to express themselves with spoken words are designed as stand-alone machines that allow only that special use while neglecting the computing power of their electronic guts.

Our association kommhelp\(^1\) e.V. was founded in 1989 as a non-profit organisation with the goal to use standard computers as powerful and versatile communication tools for people with physical impairments. Since then we have developed numerous inexpensive solutions to overcome physical restraints, each one individually tailored to meet the needs of the user.

Providing computer access with Free Software means nothing less than granting human rights: In 2003, the World Summit on the Information Society declared: “Communication is a fundamental social process, a basic human need and the foundation of all social organisations. It is central to the Information Society. Everyone everywhere should have the opportunity to participate and no one should be excluded from the benefits of the Information Society offers\(^2\).”

“Internet access for all; freedom of expression and association; access to knowledge, shared learning and creation - free and open source software and technology development” have been identified as Basic Human Rights by the APC\(^3\) Europe Internet Rights Workshop in 2001.

Since a couple of years, more and more Free Software (also referred to as Open Source Software\(^4\)) is available that enables people with physical impairments to control a computer without the need to use a keyboard or a mouse.

But keep in mind that there is no One-Fits-For-All product. Every human being is special; there is no two-of-a-kind. Therefore each solution must be evaluated very thoroughly to determine its possible advantage or disadvantage for an individual. We believe strongly that an impaired user should be enabled to use his physical abilities to control his computer providing him with appropriate input devices (like mouse substitutes) before thinking of solely software based solutions.

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1 www.kommhelp.de; info@kommhelp.de
2 http://en.wikipedia.org/wiki/Digital_freedom
3 http://en.wikipedia.org/wiki/Association_for_Progressive_Communications
4 http://en.wikipedia.org/wiki/Open_Source_Initiative
In the following I will give a short overview on some of the available programs and discuss in short their characteristics.

**Controlling the computer mouse**

Due to the graphical user interface of modern computers, controlling mouse functions is crucible, i.e. positioning of the mouse cursor and triggering mouse actions (clicks) at the appropriate positions.

**Hardware**

Mouse cursor movement can be controlled using trackballs, joysticks, touchpad’s or track points – with a simple Google search you will find a lot of these products. A reasonably priced product is the Ergo Mouse, it combines a trackball and mouse clicks with an ergonomical design. Another interesting approach is the Joy Warrior, a three axis acceleration sensor with USB interface. Mouse movement is achieved by inclining the device in different angels. It supports a number of buttons that can be attached directly to the chip. However, this not a finished product, you have to have some skills with a soldering rod in order to make use of it.

**Software**

Head control is a readily accessible option. All you need is a web cam and a program that “translates” the movement of your head into mouse cursor movements. As every camera, a web cam needs sufficient and uniform lighting conditions in order to send suitable data to the program. The picture rate should be 15 fps (frames per second) or higher, otherwise the cursor movement becomes shaky.

There are also cameras that use infrared light (IR) instead of visible light like, but they sell at considerably higher prices than ordinary web cams. You can also make an ordinary web cam work with IR; there are a number of descriptions how to do this on the internet. IR cams always require an IR-reflecting spot to be placed somewhere in the face of the user so that the camera knows what to track. And don’t forget that you also need an infrared light source; you’ll find useful instructions on this issue in the internet, too. All this makes IR based head tracking a little bit more tedious and more expensive.

Currently there are four free programs available for download: **Headmouse, eViacam, Headmouse 2.5** and **Camera Mouse**.

Headmouse, eViacam and Headmouse 2.5 are applications that find and track the users face in front of a webcam and map head movements into mouse events. Camera Mouse requires that you mark a feature on your face before it can track your movements. Obviously this must be done by a helping person, so this might be a drawback for users who want or need to work without a helping hand. This limitation turns in an advantage if you use IR based head tracking, as Camera Mouse tracks spots, not faces.

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5 www.ergotouch.com/
6 www.codemercs.com/index.php?id=128&L=1
7 e.g. www.hoagieshouse.com/IR/
9 http://nipg.inf.elte.hu/headmouse/headmouse.html
10 http://eviacam.sourceforge.net/eviacam.php
11 http://robotica.udl.es/catedra/headmouse/version25/version25e.html
12 www.cameramouse.org
To identify a face as such, it is necessary that the user’s head is and remains in an upright position. Headmouse, eViacam and Headmouse 2.5 are looking for the T-pattern formed by the eyes and the nose. They can’t find this pattern in a horizontal face.

While Headmouse 2.5 requires rather expensive webcams to function well, eViacam, Camera Mouse and Headmouse perform well even with low cost webcams. You’ll find some hints on the respective websites on which cam to use. According to our experiences the Microsoft VX 1000 (~ 20 Euros) does a good job, the Microsoft HD Cinema (~ 70 Euros) is excellent. Make sure that the webcam you want to buy works with the program you intend to use. Not all programs are compatible with all camera drivers.

All programs can easily be adapted to the users’ abilities and all programs have options for performing mouse clicks. eViacam offers the most comfortable click options, while Camera Mouse and Headmouse provide only a left click.

But together with Point N Click both programs give access to all kind of mouse functions, even to actions a conventional mouse can’t perform.

Performing mouse clicks without a mouse.

The programs mentioned earlier, give complete control over the mouse cursor movements, but you still need clicks to make things happen. Point N Click is a unique and versatile program that gives access to all kind of mouse functions via icons on the screen. A member of our association with quadriplegia uses Headmouse together with Point N Click to draw pictures on her computer. Please have a look at her gallery to see what can be achieved.

If you prefer not to use software mediated clicking, you can use buttons attached to a conventional mouse. You will also find examples how to do this on the internet.

Text Entry

Onscreen keyboards are only one choice and they are not the best one. Onscreen keyboards are slow (you are restricted to one-finger-typing) and entering text is prone to typos, as in the real world. However, if you are looking for an onscreen keyboard, have a look at Click N Type. It offers more options than commercial available onscreen keyboards and it is free. You can select a key with mouse movements and clicking, or you can switch to dwell mode, where the cursor only needs to remain a certain time over a key to select it. There is also a scan mode which requires no mouse movements at all, one simple button is enough. Better options offer Dynamic Keyboard and Dasher.

Dynamic Keyboard works with an input device such as a joystick, trackball, mouse, single switch, among others. It anticipates what you are trying to type and helps you choose the right letters and words faster. And it learns or remembers which words you tend to use and how you tend to type and, through this, will estimate your preferred choices in advance, thus helping to improve your typing speed. There are also various modes to adapt Dynamic Keyboard to the user’s motor abilities.

13 www.microsoft.com/uk/hardware/digitalcommunication/Productlist.aspx?type=LifeCam
14 www.polital.com/pnc/
16 in German, but easily to understand: www.lea-sagt.de/Dokumente/maus.pdf
17 www.lburkhart.com/mhouse.htm
18 www.lakefolks.org/cnt/de-intro.htm
19 www.canassist.ca/dynamic-keyboard
20 www.inference.phy.cam.ac.uk/dasher/
Dasher is the most sophisticated program for text entry, being developed at the famous Cavendish Laboratory in Cambridge, UK. It learns from you while you write and you can easily add your own preferred vocabulary to its text base. Dasher offers a variety of modes; you can control it by gestures – without any mouse clicks or with a single button. Though Dasher is so different to all other text entry programs it is easy to learn and it is fun. Regard it as a kind of Arcade game where you catch your word strings with small mouse movements or as a huge library where you navigate through to collect the phrases you want to write. Dasher is available in numerous, also non western21 languages.

Both programs can be used in standalone mode for direct communication or as a tool to enter text in any application that accepts text.

The Internet

Pal Browser22 works perfectly with Camera Mouse and Click N Type.

Conclusion

I could only highlight some technical aspects of the opportunities that Free Software can offer to people with impairments. There is indeed much more and there will be much more in future.

A computer is a great tool for education, sharing experience with others and social participation.

All over the world are willing people ready to share their knowledge and to contribute towards better Free Software for people with special needs. The time is ready to make the first steps towards a global network that bundles these efforts and supports the development and the distribution of Free Software - to make sure that each and everyone has immediate and unlimited access to the information he/she needs to break the barriers depriving him/her of essential parts of his/her legal human rights.

For the Conference on Assistive Technology at Bangalore it would be a small step, but a giant leap for mankind.

Last but not least I would like to send my best regards to my friend Avinash. All those brave and valuable persons like Avinash and his friends deserve our deep respect and unlimited support.

21 www.inference.phy.cam.ac.uk/dasher/Download.html
22 www.palbrowser.com/instructions.html
Low-Tech Tools for High-Tech Learners


Kids today are exposed to technology from the time they are born. High-tech has changed the way we reach and teach children, but it is important to keep low-tech and no-tech strategies in your tool kit. The keys for getting children engaged in learning are novelty and finding new ways of doing the same old tasks. Inexpensive, low-tech or no-tech strategies are valuable tools that can capture a child’s attention and help them learn. Here are three things to keep in mind.

Movement Works:

The most basic strategy humans use to focus is actually a no-tech solution. It is simply movement. Movement stimulates the brain. That’s why so many kids chew gum, tap a pencil on their desk, bounce their legs up and down, doodle, or fidget while learning. They are naturally trying to keep their brain focused on the task at hand. Take advantage of this knowledge.

• Movement increases oxygen to the brain.
• Movement stimulates the brain and improves attention.
• Movement releases stress.
• Fidgeting can help kids focus and absorb information more quickly.
• Many children will study better and faster if they are allowed to move.

Use All Of The Senses:

Most of us have a preference for how we take in information. Some are visual learners who learn by seeing. Others are auditory learners who process information best by hearing and talking. Yet others prefer hands-on, kinesthetic learning experiences. The strongest students build their strength in all learning styles. Here are some general traits associated with each style:

Auditory Learners
• Absorb information from spoken words by listening and talking
• Enjoy listening to dialog and dramatic re-enactments
• Often hum while working
• Talk to self and others to process new information
• Read using a phonetic approach

Visual Learners
• Remember best what they see
• Enjoy watching dramatic re-enactments
• Visualize things
• Like seeing graphs and charts to illustrate facts
• Get impatient listening for long periods of time

**Kinesthetic Learners**
• Like to move and fidget
• Learn best while doing something or being active
• Touch, manipulate, build, and try things
• Enjoy taking part in re-enactments
• Like hands-on experimentation

**Get A Handle On It:**
There are many low-tech ways to give children opportunities to use all of their senses while learning. The more senses or “handles” you put on information, the easier it is to “grasp” that knowledge. Kids learn more quickly and easily when several handles are attached to new information. Here are some examples of simple ways to add handles for each learning style:

**Auditory Handles**
• Encourage thinking out loud
• Listen to books on tape while reading along
• Tell stories or give examples while explaining information
• Utilize group discussion
• Try dramatic reading
• Use auditory mnemonics (memorization tricks) like rhymes

**Visual Handles**
• Draw (or refer to) diagrams, pictures, sketches, or illustrations while introducing information
• Utilize checklists to help students remember all of the steps of a task
• Use highlighters to organize information with color
• Look for ways to use visual media like film, video, or CD-ROM
• Use graphic organizers like timelines or word webs
• Show visual mnemonics (memorization tricks) such as picture clues

**Kinesthetic Handles**
• Allow for movement while learning
• Utilize manipulatives and simple gadgets
• Make learning multi-sensory and employ the sense of touch
• Try hands-on experimentation
• Assemble models
• Use role playing
• Make learning a game

Utilizing physical movement and tapping into a child’s senses will keep them engaged in learning. Helping children grasp new information by attaching sensory “handles” will allow them to learn in a more efficient and enjoyable way. Technology has given us many amazing tools to use with students. It is important to remember that low-tech/no-tech strategies remain valuable, complementary interventions that are often low-cost or no-cost tools.
Active Learning for Individuals Who Face Significant Multiple Disabilities

Linda J. Burkhart

Barriers for Children who Face Severe Multiple Challenges:

- **Obvious Barriers:**
  - Motor (may have very limited motor control and motor experiences)
  - Communication (non-verbal, minimally verbal, pre-verbal)
  - Sensory (Vision, hearing, tactile, proprioceptive)
  - Medical Concerns

- **Less Obvious Barriers** - Areas where we can have more impact
  - Passivity:
    - Out of necessity, these children may need to be dressed, fed and cared for - sometimes without even informal communication strategies to make choices and express opinions
    - Significant challenges may prevent these children from talking an active role in the learning process and daily routines
    - Sometimes they can use only "waiting" or "fussing" strategies for communication
  - Lack of Motivation:
    - They may experience repeated failures when efforts to participate or communicate are not successful.
    - They may not have the background knowledge or experiences to see the relevancy in a particular activity
    - They may have only a limited repertoire of interests and experiences
  - Sensory processing differences may may limit their ability to process information and impact relevancy and understanding
  - Cognitive Skills vs Experiences: Some of these children lack a broad base of knowledge, due to lack of experiences, sensory limitations, motor control, and/or medical complications (long hospital stays or environmental restrictions) Others, may have limited cognitive potential
  - Teachers, therapists, and/or families may lack specialized training in assistive technology and augmentative communication to engineer opportunities for leaning and interaction
  - Teachers, therapists, and/or families may have limited expectations for the child’s potential abilities
Problem of Learned Helplessness and Passivity
- Children who have not experienced much control and/or many successes in their lives can develop passivity and learned helplessness.
- Over time, the child can begin to see herself as a passive participant who is not able to be actively involved in learning.
- The child may focus his/her efforts on pleasing others, and become prompt dependent
- Once children develop learned helplessness, it is very difficult for the child to change his or her self-image
- Active participation in the learning process helps child to begin to experience some control
- Multiple and ongoing successes with active participation are needed to rebuild a feeling of "I can do it!"
- Technology can help, but technology alone is not enough!

Active Learning and Participation
- Active learning is vastly more effective than passive participation.
- Analogy to going on a guided tour vs. exploring on your own
- Children Need to See a Reason for Doing Something
- Provide adaptations and modifications to enable active participation
- Foster Initiation and Active Engagement
- No one likes to be told what to do
- Provide Strategic Feedback instead of Direct Prompts
- Prompt Least to Most to encourage initiation and active participation
- Limit or eliminate hand-over-hand assistance - try to support movement initiated by the child, instead of prompting the initiation of that movement
- Children Need to Feel a Sense of Competence

Engineer Choices and Control for the Child
- Continuously provide opportunities for making choices - enable the child to feel "In Control"
- Provide choices that matter and choices that are easy to discriminate
- Making choices helps to increase cognitive engagement and reduce passivity
- Provide appropriate means for learning to make choices: eye gaze, two hands, body touch points, talking switches, partner listing, etc.
- Use two switches with two different functions to allow the child to explore choosing each and observing the effect - Discovery learning / problem solving
• Set up choices for who, what when, where, how, and how many - within any activity
• Choose actions instead of just objects - actions can have a natural duration, that may lead to natural desire for repetition, objects have to be removed to be chosen again
• Provide multiple opportunities for meaningful choices throughout the day
• Engineer communication opportunities

**How Do Children Learn? How Can Technology Help?**
- The child is born with billions of neurons and trillions of neurological connections
- Through experience, children learn by creating/building/expanding sets of neurological connections known as a cognitive schema and they use these cognitive schema as the basis for understanding new experiences.
- “What Fires together, Wires Together”
- Learning is the process of strengthening connections, adding connections and discarding connections based on experience (The child’s cognitive schema for a particular concept is strengthened, expanded and refined)
- “Use it or Lose it!”
- Neural Networks or Cognitive Schema represent understanding about a concept that is processed in many areas of the brain to give a rich representation of all the aspects of that concept. For example, neurological connections related to one concept may extend to areas of the brain that process: visual, auditory, tactile, kinesthetic, olfactory, gustatory, vestibular, proprioception, function, cultural considerations, context and other associated concepts.
- Once a cognitive schema is in place it operates unconsciously in the background until there is a reason to pay attention to it
- Attention to any aspect of that cognitive schema immediately gives the person access to everything connected to that concept
- It is critical to teach concepts within natural contexts so that neurological connections for a given concept will be “wired” together for access later

**How Can You Help Children Develop Rich Cognitive Schemas?**
- The Brain is Pre-Wired to Look for Patterns and Make Comparisons to what is Known
- Memory is stored as patterns, not details
- When we see a difference in a pattern, we are compelled to attend to it.
- When we “See” a Difference in an Expected Pattern, We are Compelled to Attend to it and Process it!
- Patterns Can be Visual, Spacial, Auditory, Tactile, Kinesthetic, Temporal, Procedural, Cognitive, Linguistic, Multi-Modal, etc.
- Language is a Pattern. Our task is to:
  - Emphasize and Clarify the Patterns
  - Use Appropriate Modalities
  - Model Patterns in Context
  - Engineer Ways the Child can Actively Engage and Experiment
  - Provide Strategic, Clear Feedback
- Create communication displays: ‘light tech’ or ‘high tech’ that systematically arrange vocabulary, so the child can take advantage of the pattern and focus on the conversation, instead of searching for vocabulary (Such as PODD - Pragmatic Organization Dynamic Display - Gayle Porter, Melbourne, Australia)
- Patterns are learned through experience - not isolated drills
- Problem solving is critical to the process
- Mistakes and self-corrections are just as important as getting it ‘right’

The brain is pre-wired to look for patterns and make comparisons to what is known

Motivation for Active Learning:
- Nobody does anything without a reason that makes sense to them at the time - including young children
- Motivation for learning comes from within a person
- Inborn Drives:
  - 1. Curiosity and Intrigue
  - 2. for Autonomy and Sense of Self

Motivational Drive #1: Curiosity and Cognitive Intrigue as Motivation:
- Nothing is as powerful as the feeling of success when we have accomplished something on our own, or figured something out by ourselves.
- We all have a “need to know”

Linda J. Burkhart, linda@Lindaburkhart.com, http://www.Lburkhart.com
- Discovery learning is much more effective than teacher-directed lessons, because it is child initiated and child directed. Technology can allow for trial and error.
- Discovery Learning - Opportunities to learn from mistakes

**Provide "Repetition with Moderate Differences"** (Burkhart)

- Cause and effect learning - baby scientists
- Problem of habituation (Boredom develops with too much repetition that is not child-directed)
- Repetition is necessary for learning.
- Too much repetition can cause habituation
- Balance of Novel and Known
- Children learn by a process of gradually adding to what is known through comparisons and patterns.
- Help the child build associations and comparisons to known information
- Start with what the child understands. Patterns that make sense, and then provide repetition with moderate difference
  - This taps intrinsic motivation and assists learning
  - Helps the child relate new information to familiar information and build associations
- Personalize materials and use preferred/familiar items
- Use Multiple Modalities for better processing
- Set up activities for the child to use a combination of previous knowledge and trial and error to achieve success.
- Teach language in natural contexts throughout the day - not just in isolated activities
  - Natural contexts provide opportunities for repetition with variation
  - Emphasize communicative functions in a variety of natural contexts

**Motivational Drive #2: Autonomy - Inner drive to develop independence, control and sense of self:**

- Continuously provide opportunities for making choices - enable the child to feel "In Control"
- Making choices helps to increase cognitive engagement and reduce passivity
- Always provide "none of those" or "something else" as one of the choices
- Set up choices for who, what when, where, how, and how many - within any activity
- Provide multiple opportunities for meaningful choices throughout the day.
• Modify method of choice making for individual needs: eye-gaze, reaching, partner listing, touch points, etc.
• Provide children active experiences with early computer play where the child can direct the actions of the computer through simple choices and then observe the results.
• Allow for self-directed repetition instead of adult directed repetition.
• Use a prompt hierarchy of least to most
• Choices are important for active participation, but are not enough to provide children with a language system. Choices should be used in conjunction with a robust receptive and expressive aided language system, that can be modeled for the child in natural contexts in such a manner that the child can learn the patterns to use it expressively

**Motivational Drive #3: Social Connection - Inner Drive for social interaction and connection with other people:**

• Attention and connection with others are often powerful motivators.
• Pay attention to, and respond to, subtle signs and attempts at communication and interaction from the child.
• Engineer child-directed choice making that impacts how someone responds to them.
• Communicate a feeling of value or worth as a human being.
• Give children tasks that are truly appreciated by, or important to, someone else, and motivation is likely to be increased.
• Provide frequent opportunities for social interaction and connection with other people.
• Co-Planned Sequenced Social Scripts (Musselwhite, Burkhart 2004)
• Adapted Spinner games
# 1. Assistive Technology Ideas for Aids to Daily Living

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce clutter</td>
<td>Non slip materials – Dycem, shelf liner</td>
<td>Light switch extension</td>
</tr>
<tr>
<td>Daily schedule</td>
<td>Universal cuff to hold items in hand</td>
<td>Interface and switch to activate battery operated devices</td>
</tr>
<tr>
<td>Weekly schedule</td>
<td>Adapted drinking cup – i.e. Nosey Cup, cup with handles, weighted cup, cup with lid</td>
<td>Interface and switch to turn on electrical appliances (radio, fan, blender)</td>
</tr>
<tr>
<td>Color coding for location and identification</td>
<td>Adapted eating utensils with foam handles</td>
<td>Radio/ultrasound to remote-control appliances</td>
</tr>
<tr>
<td>Clear simple directions</td>
<td>Scoop plates, guards for plates</td>
<td>Electronic aid to daily living to control environment in connection with an augmentative communication device</td>
</tr>
<tr>
<td>Break information down into small steps</td>
<td>Rocker knife</td>
<td>Automatic self-feeder</td>
</tr>
<tr>
<td>Model the activity</td>
<td>Adapted cooking utensils</td>
<td>Books on tape</td>
</tr>
<tr>
<td>Provide examples</td>
<td>One handed can opener</td>
<td></td>
</tr>
<tr>
<td>Teach skill to over-learning and generalization</td>
<td>Button hook or loop</td>
<td></td>
</tr>
<tr>
<td>Establish routines and timelines</td>
<td>Adapted toothbrush</td>
<td></td>
</tr>
<tr>
<td>Provide lists</td>
<td>Raised toilet seat</td>
<td></td>
</tr>
<tr>
<td>Use pictures for cues, recipes, for lists</td>
<td>Toilet splash guard</td>
<td></td>
</tr>
<tr>
<td>Provide guided practice in real situations</td>
<td>Shower rails</td>
<td></td>
</tr>
<tr>
<td>Personal care assistant</td>
<td>Shower chair</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electric toothbrush</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long handle shoe horn</td>
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<tr>
<td></td>
<td>Adapted posts and pans with built-up handles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reachers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lowered counter/work space</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sock aid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bibs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dressing sticks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Velcro fasteners on clothing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Toilet aids</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Velcro shoe fasteners</td>
<td></td>
</tr>
</tbody>
</table>

### Computer/Software
- Organization/reminder software
- Software that teaches daily living skills
- Money skills for learning and for budgeting
- Internet access
- Writing with symbols
- Templates for writing
- Text-reading software

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## 2. Assistive Technology Ideas for Computer Access

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use built-in accessibility</td>
<td>• Adapted mouse</td>
<td>• Adapted or Alternative keyboards (various)</td>
</tr>
<tr>
<td>features of a computer</td>
<td>• Trackballs or trackpads</td>
<td>• Braille printers and displays</td>
</tr>
<tr>
<td>• Built-in spelling and</td>
<td>• Joystick</td>
<td>• Touch window</td>
</tr>
<tr>
<td>grammar check, thesaurus</td>
<td>• Head pointer/mouth stick</td>
<td>• Head pointing systems</td>
</tr>
<tr>
<td>• Glare reduction</td>
<td>• Magnifiers</td>
<td>• Scanners</td>
</tr>
<tr>
<td>• Adjust contrast</td>
<td>• Increase font size</td>
<td>• Optical Character Recognition (OCR)</td>
</tr>
<tr>
<td>• Change background, font</td>
<td>• Key guards</td>
<td>• Amplification</td>
</tr>
<tr>
<td>color</td>
<td>• Switches</td>
<td>• Eye pointing/camera systems</td>
</tr>
<tr>
<td>• Positioning at the computer,</td>
<td>• Numeric keyboard used as mouse</td>
<td>• Switch with Morse Code</td>
</tr>
<tr>
<td>optimal for client</td>
<td>• Key caps</td>
<td>• Switch with scanning</td>
</tr>
<tr>
<td>• Lighting</td>
<td>• Stickers on keys</td>
<td>• Magnification software</td>
</tr>
<tr>
<td>• Arms supported as needed</td>
<td>• Moisture guards</td>
<td>• Voice recognition software</td>
</tr>
<tr>
<td>• Peer support or assistance</td>
<td>• Keyboard covers, flaps and templates</td>
<td>• Screen readers</td>
</tr>
<tr>
<td>• Participation in group</td>
<td>• Letter board</td>
<td>• Text readers</td>
</tr>
<tr>
<td>activities</td>
<td>• Key caps with Braille</td>
<td>• Word prediction</td>
</tr>
<tr>
<td></td>
<td>• Tactile displays for alternate keyboards</td>
<td>• Abbreviation/expansion software</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• On-screen keyboard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Predictive keyboards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Computer access from Augmentative Alternative Communication (AAC) device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interactive whiteboard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interactive whiteboard software</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Preprogrammed multiswitch input boxes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Programmable multiswitch input boxes</td>
</tr>
</tbody>
</table>

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3. Assistive Technology Ideas for Hearing

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pen/pencil for writing</td>
<td>• Flashing light for signaling phone, doorbell, fire alarm</td>
<td>• TDD/TTY for phone access with or without relay</td>
</tr>
<tr>
<td>• Picture communication</td>
<td>• Carbonless note taking paper</td>
<td>• Closed captioning</td>
</tr>
<tr>
<td>• Sign language or finger spelling</td>
<td>• Talk about it — feelings cards</td>
<td>• Real time captioning</td>
</tr>
<tr>
<td>• Dry erase board</td>
<td>• Vibrating alert</td>
<td>• Hearing aid</td>
</tr>
<tr>
<td>• Meaning of facial expressions, gestures, body language</td>
<td>• Vibrating alarm</td>
<td>• Cochlear implant</td>
</tr>
<tr>
<td>• Always face the student/client</td>
<td>• Phone amplification</td>
<td>• Personal amplification system</td>
</tr>
<tr>
<td>• Gently touch shoulder to gain attention</td>
<td></td>
<td>• FM loop or loop system</td>
</tr>
<tr>
<td>• Gain attention before you start speaking</td>
<td></td>
<td>• Infrared system</td>
</tr>
<tr>
<td>• Speak slowly, naturally and clearly</td>
<td></td>
<td>• Auditory trainer</td>
</tr>
<tr>
<td>• Do not exaggerate your lip movements</td>
<td></td>
<td>• Environmental alerting devices</td>
</tr>
<tr>
<td>• Break up longer sentences into smaller ones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Repeat new vocabulary in different contexts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sequence topics relating to that previously learned</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Use written announcements for assignments, due dates, exam dates, changes in schedule, special event dates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Provide outline of lesson/activity in advance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Use captioned films, videos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Avoid seating in heavy traffic areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Seat near speaker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Do not talk while writing at the chalkboard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Eliminate background noises</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Avoid standing where light source can cause glare when speaking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Work from concrete to abstract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Keep your hands away from your face when speaking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Maximize the use of visual media</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Establish an in-case-of-emergency procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Use a note-taker or interpreter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Computer/Software
- Portable word processor
- Computer aided note-taking
- Screen flash for alert signals on computer

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4. Assistive Technology Ideas for Math

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce clutter on desk</td>
<td>Manipulatives (blocks, magnetic objects, etc.) with or without templates</td>
<td>Talking calculators</td>
</tr>
<tr>
<td>Seating position</td>
<td>Abacus (regular or enlarged)</td>
<td>Printing calculators</td>
</tr>
<tr>
<td>Extended time for assignments/tasks</td>
<td>Visual cues (# line, posters, templates, etc.)</td>
<td>Braille calculator</td>
</tr>
<tr>
<td>Reduced or alternative assignments/tasks</td>
<td>Note cards with terms/symbols as memory triggers</td>
<td>Calculator with large keys, LCD, printout</td>
</tr>
<tr>
<td>Use clear, simple directions with examples and checks for comprehension</td>
<td>Use fact charts or Math dictionary</td>
<td>Voice output measuring devices</td>
</tr>
<tr>
<td>Peer tutor/cross age tutor &amp;/or volunteer</td>
<td>Dotted, highlighted or graph paper to line up math problems</td>
<td>Tactile graphics &amp;/or measuring tools</td>
</tr>
<tr>
<td>Allow manipulatives/counters/calculators</td>
<td>Graph paper for place value</td>
<td>Conversion calculators</td>
</tr>
<tr>
<td>Functional application of math skills</td>
<td>Circle or highlight computation sign</td>
<td>Coin-U-Lator</td>
</tr>
<tr>
<td>Adapt worksheets and packets</td>
<td>Calculators</td>
<td>Computer/Software</td>
</tr>
<tr>
<td>Teach &quot;counting on&quot; &amp; other math strategies</td>
<td>Dice made with large squares of foam</td>
<td>On-screen calculator</td>
</tr>
<tr>
<td>Alter type of information (i.e. give answer first)</td>
<td>Counting mat or boxes</td>
<td>Enlarged &amp;/or talking &amp;/or printing calculator</td>
</tr>
<tr>
<td>Use visual cues (see light tech)</td>
<td>Number line on desk</td>
<td>Software with templates for computation</td>
</tr>
<tr>
<td>Large print</td>
<td>Mini whiteboard/chalkboard</td>
<td>Software for manipulation of objects</td>
</tr>
<tr>
<td>Use alternative page set-ups</td>
<td>Alter workbooks/worksheets</td>
<td>Accessibility Options in Control Panel</td>
</tr>
<tr>
<td>Reduce number of items on page</td>
<td>Flash cards w/ string &amp; beads attached</td>
<td>Software for adapted input methods</td>
</tr>
<tr>
<td>Provide adequate space for students to write out solutions</td>
<td>Walking number line on floor</td>
<td>Simulation software for money skills, budgeting, etc.</td>
</tr>
<tr>
<td>Follow a standard format for worksheets</td>
<td>Multiplication grid</td>
<td>Math talking worksheet software</td>
</tr>
<tr>
<td>Use white space, boxes to fill in, individual cards with answers or answered problem</td>
<td>Lined paper turned sideways for columns</td>
<td>Spreadsheet software</td>
</tr>
<tr>
<td>Eliminate need to copy problems</td>
<td>Card holders</td>
<td>Graph making software</td>
</tr>
<tr>
<td>Minimize number of items on page</td>
<td>Number stamps</td>
<td>Interactive online math activities</td>
</tr>
<tr>
<td>Avoid mixing &quot;signs&quot; on page</td>
<td>Computational aides</td>
<td>Word Equation Editor</td>
</tr>
<tr>
<td>Teach imagery techniques</td>
<td>Containers for counters</td>
<td>paint program to complete worksheet</td>
</tr>
<tr>
<td>Use mnemonic devices</td>
<td>Tangrams</td>
<td>PowerPoint activities</td>
</tr>
<tr>
<td>Use &quot;Finger Math&quot;</td>
<td>Geoboards</td>
<td>Math freeware and shareware</td>
</tr>
</tbody>
</table>

http://klingon.cs.iupui.edu/~aharris/chis/chis.html

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# 5. Assistive Technology Ideas for Reading

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Seating position</td>
<td>• Slant board</td>
<td>• Electronic book readers</td>
</tr>
<tr>
<td>• Extend time for assignment/tasks</td>
<td>• Book holder</td>
<td>• Voice recorder with/without adapted controls</td>
</tr>
<tr>
<td>• Use alternative assignments/tasks</td>
<td>• Page flufflers to help turn pages</td>
<td>• Electronic/talking dictionary/thesaurus</td>
</tr>
<tr>
<td>• Seating needs (hearing, seeing, distractibility, noise level, traffic pattern, near teacher or peers, etc.)</td>
<td>• Page extenders to turn pages</td>
<td>• Electronic page turner</td>
</tr>
<tr>
<td>• Desk modifications (lip on one side, match height to student, remove bin from underneath, stand rather than sit, use two desks to allow for movement)</td>
<td>• Laminate book pages</td>
<td>• Devices with speech output</td>
</tr>
<tr>
<td>• Reduce clutter on desk</td>
<td>• Enlarged print</td>
<td>• Reading pens</td>
</tr>
<tr>
<td>• Supply appropriate reading level</td>
<td>• High contrast materials</td>
<td></td>
</tr>
<tr>
<td>• Provide means for self-selection of books</td>
<td>• Tactile enhancements</td>
<td></td>
</tr>
<tr>
<td>• Reduce # of items and/or items on a page</td>
<td>• Lighting adjustments (more, less, direction)</td>
<td></td>
</tr>
<tr>
<td>• Tape tests, untimed tests, or use a reader</td>
<td>• Books on tape</td>
<td></td>
</tr>
<tr>
<td>• Allow alternative methods to demonstrate comprehension</td>
<td>• Highlight key points in textbooks and notes</td>
<td></td>
</tr>
<tr>
<td>• Select question format carefully</td>
<td>• Rubber tabs to turn page</td>
<td></td>
</tr>
<tr>
<td>• Teach and review test-taking vocabulary</td>
<td>• Paper clips and a magnet to turn pages</td>
<td></td>
</tr>
<tr>
<td>• Teach strategies to prepare for different types of tests/assignments</td>
<td>• Loose-leaf notebooks and page protectors</td>
<td></td>
</tr>
<tr>
<td>• Provide extra cues or prompts</td>
<td>• Word/sentence windows to guide reading</td>
<td></td>
</tr>
<tr>
<td>• List critical vocabulary for content material</td>
<td>• Eye gaze to choose books</td>
<td></td>
</tr>
<tr>
<td>• Provide discussion questions before reading</td>
<td>• Large print books</td>
<td></td>
</tr>
<tr>
<td>• Easy access to books</td>
<td>• Pictorial directions</td>
<td></td>
</tr>
<tr>
<td>• Discuss assignments before reading</td>
<td>• Add pictures, symbols, and/or signs</td>
<td></td>
</tr>
<tr>
<td>• Use extra space between lines of print</td>
<td>• Label important items in room</td>
<td></td>
</tr>
<tr>
<td>• Change text size, spacing, colors, etc.</td>
<td>• Classroom devices with speech output</td>
<td></td>
</tr>
<tr>
<td>• Use student interest</td>
<td>• Teacher-created books</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Letter/word tiles, scrabble tiles, magnetic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Highlight/mark syllables or target words</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Magnifying ruler/word windows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mini-flashlight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Word searches, crosswords, mazes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reading window, showing one line of text</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Props to support comprehension</td>
<td></td>
</tr>
</tbody>
</table>

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6. Assistive Technology Ideas for Recreation and Leisure

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Special Olympics</td>
<td>• Toys adapted with Velcro, magnets, handles; for switch activation</td>
<td>• Arm supports</td>
</tr>
<tr>
<td>• Big Brothers</td>
<td>• Adapted sporting equipment</td>
<td>• Electronic aids to control TV, VCR, CD and DVD players</td>
</tr>
<tr>
<td>• Big Sisters</td>
<td>• Lighted or beeping balls</td>
<td>• Swimming pool lift</td>
</tr>
<tr>
<td>• Scouts</td>
<td>• Universal cuff/strap to hold objects</td>
<td>• Modified transportation</td>
</tr>
<tr>
<td>• Exercises, program and adaptive equipment</td>
<td>• Modified utensils</td>
<td>• Adapted playground equipment</td>
</tr>
<tr>
<td>• Modify game rules for simplicity</td>
<td>• Modified stamps with handles</td>
<td>• Special trikes, bikes</td>
</tr>
<tr>
<td>• Pinch hitter</td>
<td>• Adapted spinners</td>
<td>• Closed captioning</td>
</tr>
<tr>
<td>• Interpreter – oral, sign, visual</td>
<td>• Playing card holder</td>
<td>• Brailled games</td>
</tr>
<tr>
<td>• Field trip – accessible bus</td>
<td>• Water wings</td>
<td>• Electronic book readers</td>
</tr>
<tr>
<td>• Research whether facility is accessible</td>
<td>• Safety helmet</td>
<td>• MP3 players with adaptations</td>
</tr>
<tr>
<td></td>
<td>• Tape recorder</td>
<td><strong>Computers/Software</strong></td>
</tr>
<tr>
<td></td>
<td>• Enlarged print</td>
<td>• Draw and paint programs</td>
</tr>
<tr>
<td></td>
<td>• Picture books</td>
<td>• Computer games</td>
</tr>
<tr>
<td></td>
<td>• Lifted pages; page fluffers</td>
<td>• Simple access game spinners</td>
</tr>
<tr>
<td></td>
<td>• Templates</td>
<td>• Single switch software</td>
</tr>
<tr>
<td></td>
<td>• Book stands or holders</td>
<td>• Voice recognition software</td>
</tr>
<tr>
<td></td>
<td>• Ramp in the sand</td>
<td>• Sticky keys</td>
</tr>
<tr>
<td></td>
<td>• Adaptive devices for eating out</td>
<td>• Touch screen</td>
</tr>
<tr>
<td></td>
<td>• Switches</td>
<td>• Interactive white board</td>
</tr>
<tr>
<td></td>
<td>• Grips</td>
<td>• Programmable multi-switch input boxes</td>
</tr>
<tr>
<td></td>
<td>• Pool cue holder</td>
<td>• Pre-programmed multi-switch input boxes</td>
</tr>
<tr>
<td></td>
<td>• Driving aids</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Spin art</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• One-handed fishing rod</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Adapted puppet stands</td>
<td></td>
</tr>
</tbody>
</table>

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### 7. Assistive Technology Ideas for Seating, Positioning, and Mobility

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferential seating for location and lighting</td>
<td>Towel rolls</td>
<td>Lifts</td>
</tr>
<tr>
<td>Inquire in advance if bus is accessible</td>
<td>Pillows</td>
<td>Standers</td>
</tr>
<tr>
<td>Physical assistant</td>
<td>Cushion</td>
<td>Motion table</td>
</tr>
<tr>
<td>Person-assist for walking</td>
<td>Wagons</td>
<td>AFO’s</td>
</tr>
<tr>
<td>Person-assist for moving</td>
<td>Wedges</td>
<td>Braces</td>
</tr>
<tr>
<td>Adjust height of table and chair</td>
<td>Bolsters</td>
<td>Manual wheelchair</td>
</tr>
<tr>
<td></td>
<td>Tumbleform chairs</td>
<td>Power chair</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Powered scooter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adapted vehicle for driving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Powered door opener</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adapted stroller</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lift chairs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tilt-in-space system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tilt tables</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power lift systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specialty wheelchairs</td>
</tr>
</tbody>
</table>

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### 8. Assistive Technology Ideas for Speaking

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Quiet environment</td>
<td>- Dry erase board</td>
<td>- Electronic/talking dictionary/thesaurus</td>
</tr>
<tr>
<td>- Facing the communicator</td>
<td>- Communication book</td>
<td>- Communication devices</td>
</tr>
<tr>
<td>- Maintaining eye gaze</td>
<td>- Story boards</td>
<td>- Multiple level voice output</td>
</tr>
<tr>
<td>- Writing the message down (esp. for students with ASD)</td>
<td>- Post-it notes</td>
<td>- Paper displays</td>
</tr>
<tr>
<td>- Visual choices</td>
<td>- Cheat sheets showing location of words/sentences on a communication device</td>
<td>- Dynamic screen displays</td>
</tr>
<tr>
<td>- Multiple choices</td>
<td>- Letter communication board</td>
<td>- Spelling based system</td>
</tr>
<tr>
<td>- Pointing to pictures/letters/objects</td>
<td>- Object tray</td>
<td>- Computers w/ communication software</td>
</tr>
<tr>
<td>- Adding pictures to objects; schedules; bulletin boards</td>
<td>- Mirror</td>
<td>- Cell phone with texting</td>
</tr>
<tr>
<td>- Allow single word communication</td>
<td>- Single message devices</td>
<td>- Passy Muir Valve</td>
</tr>
<tr>
<td>- Sign language</td>
<td>- Step listing devices</td>
<td>- Electro-larynx</td>
</tr>
<tr>
<td>- Gestures</td>
<td>- Recipe cards</td>
<td></td>
</tr>
<tr>
<td>- Peer groups</td>
<td>- Talking picture frames/photo albums</td>
<td></td>
</tr>
<tr>
<td>- Teacher uses clear speech models</td>
<td>- Mealtime placemat</td>
<td></td>
</tr>
<tr>
<td>- Provide clear feedback</td>
<td>- Activity specific language boards</td>
<td></td>
</tr>
<tr>
<td>- Reflect back what the speaker has said</td>
<td>- Electronic book reader</td>
<td></td>
</tr>
<tr>
<td>- Modify activity for increased practice</td>
<td>- Talking books</td>
<td></td>
</tr>
<tr>
<td>- Provide extra cues and prompts</td>
<td>- Amplifiers</td>
<td></td>
</tr>
<tr>
<td>- Allow for increased practice</td>
<td>- Communication notebooks</td>
<td></td>
</tr>
<tr>
<td>- Partner models using communication system that student is learning</td>
<td>- Communication flipbooks</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Connect learning to students’ lives and prior knowledge</td>
<td>• Organizers for materials (drawers, bins, etc.)</td>
<td>• Recorded materials (i.e. books on tape)</td>
</tr>
<tr>
<td>• Reduce clutter on desk</td>
<td>• Organizers for desk</td>
<td>• Tape lectures with number coded index</td>
</tr>
<tr>
<td>• Clear, simple directions, check comprehension</td>
<td>• Highlight key words and instructions</td>
<td>• Mini pocket recorders</td>
</tr>
<tr>
<td>• Prioritize tasks with time suggestions</td>
<td>• Use a “Notebook Control System”</td>
<td>• Portable electronic organizers, date books, etc.</td>
</tr>
<tr>
<td>• Use peers/cross-age tutors/volunteers</td>
<td>• Use Post-it notes, flags</td>
<td>• Digital recorder/voice organizer</td>
</tr>
<tr>
<td>• Attach assignments, schedule, checklist, timetable, etc. to desk</td>
<td>• Highlighter tape/pens and erasable pens</td>
<td>• Videotape lesson for later review</td>
</tr>
<tr>
<td>• Allow separate settings for tests/assignments</td>
<td>• NCR paper for notes</td>
<td>• PDAs</td>
</tr>
<tr>
<td>• Have student arrive early to go over day’s play, preview materials or tasks</td>
<td>• Record instructions</td>
<td></td>
</tr>
<tr>
<td>• Provide daily and weekly assignment sheets</td>
<td>• Supplementary, multi-modality materials</td>
<td></td>
</tr>
<tr>
<td>• Use alternative page set-ups</td>
<td>• Vocabulary files, cards, or books</td>
<td></td>
</tr>
<tr>
<td>• Model the activity or provide examples</td>
<td>• Pre-label, highlight, punch and collate handouts</td>
<td></td>
</tr>
<tr>
<td>• Break information into steps</td>
<td>• Pictorial schedule/assignments</td>
<td></td>
</tr>
<tr>
<td>• Home texts/materials for preview/preview</td>
<td>• Color-coded filing system (index tabs, folders, notebooks, book covers, etc.)</td>
<td></td>
</tr>
<tr>
<td>• Seating needs and position</td>
<td>• Voice output reminders for assignments, studying, steps of task, schedule, etc.</td>
<td></td>
</tr>
<tr>
<td>• Pre-teach vocabulary</td>
<td>• Study sheets to organize material</td>
<td></td>
</tr>
<tr>
<td>• Teach study skills and self monitoring</td>
<td>• Change lighting (light on desk, back to window)</td>
<td></td>
</tr>
<tr>
<td>• Use cooperative learning groups</td>
<td>• Book holders</td>
<td></td>
</tr>
<tr>
<td>• Provide guided practice</td>
<td>• Overlays/acetate on text pages</td>
<td></td>
</tr>
<tr>
<td>• Routines for handing in work, heading papers, etc.</td>
<td>• List of confusing words</td>
<td></td>
</tr>
<tr>
<td>• Provide essential fact list</td>
<td>• Business cards/mailing labels</td>
<td></td>
</tr>
<tr>
<td>• Photocopy information ahead of time</td>
<td>• Combination analog/digital watches</td>
<td></td>
</tr>
<tr>
<td>• Prepare summary of important facts with blanks to be filled in by student</td>
<td>• Phone dialers</td>
<td></td>
</tr>
<tr>
<td>• Use physical cues/gestures</td>
<td>• Talking clocks</td>
<td></td>
</tr>
<tr>
<td>• Cover parts of page/worksheets</td>
<td>• Day-timers, schedulers and planners</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Headphones with white noise or music</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Flashlight or light pointer</td>
<td></td>
</tr>
</tbody>
</table>

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10. Assistive Technology Ideas for Transition to Adult Life

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide social opportunities</td>
<td>• Picture recipe cards</td>
<td>• Calculator that writes checks</td>
</tr>
<tr>
<td>• Visit community centers</td>
<td>• Picture cards for transportation</td>
<td>• Portable word processor</td>
</tr>
<tr>
<td>• Use of self care devices</td>
<td>• Picture schedules</td>
<td>• Personal digital assistant (PDA)</td>
</tr>
<tr>
<td>• Use of AAC devices or systems</td>
<td>• Timer</td>
<td>• Reminder system</td>
</tr>
<tr>
<td>• Create peer support</td>
<td>• Alarm clock</td>
<td>• Accessible phone/communication system</td>
</tr>
<tr>
<td>• Friends as support services</td>
<td>• Simplified budget system</td>
<td>• Emergency alert system</td>
</tr>
<tr>
<td>• Recreation mentor</td>
<td>• Calculator, regular or talking</td>
<td></td>
</tr>
<tr>
<td>• Provide access to the internet</td>
<td>• Communication wallet</td>
<td></td>
</tr>
<tr>
<td>• Group home placement</td>
<td>• Emergency info system</td>
<td></td>
</tr>
<tr>
<td>• Companion</td>
<td>• Picture/large button phone</td>
<td></td>
</tr>
<tr>
<td>• Vocational education training</td>
<td>• Memory dial</td>
<td></td>
</tr>
<tr>
<td>• Teach to recognize symptoms, health needs</td>
<td>• Talking watch/clock</td>
<td></td>
</tr>
<tr>
<td>• Job shadowing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Job coaching to obtain volunteer position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Job coaching to obtain paid employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SAT/GED testing in an alternative format</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Icon-based instructions, maps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Shopping list template</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Visual budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Training to travel independently</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Multi-agency collaboration, planning</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Computer/Software
- Talking word processor
- Accessible internet access
- Text reader
- Planning/organizing software

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## 11. Assistive Technology Ideas for Vision

<table>
<thead>
<tr>
<th>STRATEGIES AND MODIFICATIONS</th>
<th>LIGHT-TECH</th>
<th>HIGHER-TECH</th>
</tr>
</thead>
<tbody>
<tr>
<td>‣ Oral presentation of material, directions, tests</td>
<td>‣ Dark pens</td>
<td>‣ CC-TV</td>
</tr>
<tr>
<td>‣ Contrast</td>
<td>‣ Markers</td>
<td>‣ Magni-Cam</td>
</tr>
<tr>
<td>‣ Reduce glare</td>
<td>‣ Writing guides, including checks, letters, envelopes</td>
<td>‣ Large button calculator, phone, keyboards, remote controls</td>
</tr>
<tr>
<td>‣ Large print</td>
<td>‣ Check-writing guide</td>
<td>‣ Large numbered clocks</td>
</tr>
<tr>
<td>‣ Color overlays</td>
<td>‣ Large print address book, calendar</td>
<td>‣ Braille clocks and watches</td>
</tr>
<tr>
<td>‣ Sans serif fonts (Arial, Tahoma)</td>
<td>‣ Large print check register</td>
<td>‣ Talking clocks and watches</td>
</tr>
<tr>
<td>‣ Peer note taking</td>
<td>‣ Abacus</td>
<td>‣ Laser cane</td>
</tr>
<tr>
<td>‣ Carbonless paper for note taking</td>
<td>‣ Tactile ruler</td>
<td>‣ 3-in-1 tracker</td>
</tr>
<tr>
<td>‣ Raised line paper</td>
<td>‣ Pill minder</td>
<td>‣ Talking books; Recorded books</td>
</tr>
<tr>
<td>‣ Dark lined paper</td>
<td>‣ Four track player/recorder</td>
<td>‣ Braille books</td>
</tr>
<tr>
<td>‣ Glue or raised paint guides</td>
<td>‣ Braille label writer</td>
<td>‣ Talking thermometer</td>
</tr>
<tr>
<td>‣ Guides made with Wikki sticks</td>
<td>‣ Magnifiers (various)</td>
<td>‣ Speaker phone</td>
</tr>
<tr>
<td>‣ Textures cues</td>
<td>‣ Label maker</td>
<td>‣ Talking scale</td>
</tr>
<tr>
<td>‣ Textures boards</td>
<td>‣ Tactile overlays</td>
<td>‣ Voice announcer for caller ID</td>
</tr>
<tr>
<td>‣ Slant boards</td>
<td>‣ Walking stick</td>
<td>‣ Self-threading sewing machine</td>
</tr>
<tr>
<td>‣ Orientation training</td>
<td>‣ Mobility cane with roller tip</td>
<td>‣ Braille or talking compass</td>
</tr>
<tr>
<td>‣ Mobility training</td>
<td>‣ Adapted rec-leisure equipment</td>
<td>‣ Talking tape measure</td>
</tr>
<tr>
<td>‣ Position at activity</td>
<td>‣ Clothing markers</td>
<td>‣ Voice recognition organizer</td>
</tr>
<tr>
<td>‣ Tactile cues</td>
<td>‣ Clip holders for cane</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‣ Cane pouches and holsters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‣ Wooden board and cell slate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‣ Braille stylus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‣ Bagel biter or trap</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‣ Food chopper</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‣ Cutting board with slicing guide</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‣ Audible battery tester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‣ Liquid level indicator</td>
<td></td>
</tr>
<tr>
<td></td>
<td>‣ Raised letter &amp; Braille measuring cups/spoons</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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# 12. Assistive Technology Ideas for Writing

<table>
<thead>
<tr>
<th>Strategies and Modifications</th>
<th>Light-Tech</th>
<th>Higher-Tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extend time for assignments/tasks</td>
<td>Pencil grips/holders</td>
<td>Labeler</td>
</tr>
<tr>
<td>Reduce or use alternative assignments/tasks</td>
<td>Short pencil stub</td>
<td>Electronic/talking dictionary/thesaurus</td>
</tr>
<tr>
<td>Adjust seating position (90° x 90° x 90°)</td>
<td>Pens with different grips</td>
<td>Digital recorder/voice organizer</td>
</tr>
<tr>
<td>Peer “scribe” for note taking or dictation</td>
<td>Sentence strips</td>
<td>Portable note-taker (regular or Braille)</td>
</tr>
<tr>
<td>Seating needs (hearing, seeing, distractibility, noise level, traffic pattern, front/back of room, near teacher or peers, etc.)</td>
<td>Straps/splints; “T” holder for pencil</td>
<td>Portable word processor, with or without word prediction, word banks, built-in dictionaries</td>
</tr>
<tr>
<td>Desk (wheelchair accessible, laptop, tilt, flip top desk, lip on side of desk, large table, stand rather than sit, study carrel, etc.)</td>
<td>Spinner with parts of story</td>
<td>Computer</td>
</tr>
<tr>
<td>Reduce clutter on desk</td>
<td>Eye gaze symbol or alphabet boards</td>
<td>• Word processors, w/ or w/o speech feedback</td>
</tr>
<tr>
<td>Allow word cards, spelling list, hints, etc.</td>
<td>Wrist weight/hold down</td>
<td>• Spelling and grammar checker</td>
</tr>
<tr>
<td>Allow alternative methods, i.e. oral report</td>
<td>Slat board or easel; or use 3” 3-ring binder</td>
<td>• Keyguard (with reduced # of keys)</td>
</tr>
<tr>
<td>Do not penalize for misspellings, poor writing or grammar on draft</td>
<td>Dycem/other material to prevent slippage</td>
<td>• Keyguard (for all keys)</td>
</tr>
<tr>
<td>Allow single word or short answers</td>
<td>Name/number/date/stamps</td>
<td>• Alternative mouse and/or keyboard</td>
</tr>
<tr>
<td>Give multiple choice tests</td>
<td>Magnetic letters and board/cookie sheet</td>
<td>• Accessibility Options in Control Panel</td>
</tr>
<tr>
<td>Allow either printing or cursive</td>
<td>Line indicators (raised line, w/ mid-line, etc)</td>
<td>• Screen/text reader</td>
</tr>
<tr>
<td>Use checklists to help get started</td>
<td>Sections on paper (draw lines, fold, etc.)</td>
<td>• Word processor “forms” feature</td>
</tr>
<tr>
<td>Teach and review test-taking vocabulary</td>
<td>Type of paper (graph, textured, colored, etc.)</td>
<td>• Enlarged or Braille key caps, labels, covers</td>
</tr>
<tr>
<td>Provide models of writing tasks</td>
<td>Provide extra white spaces</td>
<td>• Screen flasher when sound is emitted</td>
</tr>
<tr>
<td>Lighting adjustments (more/less/direction)</td>
<td>Highlight or color code special words or parts of speech</td>
<td>• Alternative methods to access keyboard (mouseticks, headsticks, electronic)</td>
</tr>
<tr>
<td>Provide outline/lecture notes beforehand</td>
<td>Put less information on page</td>
<td>• On-screen keyboard</td>
</tr>
<tr>
<td>Provide spelling journals</td>
<td>High contrast colors</td>
<td>• Touch window/screen</td>
</tr>
<tr>
<td>Brainstorm ideas before beginning to write</td>
<td>“Post-it” notes for “fill in the blank” tests</td>
<td>• Switch control (single or multiple)</td>
</tr>
<tr>
<td>Use remnant books for topic setting</td>
<td>Word cards, book, wall or file</td>
<td>• Utilities to enlarge the cursor, hold Windows open, assist with click/drag, etc.</td>
</tr>
<tr>
<td>Develop idea lists for topic setting</td>
<td>Pocket dictionary/thesaurus</td>
<td>• Voice recognition</td>
</tr>
<tr>
<td>Model using the writing instrument used by student</td>
<td>Pencil/pen attached to desk</td>
<td>• Software strategies (word prediction, abbreviation expansion, etc.)</td>
</tr>
<tr>
<td>© 2009 – Developed by Easter Seals Southwest Human Development AT Program, Phoenix, Arizona. Adapted from a project in collaboration with the Arizona Department of Education</td>
<td>Word/sentence windows</td>
<td>• Software for organization and expression</td>
</tr>
<tr>
<td>Trace letters/numbers/words with highlighter</td>
<td>Trace letters/numbers/words with highlighter</td>
<td>Graphic organizer software</td>
</tr>
<tr>
<td>Stencils to trace letters</td>
<td>Tactile letters/words</td>
<td>Software for screen magnification</td>
</tr>
<tr>
<td>Draw/paint software</td>
<td></td>
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</tr>
</tbody>
</table>
FCTD
Assistive Technology Glossary

It is important for parents to understand the “language” of assistive technology so they can be informed advocates for their child’s technology needs. The following glossary of terms can help parents learn about the kinds of assistive technologies that are currently available and how they can be used.
Abbreviation Expansion Software:
Abbreviation Expansion Software is used to help individuals become more efficient writers. This software will automatically expand words or phrases based on pre-programmed commands that have been entered by the user. An example of an abbreviation used is first and last initials will be expanded into a name. The Abbreviation Expansion Software allows the user to minimize the number of keystrokes necessary to produce a written piece. It is often combined with word prediction programs or specialized keyboard assistance programs.

Accessibility Features:
Accessibility features are various options that exist within products that allow a user to adjust the settings to their personal needs. Products can come with various accessibility features that can adjust to the individual’s visual, mobility, hearing, language, and learning needs. Accessibility features allow individuals with disabilities to use products that may not otherwise be useful. They also serve as a piece of assistive technology because adjustments are being made to help the individual.

Access Utility:
An access utility is a software program that modifies a standard keyboard to simplify operation of the keyboard, replace the mouse, substitute visual cues for sound signals, or add sound cues to keystrokes. Many basic modifications can be made through software that already exists on your computer. Altering font size, color contrast, and adding or modifying audio alerts can all be done without purchasing additional software. “Sticky keys” are another very useful modification tool that can be made using existing software. Sticky keys allow an individual to type one key at a time, sequentially, and experience the same results as holding down multiple keys simultaneously. For example, instead of holding down CTRL-ALT-DELETE at the same time, the individual can select each key, one at a time.

Accommodations:
In the context of education, an accommodation is a change in the format or presentation of educational materials so that a student with a disability can complete the same assignment as other students. Accommodations can also include changes in setting, timing, scheduling, and/or response mechanisms. Students who receive accommodations may be allowed to: listen to audio versions of textbooks, record classroom lessons, use calculators, submit a drawn picture of key concepts rather than a written report, and work with a “study buddy” or notetaker. There are dozens of accommodations that can change a student’s experience from frustration to success if teachers, aides, and parents are creative.
Activities of Daily Living:
Frequently used in national surveys as a way to measure self-care activities, ADLs include basic tasks such as eating, bathing, dressing, toileting, getting in and out of a chair or bed, and getting around at home. National surveys also measure another level of self-care – Instrumental Activities of Daily Living (IADLs) – which include household chores, meal preparation, business activities, shopping, telephone use and mobility outside the home.

Adaptive Technologies:
Adaptive technologies are a type of assistive technology that includes customized systems that help individuals move, communicate, and control their environments. Adaptive technologies are designed specifically for persons with disabilities and include augmentative and alternative communication devices, powered wheelchairs, and environmental control systems.

Adult Services:
After an individual reaches the age of majority (typically 18), services provided to them are considered adult services. These are governed and administered by different laws and agencies and are not generally considered to be an entitlement, but rather are made available based on need and resource availability.

Age of Majority:
The age of majority is the legal age established under state law at which an individual is no longer considered a minor and, therefore, has the right and responsibility to make the legal choices that adults make. In most states, the age of majority is 18. However, the parents/guardians of youth with certain levels and types of disability may apply to delay the transfer of decision-making authority.

Aids for Daily Living:
Another category of assistive technology, these self-help aids help people with disabilities eat, bathe, cook and dress. A “low tech” example would be a fingernail brush with two suction cups attached to the bottom that could stick onto a flat surface in the bathroom. Such an ADL would allow a child with limited mobility to clean her nails without having to grip the brush. There are also “high tech” ADLS, many of which contain computerized components.

1 Deluxe Suction Nail Brush - Photo courtesy of AbleData
2 UskeEaters™ Curved Utensils - Photo courtesy of Accessible Environments, Inc.
Alternative Access/Input Device:
An alternative access/input device allows individuals to control their computers using tools other than a standard keyboard or pointing device. Examples include alternative keyboards, electronic pointing devices, sip-and-puff systems, wands and sticks, joysticks, and trackballs.

Alternative Keyboard:
Alternative keyboards may be different from standard keyboards in size, shape, layout, or function. They offer individuals with special needs greater efficiency, control, and comfort. For example, a traditional QWERTY keyboard may be confusing to a child with a developmental disability and can be replaced with a keyboard that lists letters A-Z in big, bold letters and doesn’t contain a lot of “extra” keys. This makes focusing on spelling and typing words a lot easier.

Ambulation Aids:
These devices help people walk upright and include canes, crutches, and walkers.

Americans with Disabilities Act:
The Americans with Disabilities Act of 1990 (ADA) prohibits employers from discriminating against people with disabilities and makes such discrimination a civil rights violation. Providers of public services, schools, public buildings and public transportation services also must provide accessibility to people with disabilities.

Architectural Adaptations:
Architectural adaptations are physical changes in the home, school, workplace, or other area. Adaptations that remove or reduce physical barriers include ramps, lifts, lighting, altered counter top heights and widened door frames.

Articulated Forearm Support:
An articulated forearm support follows the user’s movements and drastically reduces the muscle work involved in sustained keying or mouse use.

Assessment:
An assessment is a formal process of gathering information about a child’s strengths, weaknesses and needs in order to plan his educational services. File and portfolio reviews, tests, and obser-
vations may be used to get information on cognitive, social, emotional, and functional abilities.
An assistive technology assessment is designed to identify appropriate AT devices and services.
The most useful assessments are generally those conducted within an individual’s “customary
environment” rather than in an unfamiliar testing site. (See Ecological Vocational Assessment
and Functional Vocational Assessment, which are related specifically to employment.)

Assistive Listening Device (ALD):
Assistive listening devices (ALDs) are used to aid individuals with hearing impairments to hear
more clearly in public situations. The system can be set up to amplify things such as televisions,
radios, doorbells, and PA systems. ALDs can be used with or without hearing aids.

Assistive Technology Device:
An assistive technology (AT) device includes any item, piece of equipment, or product system that
is used to increase, maintain, or improve the functioning of individuals with disabilities. It may
be purchased commercially off the shelf, modified, or customized. The term does not include a medical
device that is surgically implanted, or the replacement of such a device. AT devices range from low
technology, such as a magnifying glass to high tech, such as a computer that responds to touch and allows a
child to communicate more effectively.

Assistive Technology Evaluation:
This functional evaluation of a child in his/her customary environment focuses specifically on the
child’s need for assistive technology. While it is conducted by a team of professional evaluators,
input from family members and other knowledgeable personnel is sought in order to identify
the child’s strengths and challenges. Some people use the terms “assessment” and “evaluation”
interchangeably, while others use “assessment” to refer to the process that takes place before a
child receives an AT device, and “evaluation” to refer to the process (and resulting document)
that studies how well the device has worked for the child.

Assistive Technology Interventions:
Assistive Technology intervention refers to the use of various types of technology in order make
things more accessible to individuals with disabilities as well as help them with various academic
tasks. AT interventions can be used to help students access reading, writing, math, and other
instructional curriculum.

1 Alternative Keyboard - Photo courtesy of Intellitools
2 Pencil Grip - Photo courtesy of My School Shop
**Assistive Technology Service:**
An assistive technology service is one that directly assists in the selection, buying, designing, fitting, customizing, maintaining, repairing, replacing, and coordinating of assistive technology devices. It also includes the training of students, teachers, therapists and family members on the use and maintenance of the device.

**Augmentative and Alternative Communication (AAC) System:**
An AAC system is one that increases or improves the communication abilities of individuals with receptive or expressive communication impairments. The system can include sign language, graphical symbol systems, synthesized speech, dedicated communication devices, and computer applications. AAC technology spans a wide range of products, from low-tech picture boards to high-tech speech recognition programs.

**Auxiliary Aids and Services:**
Under the Americans With Disabilities Act, professionals and organizations must communicate as effectively with people with disabilities as they do with others. Auxiliary aids and services assist in this effort. Auxiliary aids may include taped texts, interpreters or other effective methods of making materials usually delivered orally available to students with hearing impairments; readers in libraries for students with visual impairments; classroom equipment adapted for use by students with manual impairments; and other similar services and actions.

**Battery Interrupter:**
A battery interrupter allows a user to modify battery-operated devices for switch input. It is placed between the battery and its connection point in the battery compartment. The compartment is notched to allow the cord to pass through when closed. The device is left in its ON position, with the switch plugged into the input jack of the battery interrupter.

**Braille:**
This raised dot printed language is used by many people with visual impairments. Each raised dot arrangement represents a letter or word combination. A great deal of information about Braille is available through the National Federation for the Blind at http://www.nfb.org/nfb/Braille_Initiative.asp.
Braille Display:
A Braille display is a tactile device consisting of a row of special "soft" cells. A soft cell has 6 or 8 pins made of metal or nylon; the pins are controlled electronically and move up and down to display characters as they appear on the display of a computer or Braille note taker. A number of cells are placed next to each other to form a soft or refreshable Braille line. As the pins of each cell pop up and down, they form a line of Braille text that can be read by touch.

Braille Embossers and Translators:
A Braille embosser transfers computer-generated text into embossed Braille output. Translation programs convert text that has been either scanned or typed into Braille that can be printed on the embosser.

Captioning:
This is a text transcript of the audio portion of multimedia products, such as movies and television programs. Captioning is synchronized with the visual events taking place on screen. In addition to its usefulness for those with hearing impairments, it has been shown to be helpful to students with a range of visual and auditory processing problems. It has also been shown to enhance learning for those without disabilities.

Career Awareness and Exploration:
A young person develops career awareness by learning what a career is and by being able to identify different types of jobs, and the functions of each, within different career paths. Career exploration takes the process a step further by identifying specific career paths and jobs that might be suitable for a particular individual.

Community Participation:
Community participation is a functional goal for most individuals with disabilities. To accomplish this goal, young people are encouraged to be interested in, and are taught how to engage in community-based activities. Assistive technology devices can be very helpful in facilitating community participation. You should not be afraid to ask others to help adapt appropriate environments; the Americans with Disabilities Act is on your side!

1 Braille Lite M20 - Photo courtesy of Freedom Scientific
D

Descriptive Videos: Descriptive videos are those that have been enhanced with narration that describes the visual elements of action, characters, locations, costumes and sets without interfering with the production’s dialogue or sound effects. They allow individuals with blindness or other vision impairments to enjoy a video in greater depth.

Digitized Speech: Digitized Speech is speech that has been digitally recorded for later play-back. As it is a recording, the quality is good and easy to understand. Digitized speech may be used in CD-Roms for talking stories, in encyclopedias, and in software packages where teachers and students are able to record sounds, words and sentences themselves. Digitized speech has a finite, predetermined vocabulary and so does not offer full access to mainstream software.

Due Process Hearing: Parents and/or guardians may request a due process hearing if they are unable to resolve differences with a school or school system concerning the special education services being provided to their child. A due process hearing is more formal than mediation (see below) and the parties are generally represented by attorneys and/or advocates. An impartial hearing officer hears both sides of the dispute and issues a written decision within 45 calendar days of the hearing request. If either the parents or the school disagree with the decision, they may appeal through the court system.

Durable Medical Equipment (DME): Durable Medical Equipment (DME) is any piece of equipment that is used to serve a medical purpose, can withstand repeated use, and is appropriate for use in the home. It is expected to last for a substantial period of time. Durable medical equipment can include devices, controls, or appliances specified in an individual’s plan for medical care. The equipment is used to help increase the individual’s ability to perform various activities of daily living or to communicate with the community in which they live. DME can include items necessary for life support, supplementary supplies and equipment necessary for the proper functioning of such items.

E

Early Intervention Services: Early intervention services are provided under Part C of the Individuals with Disabilities Education Act (IDEA), which addresses the needs of infants and toddlers with disabilities – from birth to age three – and their families. Services are made available based on a federal grant program which directs states to evaluate the needs of both the child and his or her family and to set measurable outcomes for progress in an Individualized Family Service Plan (IFSP).
Ecological Vocational Assessment:
Also known as a situational assessment, this specially-focused professional evaluation looks at particular employment tasks and job sites to determine whether the person with disabilities can perform necessary tasks and, if so, with what accommodations and other supports. It evaluates the degree to which the demands of a job and the skills of an individual are a good match.

Electronic Pointing Devices:
These devices allow an individual to control the cursor on a computer screen (or other computerized device) using ultrasound, an infrared beam, eye movements, nerve signals, or brain waves. When used with an on-screen keyboard, electronic pointing devices also allow the user to enter text and data.

Environmental Control Unit (ECU):
ECUs enable individuals to control electronic devices in their environment through a variety of alternative access methods, such as switch or voice access. ECUs can control lights, televisions, telephones, music players, door openers, security systems, and kitchen appliances. These systems are also referred to as Electronic Aids to Daily Living (EADL).

Eye Gaze Board:
An eye gaze board is a clear Plexiglas board that is used as a simple communication device. Pictures are mounted at strategic areas on the board and the user communicates by looking at a selected picture.

Evaluation:
Evaluation is both a product and a process. An evaluation is the result of assessment activities in which a team of professionals (e.g., teachers, counselors, and/or service providers) determine whether a child is eligible for early intervention services (birth to three), whether the child has a disability, and what special education and other services s/he might need.
**F**

**FAPE:**
This abbreviation stands for “free and appropriate public education.” It is the term used in the IDEA law, which states that school systems must provide children with disabilities with special education services and accommodations, including AT, at no cost to the parents. The law does not say what is considered an “appropriate” education, but it does refer to the need for children to be taught in the most typical classroom setting possible, often referred to as the “least restrictive environment.”

**Functional Vocational Assessment:**
This is an assessment of a person’s ability and desire to do a job by observing his or her performance on various tasks in a variety of job settings. This type of assessment should record not only the ease or difficulty with which a person is able to complete particular tasks, but also affective information – whether the person appears relaxed and happy while doing the job or unduly stressed and agitated during or after completing the tasks. A functional assessment might also include an individual’s ability to get to and from a job and their ability to get along with co-workers.

**H**

**Higher Education:**
Higher education refers to a course of study that takes place after high school, typically at formal educational institutions such as colleges, universities, or trade schools. As discussed earlier, institutions of higher learning are not required by law to provide accommodations; however, an increasing number are doing so as a means of encouraging student enrollment. The responsibility is on the student, however, to request accommodations and to provide documentation of need.

**I**

**Independent Living Centers (ILCs):**
Also known as Centers for Independent Living (CILs), ILCs are typically non-residential, community organizations that advocate for people with disabilities. The centers promote full access to housing, transportation, employment, recreation, and other support services.

**Individualized Education Program (IEP):**
Each public school child who receives special education and related services must have an Individualized Education Program (IEP). The IEP should be a truly individualized document and include such information as present levels of functioning, future goals, and services to be pro-
vided. By law, the IEP process must consider the need for assistive technology. If documented in the IEP, schools must provide AT devices and services. The IEP creates an opportunity for teachers, parents, school administrators, related services personnel, and students (when appropriate) to work together to improve educational results for children with disabilities. At age 16, IEPs must contain a statement of services needed for successful transition from high school to a youth’s next environment. (An IEP team may, however, determine that a statement of transition services should be included in a younger child’s IEP.)

**Individualized Family Services Plan (IFSP):**

Like an IEP, an IFSP is a written statement of an infant’s or toddler’s (birth to age three) developmental status, information about his family’s needs and abilities to support his learning and development, and a list of outcomes for the child and the family to achieve. The IFSP describes the services the child will receive, how these will be delivered and how the child will transition to his next environment. The document should identify a service coordinator to work with the family to monitor and achieve the goals established.

**Individualized Transition Plan (ITP):**

The ITP is the portion of a child’s IEP that focuses on the issues associated with his or her transition from high school to higher education, employment, or individual living. The ITP should be as specific as possible, identifying the child’s interests, goals, current educational status, remaining educational needs (such as credit hours), current and projected assistive technology needs, and the steps that need to be taken to help the child move smoothly to post-high school settings.

**Infrared Sender/Receiver:**

This is a device commonly found in an environmental control unit (ECU). An infrared signal is sent to the control unit, which in turn sends a signal to the appliance. These are usually small and portable and vary in size and shape. They can be used in different areas of a room, but the remote must be aimed at the control box, with nothing in its path.

**Integrated Employment:**

This is a category of employment in which a person with disabilities works alongside people without disabilities without major systemic supports.

**J**

**Joysticks:**

A joystick may be used as an alternate input device. Joysticks that can be plugged into the computer’s mouse port can control the cursor on the screen. Other joysticks plug into game ports and depend on software that is designed to accept joystick control.

1 Roller II Joystick - Photo courtesy of Avoga
K

Keyboard Additions:
A variety of accessories have been designed to make keyboards more accessible to people with disabilities. **Keyguards** are hard plastic covers with holes for each key. Someone with an unsteady finger or using a pointing device can avoid striking the wrong key by using a keyguard. **Moisture guards** are thin sheets of plastic that protect keyboards from spills and saliva. **Alternative labels** add visual clarity or tactile information to the keys.

Keyboard Emulator:
A keyboard emulator is a device that is connected to or resides in a computer and imitates the computer’s keyboard in function and performance.

L

Local Transition Councils:
LTCs are state interagency councils made up of representatives from the state agencies involved in supporting student transitions within K-12 education and, especially, transitions from secondary school to post-secondary activities.

LRE:
The abbreviation LRE stands for “least restrictive environment.” This means that, to the maximum extent possible, children with disabilities are educated with children who do not have disabilities. Removal from a general educational classroom occurs only when a student cannot be successfully taught in that setting even with assistive aids and services.

M

Mediation:
In the context of AT, mediation is a process to resolve disagreements between parents and school personnel. It is provided at no cost to the family or the school district. Both parties must agree to mediation. A neutral trained mediator facilitates the meeting to help both parties resolve their disagreements. Mediation is more structured than conciliation but less formal than a...
due process hearing. The most recent revision of the Individuals with Disabilities Education Act (IDEA) strongly encourages the use of mediation.

**Mentoring:**
Mentoring is a process through which an individual with experience in a certain area provides information and insight to a less experienced person. Mentors can be matched with “mentees” through formal programs or through informal family friendships and connections, or community contacts. Mentors can be valuable sources of inspiration and support to young people. Their focus may be on education, career development, and/or independent living. Mentoring sessions may involve in-person meetings, but may also be based on email and/or telephone communication.

**Mobility and Transportation Aids:**
This category of AT includes products that help mobility-impaired persons move within their environment and give them independence in personal transportation. Products include standing or walking aids, transfer aids, stair lifts, walkers, scooters, wheelchairs and three-wheeled chairs, adapted bikes and tricycles, car seats or beds, stretchers, ramps, strollers, adapted driving controls, vehicle conversions, patient and wheelchair lifts and carriers.

**Online Community Support:**
Online communities and online support are websites, listservs, chat rooms, and other electronic ways for people to communicate with each other about a topic of mutual interest.

**Onscreen Keyboard:**
Onscreen keyboards are software-generated images of a standard or modified keyboard placed on the computer screen. The keys are selected by a mouse, touch screen, trackball, joystick, switch, or electronic pointing device.

**Optical Character Recognition and Scanners:**
Optical character recognition (OCR) software works with a scanner to convert images from a printed page into a standard computer file. With OCR software, the resulting computer file can be edited. Pictures and photographs do not require OCR software to be manipulated.

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1 Onscreen Keyboards - Photo courtesy of Zygo, USA
Personal Assistance Services (PAS):
Personal assistance services help people with disabilities complete daily tasks needed for successful participation in school, work, and community living. They include, but are not limited to, dressing, eating, personal hygiene, shopping, and home/office organization.

Pointing and Typing Aids:
A pointing or typing aid is typically a wand or stick used to strike keys on the keyboard. They are most commonly worn on the head, held in the mouth, strapped to the chin, or held in the hand.

Portable Word Processor:
Portable Word Processors are often lightweight and inexpensive devices that can be easily taken from place to place. The device provides access to word processing without a computer. Some portable word processor products also include various organization features such as those in a personal digital assistant (PDA). Text can also be downloaded from the device to a computer or to a printer for saving and printing.

Postsecondary Accommodations:
Postsecondary accommodations in educational settings typically include: 1) modifications to the curriculum or educational tasks in college-level coursework or vocational training, and 2) tools, devices or services that help a student better access course material, participate in class, and submit assignments. Postsecondary accommodations in the workplace include equipment and services that help an individual get and keep a job. They include modifications to tasks, routines, and the workplace environment.

Postsecondary Activities:
Postsecondary activities are those that a child with disabilities can pursue after leaving high school. They are both formal and informal activities, and may include education, employment, recreation, independent living, and community participation.

Postsecondary Education:
Postsecondary education is formal education that a child with disabilities can pursue after completing high school. Examples are vocational programs, community college, college or university and continuing education. An increasing number of colleges and universities have programs designed to support students with a range of needs – physical, cognitive, and behavioral.

1 Tracker Pro Pointing Aid - Photo courtesy of Medentec
Prosthetic and Orthotics:
Prosthetic and orthotics include replacement, substitution or augmentation of missing or malfunctioning body parts with artificial limbs or other orthotic aids. This includes splints, braces, foot orthosis, helmets, restraints, and supports.

R

Receiving Environment:
The receiving environment is the setting to which a child with disabilities is transitioning. For example, if a child is transitioning from high school to assisted living, the assisted living situation would be the receiving environment.

Related Services:
Related services are any additional support services that a child needs in order to benefit from his or her education. Such services include, but are not limited to: school-related transportation, medical evaluation, parent counseling and training, developmental and corrective services such as speech pathology, psychological services, physical and occupational therapy, and recreation. Interpreters, while not specifically on the list, must be provided by the school system if needed for a child to benefit from education services.

S

Screen Enlargement Programs:
Screen enlargement programs magnify a section of a computer screen, increasing visibility for users with limited vision. Most programs have variable magnification levels and some offer text-to-speech options.

Screen Reader:
A screen reader is a software program that uses synthesized speech to “speak” graphics and text aloud. This type of program is used by people with limited vision or blindness or with a print disability, such as dyslexia.

Seating and Positioning Aids:
Seating and positioning aids offer modifications to wheelchairs or other seating systems. They provide greater body stability, upright posture or reduction of pressure on the skin surface. Equipment includes wheelchair cushions, trunk/head supports, modular seating, and seating lifts.

1 HELPReader screen reader - Photo courtesy of AbleData
Sheltered Employment:
Also known as extended employment, sheltered employment takes place in a facility that is dedicated to employing persons with disabilities who need extensive supports in order to work.

Speech Recognition Programs:
These software applications convert words that are spoken aloud to text. Speech recognition is designed to respond to a wide range of voices, without prior “training” of the software. Voice or speaker recognition, on the other hand, involves the training of a device to recognize a specific individual’s voice. Both speech and voice recognition programs may be used to create written documents without the use of a keyboard, to control specially adapted equipment, and to operate telephone, cell phone and PDA (personal digital assistant) applications.

Switches and Switch Software:
Switches offer an alternative method of providing input to a computer when it is not possible to use a standard keyboard or mouse. Switches come in various sizes, shapes, methods of activation and placement options. Some software programs have been developed specifically for use with a switch and can employ on-screen scanning. With on-screen scanning, the computer highlights the options available to the user, who then selects the desired action. When a visual or auditory prompt indicates a specific keyboard or mouse function, the user activates the switch and the desired function occurs. Other programs have built-in options for switch use.

Summary of Performance:
A summary of performance is an overview of a student’s academic achievement and functional abilities. It includes recommendations to help the student meet his or her postsecondary goals.

Supported Employment:
According to the U.S. Department of Labor, “Supported employment facilitates competitive work in integrated work settings for individuals with the most severe disabilities (i.e. psychiatric, mental retardation, learning disabilities, traumatic brain injury) for whom competitive employment has not traditionally occurred, and who, because of the nature and severity of their disability, need ongoing support services in order to perform their job. Supported employment provides assistance such as job coaches, transportation, assistive technology, specialized job training, and individually tailored supervision.”

1 Tash Mini Relax Switch - Photo courtesy of Tash
Talking Word Processors:
Talking word processors are software programs that provide audio feedback as the student writes. As each letter is typed and each word is written, the device will “speak” it aloud. Many of these inexpensive writing programs also incorporate powerful tools for reading. Students with learning disabilities often find that having written material read aloud helps them to better edit, understand and organize their projects. These programs may offer other accommodations as well, such as enlarging text size and changing the color of text and graphics.

Technical Assistance:
Technical assistance is a set of informational, educational, and related services intended to help an individual or organization build capacity and/or achieve goals.

Text to Speech Programs:
This software converts written text, including Word documents, Web pages, PDF files, and emails into audio files that play on a computer, CD-ROM player, MP3 device, IPod or other digital audio playback equipment. Developed for individuals with low vision or blindness, text to speech technology has improved greatly, with natural sounding voices, greater conversion speed, and improved ease of use.

Touch Screens:
A touch screen is a device placed on or built into the computer monitor that allows direct activation of the computer, or selection of a program, through a touch on the screen.

Transition:
Generally, transition describes a process of major change from one set of circumstances to another. For children with disabilities, transitions occur when they move from early childhood settings (e.g., home or daycare) to school and, later, between school phases (e.g., middle school to high school) or from secondary school to postsecondary education, work and/or community living.

Transition Services:
Transition services are a coordinated, results-oriented set of activities – based on the strengths, interests, and needs of a child with a disability – that help the student move from a K-12 school setting to other postsecondary environments, including postsecondary education, vocational...
training, integrated employment, adult services, independent living, or community participation. Transition services can include instruction, occupational and speech/language therapy, guided community experience, development of employment and other adult living objectives and, when appropriate, the acquisition of daily living skills and functional vocational evaluation.

**TTD or TTY:**
This is a telecommunications device for the deaf. TTY/TTD is a device with a keyboard that sends and receives typed messages over a telephone line.

**U**

**Universal Design (UD):**
This is an approach to the design of products and environments that is aimed at making them accessible to all people, both those with and without disabilities. Examples of universally designed environments include buildings with ramps, curb cuts, automatic doors, widened doorways, and door handles (rather than knobs).

**Universal Design for Learning (UDL):**
Universal Design for Learning is the design of instructional materials and activities that make learning goals achievable by individuals with wide differences in their abilities to see, hear, speak, move, read, write, understand English, organize, engage, and remember. UDL is achievable via flexible curricular materials and activities that provide alternatives for students with differing abilities. These alternatives are built into the instructional design and operating systems of the educational materials; they are not added on after-the-fact.

**V**

**Video Phone:**
A video phone has a screen that permits users to conduct real-time audio and visual conversations. It is useful for those who use sign language to communicate and for individuals who do not have access to medical and diagnostic personnel. Increasingly assessments, including assistive technology assessments, are being conducted at a distance using video phone technology.

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1. Clarity IIIP Ameriphone TTY Phone & Answering System with Printer - Photo courtesy of Amazon.com
2. D-Link GV/C 3000 Video Phone - Photo Courtesy of Gallaudet University

www.fctd.info
Vocal Output Communication Aid (VOCA):
A Voice Output Communication Aid (VOCA) is an electronic device that generates spoken language for individuals who are unable to use natural speech to express their needs and to communicate with others during a conversation. These devices are intended solely for communication purposes.

Vocational Assessment:
There are two types of vocational assessment: functional and ecological. A functional vocational assessment is an evaluation of a person's ability and desire to do a job by observing her performance on various tasks in a variety of job settings. An ecological vocational assessment focuses on particular employment tasks within a designated job site to determine whether the person with disabilities can perform those specific tasks and if so, with what accommodations and supports.

Vocational Rehabilitation (VR):
Vocational rehabilitation services, sometimes referred to as “Voc Rehab,” are services provided to individuals with disabilities so that they can develop the skills and motivation to find, secure and hold a job.

Vocational Rehabilitation Agency:
Vocational rehabilitation agencies are publicly-funded state agencies that assist youth with disabilities in their transition from school to work. These agencies seek to help such youth become integrated, independent, employed members of the community.

Voice Recognition:
Different types of voice recognition systems (also called speech recognition) are available. Voice recognition allows the user to speak to the computer, instead of using a keyboard or mouse, to input data or control computer functions. Voice recognition systems can be used to create text documents such as letters or email, to browse the Internet, and to navigate among applications and menus.

W

Web Accessibility:
Universal accessibility to the World Wide Web means that all people, regardless of their physical or developmental abilities, have access to Web-based information and services. Making Web pages accessible is accomplished by designing them to work with adaptive technologies, such

1 Say-It! SAM Tablet - Photo courtesy of Empowering Access

Family Center on Technology and Disability www.fctd.info
as screen readers. It also means making color, font size, and page design decisions that make it possible for the widest range of individuals to access the information.

**Word Prediction Programs:**
Word prediction programs allow the user to select a desired word from an on-screen list located in a prediction window. The computer-generated list predicts words based on the first or second letter(s) typed by the user. The word may then be selected from the list and inserted into the text by typing a number, clicking the mouse, or scanning with a switch.

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**X**

**X-10 Unit:**
X-10 is a communications “language” that allows compatible products to talk to each other using the existing electrical wiring in one's home. Most X-10 compatible products are very affordable and, because they use existing wiring, no costly rewiring ("retro-fitting") is necessary. Installation is simple; a transmitter is installed in one location in the home and sends its control signal to a receiver in another location.

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1. Word Prediction Software screenshot
Cost Effective Assistive Technology Solutions for the Workplace

Poornima Attigupam, Rehab Engineer, MS (USA)
Head, Assistive Technology Program, Sneha Kiran, Mysore Spastics Society, Karnataka

Assistive Technology (AT) by definition refers to any “product, device, or equipment, whether acquired commercially, modified or customized, that is used to maintain, increase, or improve the functional capabilities of individuals with disabilities” (as per the USA Assistive Technology Act of 1998). It could range from a simple footrest to a sophisticated device for communication or aids for computer access. In general, it is any piece of equipment that helps an individual with disability to regain independence where it is most required. It includes simple aids for daily living, mobility devices such as wheelchairs, sensory aids (hearing aids, & visual aids), communication aids, ergonomic seating, barrier free architectural aids, adaptive hardware and software aids for computer access, environmental controls, just to name a few.

It is interesting to note how simple tasks like opening a door, turning on the lights, or entering a building is taken for granted by those with normal function. However, the very same simple task poses to be a herculean task for individuals lacking the ability to perform the task. For, how can a person in a manual or power wheelchair get into a building with steps and no ramp access or elevator? How can a paraplegic with limited hand function open a door with a handle that is too high to reach? When even such simple tasks are hard to accomplish, one can imagine the challenges confronted in a work place situation. The present day technology provides innumerable options to compensate for the loss of function and help the individual perform a particular task independently. It could be a simple portable ramp to sophisticated options for augmentative communication and devices to work on the computer. Whether it is an office setting, an industrial/workshop setting, or working from home, Assistive Technology offers a wide gamut of solutions which shall be outlined very briefly in this article.

Unless the individual is assessed for functional abilities and an in-depth onsite evaluation of the workplace is conducted, it is not possible to provide specific solutions as each case and work scenario is unique. A thorough understanding of the limitations of the individual and the nature of their job duties and tasks is critical to identify the needs and recommend appropriate and feasible solutions. However, to give a generalized idea, a few examples and commonly used aids in the industrial and office settings are presented here.

One of the foremost issues is transportation and accessing the workplace. If that is taken care of by wheelchair accessible vehicles, or alternative arrangements by providing a wheelchair for home use and another for the work place, then, it is imperative for the building to be barrier free with the help of ramps and elevators. Given that the individual can access the worksite, the employer can further accommodate by assigning parking spaces immediately next to the entrance of the building, providing an office or workstation close to the door or elevator, providing required work desk height to accommodate the individual in a wheelchair, accessible bathrooms, sinks, and toilets, grab bars, door openers, lever handles for doors, etc.

In an industrial set-up some of the cost effective solutions include shock absorbing mats to reduce the stress on the knees for those who need to be standing up, sit/stand stools which help relieve strain on the lower back, knees, and feet for assembly line workers, retractable tool hangers that hold
the tool such as a small drilling machine or other tools for small parts assembly, height adjustable work tables (manual crank type are inexpensive), for those working with small parts assembly, height adjustable and swing away storage bins to reduce reaching out too much, and the list goes on. Individuals suffering from arthritis greatly benefit from using tools (pliers, screw drivers, etc.) with cushioned handles. This concept can be customized to any tool they need to use by covering the handle of the tool with a high density foam tube or covering (in case the adapted tool is not commercially available). For small parts assemblers dealing with small screws, bolts and nuts, tools with a magnetic tips are available. This helps those with poor fine motor control to pick up very small parts easily.

Often, in the case of contract workshops or in where the tasks are packing, counting parts, bagging, or such repetitive tasks, customized jigs prove cost effective and beneficial. Depending on the functional abilities and limitations of the individual, simple wooden and/or metal jigs could be designed and fabricated at a very low price to accomplish the task and improve productivity. For example, if the task requires bagging parts, a jig to hold the bag at the end of a fixed chute on the work table frees the hands to count and pick the parts, etc. If the job involves gripping of something like a lid or a part to put a sticker on and if the surface is slippery, a piece of slip resistant material like Dycem (available in India) cut out for the working area of the desk could solve the problem. Innovative simple ideas are implemented to serve the purpose and ease the task.

Likewise, innumerable are the challenges faced in an office setting. Thought it may be thought of as a relatively sedentary job, it poses difficulties of its own kind. For instance, a clerk with acute carpal tunnel syndrome secondary to prolonged typing for several years has lost complete function of one hand for typing due to permanent damage. What is the fate of this person whose livelihood depends on this job? Thanks to Assistive Technology, now there are solutions even for such cases. A simple, cost effective solution is to learn how to type with one hand using one-hand typing tutorials. Alternately, one can learn how to use a one-handed keyboard. They can return to their jobs in a matter of 3-4 weeks of training. Different kinds of one-handed keyboards for both PC and Macintosh are available. Options to convert the regular keyboard layout as a one handed keyboard is also popular as it allows both normal users and one-hand users to use the same keyboard. Of course, now with efficient voice recognition software readily available, it is even simpler as the user can just speak into the microphone which is then translated to text. With the increasing demand and competition, the software is quite reasonably priced given the effectiveness and the long term benefits it offers. Similarly, adaptive mouse emulators are of great help in this age of computers which has invariably become a necessity rather than a luxury in today's world. For more severely challenged, with very limited functional capabilities virtual keyboards are available that can be used with switch scanning methods or by a head mouse or visual eye gaze systems as an alternate mode of keyboarding.

Employees in the computer industry (IT/BT) who work on the computer all day long are prone to upper/lower back problems, neck and shoulder pain, headaches, and other vision related issues resulting from poor posture and office setup. Ergonomic seating and positioning is the key to these problems. Sometimes, just re-organizing the work desk helps in reducing the effort to reach out for things frequently used. Simple aids such as foot stools at the appropriate height to support the feet helps relieve lower back pain. Adjusting the desk height, monitor height, keyboard positioning, using a good ergonomic chair with lumbar support and adjustable arm height/angle features helps reduce the issues. Accessories such as wrist rest, mouse pad with gel supports, document holders, monitor settings (brightness, contrast), anti-glare screens, and lighting in the office help accommodate the individual. Although these may appear to be simple solutions, they prove to be extremely effective in the long run. Again, in a call center scenario where the individual is expected to be online and on phone all day long, a cordless headset with adjustable volume booster in lieu of a desk phone comes
to the rescue by freeing their hands to work on the keyboard and in preventing stain on their neck and shoulder.

Assistive Technology also includes several options for those with sensory problems such as low or poor vision, hard of hearing cases, etc. For example, an individual with low vision working on the computer might find it strenuous with a standard monitor. A larger monitor with better resolution would prove beneficial along with adjusting the zoom settings. Cost free solutions here include adjusting the resolution, zoom settings, contrast, and increasing the font size etc. In the recent versions of Microsoft Windows operating system, the “Accessibility Options” in Windows XP or “Ease of Access Center” as it is called in Windows 7 offers a built in screen magnifier that enlarges portions of the screen up to 16 times. On screen virtual keyboard, text to speech option and a simple version of voice recognition are also incorporated in Windows 7. Telephones and /or headsets with special volume enhancers and noise cancellation features are available for those with hearing loss or those who use hearing aids. Vibrating beepers are useful for the hard of hearing in a workplace like in the case of a bell boy working for a hotel. If he is in some location on the hotel premises and is needed elsewhere, his supervisor could just beep him on a vibrating beeper which is of various types. Strobe light signalers are also used to get the attention of individuals with hard of hearing whether it is to indicate the ringing of a telephone or a door bell or to indicate emergency alarm system.

Thus, for every type of challenge or an obstacle at the workplace, it is possible to find a feasible solution. Solutions need not necessarily be expensive commercially available aids. Based on the demands of the workplace, functional abilities and limitations, most importantly the budget, it is possible to come up with relatively cost effective solutions. Sometimes, modifying a commercial device may be necessary. In other cases, even though it is expensive, implementation might be worthwhile considering the long term goals and its impact on the productivity rate. A one-time investment could either save a job or create gainful employment that pays off in the long run. It is not uncommon to consider skills transfer or training the individual for a different position in the same firm or industry in the event the existing job duties and tasks are not practical for the individual.

It is evident that the present conditions here in India lack facilities to accommodate the needs of the physically challenged in all respects. Whether it is accessibility in the public areas, accommodation for transportation, provision of vocational training, or creating job opportunities, desperate measures are required to integrate them into the mainstream society. It calls for extensive awareness generation in the community and business sectors. Vocational rehabilitation must be emphasized and opportunities must be created. Information dissemination about Assistive Technology and its role in enabling an individual perform tasks helps convince potential employers along with tax incentives and other such benefits. It cannot be denied that there is much to accomplish and no efforts must be spared to promote vocational rehabilitation.
Inclusive Education and Assistive Technology

Dr. Prabha Hariharan
Independent Educationist and Researcher

Inclusive classrooms demand that all students be included and involved in appropriate learning activities during class time. My PhD study was planned in the United States, where the special education had already embarked on the ‘inclusive education’ idea for some time and my dissertation was conducted in India, where the idea of had just started out. In my study, I learnt that, in our country, there exists a big gap in understanding the process and definitions of ‘inclusive education’ by the stakeholders of the education system.

While the government has mandated all schools to admit students with mild and moderate disabilities, it is only the government run schools that are following this mandate. Although a few exceptions exist, where private schools admit students with disabilities, only some of them really work to bring these students into the general education system. Again, this is done through remediation outside of the regular classroom. The use of assistive technology as a means to achieve successful ‘inclusive classrooms’ is yet to happen. Assistive technology can be a tool to compensate for a difficulty that a student with a disability is facing thereby, ensuring that the student is able to keep learning (Edyburn, 2002). Another important idea is that of Universal Design for Learning (UDL) (Rose, Meyer, Rappolt & Strangman, 2002), that proposes to proactively prepare a learning environment keeping in mind the possible learning differences amongst students in a classroom.

Two major challenges we face in our system are the heavy syllabus and rigid timetables that disallow students to read anything more that what is in the textbook or the teacher to allot any extra time for a unit in general. In doing so, they leave no much scope to create conducive environment for inclusive education. The requirements of an inclusive classroom should be first well understood by all stakeholders in the education system and the necessary change should be brought about in the way we deliver the education if we are to make ‘inclusive education’ a reality in our schools. These changes need to begin at the level of individuals’ attitudes, and include curriculum, syllabus, timetable planning, access to assistive technology and infrastructure planning. There also needs to be a shift in the way and times we assess students. The move here should be to include specific skills assessment rather than just the content retention assessment done nowadays.

As an example, one major learning activity is reading. Reading can be a challenging task for students due to a variety of reasons. These reasons could be related to either the student or to the reading material which is predominantly the textbook. Reasons of reading problems related to the student include delay in or lack of development of basic reading skills such as phonological awareness, decoding, vocabulary, fluency and comprehension strategies. Reasons pertaining to the text emanate from the fact that the printed text is inherently inflexible.

Printed text is the most common form of curriculum material used in schools across the world. Its main advantages have been the possibility to accumulate and preserve written information for a long time and to be able to make multiple copies that can be used by many individuals. The main aim of texts and textbooks in schools is to impart content information which students are expected to read and learn from. These textbooks present a one-size-fits-all format while students in a classroom vary either narrowly of widely in their reading abilities.
As a first step, for an inclusive class to be successful, we need a way to assess reading abilities of all children early in the elementary school. Once the reading levels are known, and the areas of reading difficulty are known, technology can be used to address the varying reading abilities in a classroom, without negatively impacting students’ learning even in content areas.

One such way is to make the text accessible using digital text and modifying it (Dyck and Pemberton, 2002; Edyburn, 2003; Hariharan, 2007, unpublished dissertation). For example, audio support can be built into a text presented on a page such that the student can click on that button a listen to the text rather than read it. Magnifying tools can be added to the electronic text page to enable the student to read magnified text. If a student has difficulty understanding the words in a text, inbuilt meanings could be embedded using hypertext. If a student has trouble understanding the content, information organizers such as concept maps, tables or flow charts, etc., can be used to present the text. For such students, it would be helpful to convert text into a set of formats that will be suitable for students with different reading abilities. Exploration of such tools for use in the inclusive classroom and studying their effectiveness are vital to making inclusive education successful.

References:
Why is AT expensive?

Mr. Raja Shanmugam
CEO, MindTree Foundation, Bangalore, Karnataka, India

Three years ago, the CATELST was set up at Spastics Society of Bangalore to enable widespread use of AT among the special needs community in India. The center had various types of AT donated by PACER Center - Minnesota, IBM and others. Soon the leadership realized that relying on imported products will be a huge challenge. The sheer price of these imported devices was outside the reach of most children who were availing of the services at the center.

This is how MindTree Foundation's entered the Assistive Technology space – when SSK asked MindTree, "Why can’t you use your technical and product development experience to bring AT closer to the people who need them the most in India?"

From then on, we have worked on a few solutions – like the patent pending wearable input device, the ADITI switch, the AAC and the two player language game. One interesting thing about all these solutions was that their costs were less than 1/10th of the cost of internationally available solutions that perform almost similar functions.

This was further reinforced when we presented our story at the Closing the Gap conference at Minnesota last year. Many found it hard to believe that we can build a switch (ADITI) that could sell for as little as US$ 10.00. One of our partners even mentioned, “I would like to see you if you can actually bring this to the market at this price”. The ADITI has been shipped commercially earlier this year at a price of INR 520+ Taxes.

After our presentation at the CTG conference, I spoke with a senior manager of a popular AT device vendor in US. His initial expression was of surprise that we could do something like this out of India. He also shared an interesting insight into the pricing model for AT in US.

<table>
<thead>
<tr>
<th>&quot;How much do communication devices cost?&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devices range in price. Basic, single message devices cost anywhere from $10 to $100. Devices with more messages and/or more options can cost up to $8000 and more. Medicare has set cost guidelines for predefined device categories.</td>
</tr>
<tr>
<td>Devices with digitized speech and eight minutes or less of recording time = $399.27</td>
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<tr>
<td>Devices with digitized speech and greater than eight, but less than or equal to 20 minutes of recording time = $1220.91</td>
</tr>
<tr>
<td>Devices with digitized speech and greater than 20, but less than or equal to 40 minutes of recording time = $1610.55</td>
</tr>
<tr>
<td>Devices with synthesized speech, message formulation by spelling and physical contact with the device to access messages= $3651.72</td>
</tr>
<tr>
<td>Devices with synthesized speech, multiple message formulation methods and multiple access methods= $6910.38</td>
</tr>
</tbody>
</table>

http://atwiki.assistivetech.net/index.php/Augmentative_and_alternative_communication#How_much_do_communication_devices_cost.3F

In the US, the Medicare/Mediclaim kind of organizations cover almost the entire cost of the AT, based on relevant recommendations and certifications. The prices of the products are therefore quite aligned to the applicable insurance reimbursement limits for certain classes of devices. I am sharing...
the applicable slabs of Medicare as outlined in a web article below:

Regardless of the cost the devices, most devices with these functionalities tend to be priced at their respective slab rates.

One other reason for the high cost is the volume of sales. Since these are low volume devices, the cost of development has to be spread across a much smaller number of devices compared to regular consumer devices. These costs include design and engineering costs, cost of testing, certifications and agency approvals and field trials, not to mention marketing costs. There is also a very high cost of direct selling to the various institutes, school districts, AT evaluation and recommending centers, etc.

So we are stuck in a dead lock in India, where Health Insurance is yet to cover these devices – The cost of available AT with international quality is too high for the users to pick up in larger numbers & the number of users / market size is not big enough for the current players to invest seriously in this market.

MindTree Foundation is trying to address this dead lock in multiple ways. Some of them are:

- Leverage on its in house technical capabilities and its partner network to enable AT solutions
- Build relationships with Academic institutions and help them productize some excellent solutions available with them
- Absorb a significant portion of the development costs - electronic, mechanical and industrial design, software development and debugging, field trials, one time manufacturing set up costs etc, so the end product is priced purely based on material and manufacturing costs
- Use commercial vendors to make sure the product is built, stocked, shipped and serviced in a professional manner, while keeping the price points affordable
- Leverage its NGO support network to validate, socialize and market the AT

We believe this will help generate enough interest and acceptance to the concept of AT within India and make it vibrant enough for more players to participate and enrich the market with their diversified offerings.

When we started our AAC work, our target was to keep it under INR 10,000 (Approx USD 200.00). Since this will support synthesized speech, multiple modes of message formulation etc, this works out to less than 1/10th of the similar device on the Medicare slab. However, the 10K number itself is based on the potential funding slab from ADIP scheme that will help these devices to get within reach of many thousands. We are confident we will reach very close to that magic number with our current design.

Our team is already working on a new challenge – to reduce the cost further by using newer approaches. Hopefully, this will ensure we also do not fall into the same trap of using an external guideline to justify our cost/price!

We have been occasionally told that this is an idealistic model and will not work in the practical sense. It may be so. But we will never find out if we don’t try!
People with Learning Disabilities – Recognize the Stars!

Vivek Kulkarni
Former IT Secretary and Chairman Brickwork India

A learning disability is often called an “invisible handicap”. The person appears normal as opposed to a person who has visual impairment or a mobility problem. In a lot of cases learning disabilities are misunderstood and their impact is underestimated. Most parents in India put undue pressure on their children to do better in science and math and often ignore any hidden talents in their children.

History has shown countless examples of people with disabilities, yet gifted in some ways. They are not lazy or dumb, but their brains just process information differently. Some of the world’s most famous personalities had and have learning disabilities. The most famous physicist Albert Einstein suffered from a learning disability and Walt Disney whose creations fuel the imagination of every child suffered from dyslexia. USA’s first president George Washington had severe writing and grammar disabilities and today’s business tycoon Richard Branson also suffers from a learning disability. Parents and teachers would hence do well to focus on a child’s strengths rather than weaknesses.

People with learning disabilities are a part of the society and are entitled to the same rights, privileges and opportunities as any other citizen. People must understand that a learning disability is a life-long disorder and affects person’s ability to interpret what he/she sees and hears or the ability to link different types of information in the brain. It can affect a person’s ability to think, reason, recall, listen and organize information. Having a learning disability can affect many aspects of a person’s life – school, family life, daily routine, work, and social life. Often it is not until a child starts school that a learning disability comes to light – difficulty with spellings, simple calculations, attention span, coordination and illegible handwriting are all indicators of a learning disorder. Very often a person can suffer from more than one type of learning disorder. People also have varying degrees of learning disabilities – some people have mild forms which do not have any great impact on their lives and some people have severe disorders which prevent them from leading normal lives.

Irrespective of the severity of the disorder people with learning disabilities need support from society. It is vital to recognize the disorder as the limitations can show up in many ways. Once recognized the support system has to be designed as each case is unique. Further, it is important to devise a person-centered approach as the nature of support will vary depending on the age of the person. In western countries funded support is often based on the premise that people will need the same type of support from the age of 18 to 80 years of age.

In the last few decades, the western world has seen a huge development in recognizing and providing support to people with learning disabilities enabling them to live as inclusive members of the society. Even though the western society has become more accepting and inclusive towards people with learning disabilities, there are many cases and instances when these people are bullied and harassed. It is imperative to raise awareness and increase understanding in the society about learning disabilities and especially among children and young people. Another important thing to note is that a learning disability can sometimes be accompanied by physical impairment which makes it difficult for people to travel independently. Where this challenge has been overcome through motorized wheel chairs, toilet accessibility in public places is a problem thus making it difficult for these people to leave their homes.

In India, the last decade has seen a rising awareness towards recognizing learning disabilities. The
lack of incidence of learning disabilities in the eastern world was often been attributed to the failure in recognizing them. Now, with increase in sensitivity towards learning disabilities from the government and society, people with these disorders in India can lead an inclusive life. One of the main reasons for not picking up the incidence of learning disabilities in India is overcrowded class rooms and the lack of personal attention. Proper diagnosis and appropriate education combined with hard work and support from family are essential elements for the child to live a near normal and productive life. Currently, India has no policy that addresses learning disabilities. In the absence of such a policy, children with learning disabilities in India cannot be rehabilitated in regular schools and are merely sent to special schools. This is not considered an ideal practice, but is the best option available today. Learning disabilities come in varying degrees and each case has to be addressed specifically to get the best out of the child.

The first step towards making learning disabilities inclusive in India is through formulating a policy to address the issue. The policy, however, requires dedication from teachers and parental awareness. On the other hand, teachers should also be empowered by providing the right resources to research and develop a curriculum which takes into account the student’s rate of learning to achieve the best possible within the general curriculum. Early detection saves the child from being branded as lazy and neglected as he/she goes from one class to another totally ill-equipped to handle the pressures of higher education. Schools are the best places where all the right resources can be made available to help these children to develop – speech therapists, psychologists, occupational therapists and good teachers. The joint responsibility of these professionals will ensure these children grow up to be confident adults.

Another important aspect concerning people with learning disabilities is their self respect and attitude towards work. Most people can work in mainstream jobs, but people with severe learning disabilities need to have something meaningful to spend their day. Higher education is also accessible to those who are interested and there are courses specially designed to meet the needs of such students.

In conclusion, early detection, appropriate education, assistive technology and support from family and friends are the key elements to address learning disability. Spreading awareness will make people broadminded and sympathetic towards understanding the problems associated with learning disabilities. Support from society can play a key role to increase the confidence of these people and help them lead normal lives.

I would like to congratulate the Spastics Society of Karnataka that has been doing yeomen service to the cause of disabled persons. I would like to thank the Government of Karnataka, IBM, and Mind Tree for their support in organizing this workshop for creating awareness on what assistive technology can do in making a difference to lives of disabled children.

I would request the Government of Karnataka to take up an exhaustive study along with Spastics Society and come up with a five-year action plan for tackling the problem of disability head-on in Karnataka.
Finding a Suitable Solution

Senthil Kumaran and Avinash Sonnad, Spastics Society of Karnataka.

Avinash was a student with Spastics Society of Karnataka and currently a student with Christ University. He has multiple disabilities and suffers from Cerebral Palsy. Senthil is a Software Developer working in Bangalore. He knows Avinash from the time he was in Spastics Society of Karnataka and has been working him in identifying a suitable technology to overcome his challenges in communication.

Avinash and I started looking out for a suitable Assistive Technology for a long time and we have discovered a number of things with our trial and error methods. It was quite clear to me that Assistive Technologies will be useful for people like Avinash.

Just after meeting Avinash, I realized, a software called Dasher could be useful to him. So, I went to his house and started with Dasher. We did not know how to use it. We read and studied the documentation and it was of no avail. I also realized the limitations of Avinash then. I saw that he was able to move only his thumb and index finger and had a lot of involuntary movements. We tried different kinds of mouse which he can hold on with his two fingers and my search for an Assistive technology device started along the lines of finding a suitable mouse device for Avinash. It was four years ago, that we also tried Voice Recognition to see if it would be helpful. Very few people were using Voice Recognition then and I had heard that it requires considerable training to use the Voice Recognition. So we started with the Voice Recognition training and soon realized that the software was demanding a certain accent and was not able to recognize Avinash's style of speaking. It led us to give up the thought on Voice Recognition itself.

Our First Accessibility Device

Avinash is an avid reader. I was surprised by the way he used to read his books. He used to lie down on his side on bed and his mother flipped the pages for him. Reducing his dependency on his Mother might be the first step forward. We knew that Adobe Acrobat reader had the auto-scroll option that would help in reading the book.

In his personal laptop with books loaded as PDF documents in the auto-scroll mode, the book will automatically scroll at regular pace set by us, Avinash would be able to read the entire book without his mom's help. Viola! This was our first accessibility device.

With this feature, he read 5 books completely. He read, “Alice in Wonderland”, a set of 14 short-stories of Sherlock Holmes and H.G.Well's “First Men on Moon”.

The Adobe Acrobat software also has a reader option where the software can read words aloud. However, it was not desirable as it was very mechanical and not enjoyable for Avinash.

With the auto-scrolling feature, there still was a problem. It was not possible for Avinash to take a break while reading as it would require manual intervention to stop the computer from scrolling. So, Avinash had to be constantly on his toes, so as to figuratively speak, to keep pace with the automatic scrolling of the book.

We definitely needed a better solution with more control.

Second Accessibility Device - Mobile phone

One of the mobile phones in the market had a stick like pointer in the middle and was very suitable
for Avinash. If someone placed that mobile in his hands, he was able to control it with the stick interface. So, we got the idea of connecting the mobile via blue-tooth to the laptop cursor, so that the scrolling of the book can be controlled. But the mobile that we got was slippery and also it required its cover to be removed in order to expose the middle stick interface properly. Buying a new mobile and tearing it down just to use the pointer was not effective. We did try with controlling the cursor, but it was simply inefficient given the limited control which Avinash could exercise on his mobile phone.

Third Accessibility Device - A very small infra-red mouse

Given that mobile phone was unsuitable, I started looking for a small mouse which could fit into Avinash’s palm. I got a Infra-red wireless mouse from Staples store at Marathalli, Bangalore. This was incidentally the first purchase, specifically made for ‘trying things out’.

We tried if we could control our original solution of Dasher with this small-mouse in the way such that it could be used like a click device. We studied Dasher again and saw that the whole operation can be controlled using a single switch, but we did not find a way to interface that single switch to our mouse. So, I wrote to the dasher mailing list to seek help from experts. Dr. Julius who is an expert in assistive technology suggested that we try out camera mouse, which can recognize Avinash's face and thus he should be able to control the mouse movements with his head. This was an innovative suggestion, which we had not tried in our earlier attempts.

Fourth Accessibility Device - A camera mouse

The camera mouse solution was an interesting one. We setup the camera mouse that it could recognize some fixed point in Avinash’s face and as he moved his head the position of the mouse pointer could be controlled.

And to our surprise, we found that “It worked!” We practised a lot with the camera mouse solution, working in tandem with Dasher. These were the first few words written by Avinash using the Camera Mouse on Dasher.

“Education is the only possible way to enlighten the people's mind to make this world a beaieul place to live in. “

It is a from Dr. Kalam’s book, “Inspiring thoughts”. Avinash was able to write this down with great difficulty. There is a mistake in the sentence, I left it consciously, because it was okay to accept mistakes in our first trials.

The camera mouse was not the solution yet. Due to involuntary movements, the mouse pointer deviated frequently from the intended position. Julius suggested to us that by gently nudging it back to the specific point this could be controlled and he advised us to practise more. However, someone had to assist Avinash in adjusting the camera-mouse settings properly and then load the required software. Avinash could exhibit only a certain level of control from this point onwards. It was a good improvement from where we started with, but it still lacked something which we desired, namely the ease of use.

Fifth Accessibility Technology - Voice Recognition

Meanwhile in the Dasher mailing list, someone had mentioned that he was using Voice Recognition in composing the mail and he uses Voice Recognition and Dasher simultaneously. When approached, he suggested that Voice Recognition technology has improved a lot in the recent years and we try with the latest version of Microsoft Speech software.

This required us to upgrade the speech recognition software in the operating system. Once we did it, we tried the Voice Recognition training program again. To our surprise, it worked very well for
Avinash’s voice and his accent was not a problem like before. We were just enthralled. We quickly finished the training and saw if we can use the voice recognition to control the computer by voice. However, to our disappointment, it did not recognize the correct words when Avinash was using the software. It was due to the way the software is designed. It had a huge sample space to search for and it did not identify what Avinash was trying to say.

Then I set about to find a software which provides a limited voice recognition capability, something like it could do only 10 tasks for the commands we give. Given the limited and well defined set of tasks, the software may work without any problems for Avinash.

**Sixth Accessibility Technology - e-Speaking Voice Recognition software**

Now, we did find a software that was meeting our exact needs. It was e-Speaking Voice Recognition software. It used the System’s voice recognition engine and provided a limited set of commands to control the computer. It was readily available for a nominal price. We got it and found that it was exactly what we wanted at the moment.

Thus, Avinash could use the software effectively using speech. He could control the scrolling of the adobe acrobat reader to read books, browse the folder to go and get a new book, Connect to Internet and read news etc. This was wonderful, it enhanced his ability to work independently on his computer. With more practise he was only getting better and this proved to be a convenient solution for Avinash. Just switch-on the computer with with these software in the auto-start mode, if the microphone is attached to the computer, then he could control it from that point onwards. No manual intervention further required.

**Seventh Accessibility Technology - Writing via Dasher using Speech**

A complete solution required combining the above individual elements. Avinash had tried and succeeded using Dasher via head-mouse and then he could now control his computer using e-Speaking voice recognition software. How about the idea of combining both? Namely controlling the cursor of computer via speech. We tried and it worked again. It was immensely helpful and satisfying. Avinash was able to write on his computer using Dasher! This required more practise in understanding the way Dasher works. Over time, he gained the ability to control his computer and dasher together to write sentences effectively.

Avinash still uses on-screen keyboard to click on letters and composing words. He takes a long time to compose in this way. However, I believe with his speed can be increased significantly using Dasher, which would be as close to the average speed of one among us.

**Finally something useful**

This was a very good result. We were both overjoyed with the outcome. Avinash’s mom was free from the task of flipping the pages for him. Avinash was able to immerse himself in some creative pursuit for hours together on computer and Internet and thus be engaged with some activity or the other. Both Avinash’s father and his brother, Sanjeev are happy with this new found capability and the way he keeps himself engaged in his studies.

**It was very nice to find a solution which was useful and effective.**

I hope this article provided a glimpse into the process of finding an effective solution for Avinash. He uses Dasher effectively for a variety of purposes, even for taking tests in college now.

We hope this article is helpful to you. Feel free to contact Avinash at avinash.sonnad@gmail.com or Senthil at orsenthil@gmail.com, if you have any thoughts or questions on the above solutions. We would be glad to help you out with your trials with assistive technologies.
Modern banking for older people

Siobhan Wagner

New user-friendly technology needs to be developed to help older people access modern banking methods, argue the researchers behind a new government-sponsored project.

The team from Newcastle and York Universities are working with Barclays Bank to help the nearly 2.4m people over the age of 80 in the UK become more comfortable with digital banking.

Their aim will be to develop assistive technology for older people who feel uneasiness with internet banking or chip and pin cards. An even greater focus will be on members of the elderly community without a banking account.

According to Age Concern, six per cent of people aged 85 and over do not have a traditional bank account.

'We hear stories like “Oh my granny used to keep piles of pound notes under her mattress”,' said project leader Andrew Monk, a researcher in human computer interaction at York.

Many older people who do not have a traditional bank account, he said, have a special Post Office account, which allows pensioners to withdraw money from a staff member at the counter.

Monk argued these accounts require pensioners to withdraw large sums of cash at once and are not much better than having no account at all. ‘They’re in a difficult position for financial abuse,’ he said.

The new assistive technology developed by Newcastle and York researchers will be tried out by a variety of focus groups over 18 months.

Some ideas include a wallet shaped foldable display. One half would display recent transactions with dates and amounts, the other half your current balance, as a figure and an analogue quantity.

Monk said other assistive technology devices could mimic the ‘physicality’ of cash. This is important, he said, because many older people work in a ‘cash economy’ and are wary of ATM cards because there is no way to immediately see the amount of money being withdrawn.

One of the main problems Monk and his team are looking to tackle are means for identifying oneself because many older people have trouble remembering passwords and PINs.

Assistive technology designed for these issues have already been deployed in India. The Bank of Maharashtra, one of the largest banks in Western India, announced plans last year to ramp up installations of biometric ATMs, which enable older people to access their bank accounts with a thumb impression instead of a PIN.

The system works by scanning a fingerprint of a customer when they open an account. A template of the fingerprint is stored in the customer’s cash card. After inserting the card into the machine, the customer’s fingerprint is captured with a built-in scanner and compared with the stored impression.

The technology has also been championed by the government-run Central Bank of India for rural Indian communities where modern banking methods are still unfamiliar.
Aside from cash machines, Monk said there will need to be more work done to make online banking more accessible. ‘Older people weren’t forced to use computers when they were at work unlike the baby boomers,’ he said. ‘So the notions like menus and passwords are very foreign to them.’

Michelle Mitchell, charity director of Age Concern and Help the Aged Charity, said it could be extremely challenging to make online banking more accessible for the elderly community.

‘Efforts to make modern banking methods more attractive and accessible to older people are warmly welcomed,’ she said. ‘However, it is important that alternatives continue to be made available to older people who are unable to use modern banking methods such as internet banking and chip and PIN. For example, improving internet banking systems will be little help to the third of people over 65 who have never even used the internet.

Monk still believes technology could be a big enabler for making older people more comfortable with modern banking, and the goal of their research will be to deploy the solutions they think work best.

‘I hope by the end of 18 months Barclays are putting something in place,’ he said.

Taken from: www.theengineer.co.uk
On Assistive Technology

**Tito Rajarshi Mukhopadhyay** (b. 1989, India) was diagnosed in early childhood with severe or low functioning non-verbal autism, and is an individual who provides unique insights into the nature of his autism, and perhaps autism in general, according to Autism Speaks. Scientists who studied his case, such as distinguished neuroscientist Dr. Michael Merzenich, and doctors, journalists, and authors at many major media companies such as ABC, CBS, National Geographic, New York Times, Scientific American, PBS, and CNN.

Tito communicates through writing, and learned to develop his reading, writing, and thinking abilities through the educational method of his mother Soma.

Autism Speaks sponsored Tito and his mother Soma to come to the United States so he could participate in scientific investigations, and so she could teach them her method, called the Rapid Prompting Method.


Tito had been a student of Spastics Society of Karnataka.

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**Tito's article - Tito <titomukho@yahoo.co.uk>**

**Sat, Jun 12, 2010 at 8:30 PM**

There is the manual technology and there is assistive technology.

Manual technology involves the usage of our limbs, bones, joints, muscles and all that require our voluntary control. That sort of technology makes our bodies work as machines. The arms, as we lift an object turns into a machine of some order defining the shoulders as fulcrum, arms as the effort and object as the load.

This complicated system of our arms certainly have put us as the most successful living entities in the planet with our right to steer its future course.

Now let us move our vision towards the minority – the lesser successful individuals who cannot voluntarily use their bodies, limbs, bones and muscles to enable them to do some basic tasks leave alone decide for themselves, always waiting for help.

When we see the continuous struggle to exist, struggle to manipulate their bodies even to perform basic activities like locomotion and moving, like basic expression of a thought through vocal-communication, it becomes our humane nature to assist them either through our own manual help or through technological help.

Being a person with Autism, having a very defective form of speech articulation, it is important for me to either write or type my words to communicate. Since typing on a computer is faster than writing, I obviously am thankful to my computer. I am able to maintain my communication with my friends either through e-mailing or Facebook.

As far as I know that the world did not begin with computers, neither with wheel chairs. Man has survived through some drastic times without them. Yet we have no idea how an autistic man survived without communication or how a person who was unable to support his body on a crutch support, escaped the jaws of dangers when others could not help him, trying to save their own dear lives.
Avinash Sonnad... living life to the fullest with a smile

Avinash is a remarkable boy who has the ability to handle his severe disability (Cerebral Palsy – spastic quadriplegia with speech difficulty and dependent for all his physical needs) with unique grace and maturity far ahead of his age. His cheerfulness, enthusiasm and zeal are a great source of motivation for one and all - from peers to teachers, and embodies the true “spirit of life”. His acceptance of his condition, and his endeavor to rise above it through whole-hearted participation, be it in academics or extra curricular activities makes him a WINNER outright! His ability lies in giving his best in the face of adversity every single day of his life!

After completing his Senior Secondary, NIOS at Spastics Society of Karnataka with the help of assistive devices, he is now pursuing college education in Bachelor of Computer Application at Christ College Bangalore. He is a voracious reader, likes quizzing and also amuses himself with the wonders of the technology advancements.

Avinash now uses assistive technology, mainly, speech recognition software in order to work on his Computer. Using Speech, he independently controls his computer, reads ebooks, online news, writes letters, emails and also submits assignments. He studies for exams by downloading the curriculum material for his studies.

Avinash has participated in the Jackilby Quiz for science & technology organized by Texas Instruments for 3 consecutive years along with his quiz mate Karthik. He has also participated in All India Young World Quiz and Karnataka Quiz Association competitions. He was part of the school team, which stood second in the national round of the FIRST Lego League Robot building competition in 2008.

“I would like to do something for society in the future” he says. His role model is none other than the past President of India, Dr Abdul Kalam whose book ‘Ignited Minds’ is his inspiration. I would like to follow Dr Kalam’s message of ‘dream big, dreaming small is a crime.’ ‘I enjoy talking to people, there is so much to learn from such interactions.’

Watching good movies with his brother Sanjeev, whom he refers to as a ‘boon’, is what he enjoys too. His current favourite song is ‘Meri Ma’ from the movie Taare Zameen Par.

Avinash, living life to the fullest with a smile.........
Determination and Hard Work... all along

Ms. Vaishanavi Kasthuri
Business Analyst, MindTree, Bangalore, Karnataka, India

I was diagnosed as Retinotis Pigmentosa at the age of 12. Never the less my parents have supported me throughout my life and are still supporting me. The first decision I took in 8th standard was not to choose Economics and Sociology and instead opted for Mathematics and Science. Since I go this condition at a later age, I never learnt Braille. My mother used to teach mathematics (especially figures) by drawing them on my wrist so that I could feel and understand to dictate to the scribe. I got 82% in mathematics. This helped me understand that I can perform under severe challenges and also prove it to others.

Assistive technology helps visually challenged people to a great extent. In today’s world with the advancement of technology it is very easy for differently-abled people. There are various kinds of technologies which could be used.

I used a recorder which helped me to record during class hours and once I reach home, I used to put every day notes in the system with the help of JAWS. I also use the talking watch which helps me in knowing the time. I also use a software called Talks which is a talking software on my phone. It helps me to read messages, phone book, address book, etc. I also use the cane for moving around at times and I am independent.

I joined MindTree Foundation in June 2009 as an intern. Based on my performance I was put on contract from April 2010. From July 2010 MindTree has absorbed me as a full-time employee after evaluating my performance. Hence it is extremely easy for differently abled people to work in the corporate environment.

I am part of Knowledge Services from December 2009. I have learnt a lot being part of that team. Derick and his team has helped me a lot in laying a strong foundation in analytics. I was part of a trade promotion launch which is an excellent exposure for me. I would like to thank MindTree for having given me this wonderful opportunity.

I was part of a customer call where I developed Key Performance indicators comparing MindTree with various competing companies vying for the client’s business. Along with this I had also developed business questions with the help of which we could obtain solutions for those questions. It gives me immense pleasure that I was part of international client calls.

It’s important for us to work hard, prove ourselves and then the organization will absorb us. Hence I have achieved success after facing various challenges.
Autism spectrum disorder in a business context

Mr. Thorkil Sonne
Founder of Specialisterne and Specialist People Foundation

“Specialisterne”, a Danish computing company, a 5 year old company that specialises in employing people with autism, is headed by Mr. Thorkil Sonne.

About 40 members of staff - 75 per cent - at “Specialisterne” are autistic. They typically work for about 20 to 25 hours a week, carrying out work in areas such as programming, software testing and data registration, which require great accuracy. This type of work is ideal for many people with autism whose communication skills are poor but excel at technical tasks.

We thank Mr. Thorkil Sonne for writing this article for the souvenir and working on Inclusion.

The autism community and the business community have been separate entities for a long time. But it does not have to be so.

In 2008 the IT Prize Denmark was given by the Danish IT Industry Association to the company Specialisterne. The unusual circumstance is that the majority of the employees in Specialisterne have Autism Spectrum Disorder (ASD). The prize is the proof of acceptance of people with ASD competing at market terms in the Danish IT business.

The consultants of Specialisterne have ASD and solve tasks like software testing, quality control, data entries, packing/shipping, programming and monitoring for large Danish and international companies. The company is a case study at Harvard Business School and I was interviewed as founder by Harvard Business Review to discuss what the traditional business can learn from managing people with ASD. With Specialisterne we have opened the door to the business community for people with ASD.

We have a proven track record in Denmark of demonstrating that behind the disability you can assess special abilities which are potentially very valuable in the business sector and can be harnessed to meet and exceed the needs for special skills in the market.

In 2008 Specialisterne was handed over to Specialist People Foundation - a not-for-profit organization with the purpose of disseminating the knowhow from Specialisterne internationally. The first international Specialisterne license will be established in Glasgow, Scotland, in 2010.

The vision is to make societies respect and accommodate specialist people with ASD and similar challenges as valuable and worthy citizens.

We have set a goal to enable one million meaningful and productive jobs for specialist people globally. To fulfil this ambitious goal, we intent to establish Specialisterne showcases globally and to enable and certify large companies in the business sector to hire and manage specialist people with ASD and similar challenges (i.e. ADHD).

We are convinced that we can make the Specialisterne concept work in different cultures if the local stakeholders are supportive and if we can find the right social entrepreneur with the right mix of business and heart.
We know that people with ASD have similar needs for taking active part in societies all over the world and we know that the needs in the business markets are the same all over the world.

With the support of the autism communities and the business communities we can transfer the Specialisterne model to different cultures and nations and create new opportunities for people with ASD globally.

**We hope that one day we will be able to bring the Specialisterne concept to India.**

If you want to support our goal - you can do so by making a donation to our not-for-profit foundation and thereby help us prepare for a global roll out of job creation for people with ASD.

Read more on our website www.specialistpeople.com
Mr. Zamir Dhale,
Advocacy Officer, Sense International (India), Ahmedabad, Gujrat, India

Zamir is employed as Advocacy Officer in Sense International (India), the only national non governmental organisation working with deafblind/ multi sensory impaired (MSI) persons in the country. Key area of his work involves ensuring recognition of rights of deafblind persons and their families.

He is actively involved in developing, implementing and monitoring advocacy plans of Sense International (India) and its partner organisations. He also assists in national advocacy initiatives interacting with a host of stakeholders namely deafblind people, their family members, government officials, other development organisation representatives, practitioners and occasionally general public.

Zamir represents deafblind people and their families in relevant government/ development platforms to create awareness about deafblindness and promote rights based approach. He also has an important role in supporting development of national support groups of deafblind/ MSI people, families and teachers. He supports them by developing plans for recognition of deafblindness and the rights of deafblind people, exploring opportunities of representation of networks at appropriate platforms and helping members to take advantage of the same. As President of ‘Udaan’, support group of Adult Deafblind persons, he Works closely with network members for greater acceptability and recognition at local /regional levels.

Highlights:

- Zamir was recently awarded CavinKare ABILITY Mastery Award, an international honour given to individuals with disability in recognition of their extraordinary achievements
- Zamir is on Board of National Trust for the Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation & Multiple Disabilities, a Statutory Body under the Ministry of Social Justice & Empowerment, Govt. of India.
- He has been a member of Local Level Committee of National Trust in Delhi to appoint legal guardians for persons with disability
- He was part of the team for Accessibility audit in Delhi, organised and supported by Ministry of Social Justice and Empowerment.
- Zamir was portrayed as a Role Model in the yearly calender of National Trust, 2008-09
- Fighting all odds, Zamir got his own bank account in a nationalised bank with ATM Card /Cheque book and is availing personal accident insurance from National Insurance company.
- As Udaan President visited National association of Deafblind in Uganda, East Africa on Exposure visit to strengthen exchange of knowledge, skills, practices for innovating new strategies for development of deafblind persons and fulfilment of their needs.
- Zamir supported Mr Amitabh Bachhan and Rani Mukherjee to learn tactile sign language for the movie ‘Black’.

Email: zamir@senseintindia.org
My experience in a Multinational IT Company

Ms. Smitha Pai
Independent Special Education Consultant, Mangalore, Karnataka, India.

My name is Smitha, and I’m a person who was born with rubella syndrome. So, at birth, I had congenital cataracts, which were surgically removed at 3 months, 6 months and 9 months of age. And from the age of 3, have been wearing plus twenty power glasses. I also had a ‘hole’ in the heart, which required a PDA (Patent ductus arteriosus) surgery when I was a year old. At age 6, I contacted a middle ear infection, along with a very high temperature, after which my hearing began to deteriorate considerably. In those days, the hearing aids available in the market were the external kind – you carried the batteries around your neck and the hearing aid itself was rather bulky! Anyway, to cut a rather long story short, I was fitted with my first set of hearing aids at the age of ten, and that was the first time in years that I’d heard sounds and conversation very clearly!

Fast forward about 20 years……I find myself working for a multi national IT company. As you know, there are policies in place to enhance and benefit the working conditions of employees with disabilities working at these multi national companies. Even though I use a hearing aid and am comfortable with one-on-one interactions, I had a hard time during meetings, in a group setting where there are about 10-12 people talking at once. So I had requested for a Dictaphone or a similar recording device that would record the meeting for me so I could play it back later to help me make notes, which I could then use for my work as a content developer. I had also requested for the JAWS (Job Access with Speech) software, which is a software that reads out text from anywhere on the computer screen to the visually impaired person. I had difficulty reading text on the computer, despite increasing the font, because it was a desktop, and kept at a certain distance, which I have never been comfortable with. Before joining this company, I had been used to a laptop, which I could keep at any angle that was comfortable for my eyes.

Well, suffice it to say, due to a lot of red tape and the long process involved in obtaining these devices from the vendors, it took ages for my request to be granted. I really felt then that managers, employees and vendors alike needed to be sensitized towards people with disabilities, to understand not only the nature of their problems but also to be sensitive towards helping them, by making the process of obtaining tools and software required for the workplace a more straightforward affair.

People should also be made aware of how to approach a person with disabilities; otherwise we take for granted that how we deal with others on a daily basis is also how we should be dealing with the person who is differently abled. But dealing with a person who is differently abled is a bit different, only because they have certain limitations – it could be with regard to communication (the deaf or hard of hearing) or someone who uses a wheelchair. So, for instance, a person who is wheel chair bound, the wheel chair is an extension of the person’s body, and should be treated that way, instead of encroaching on their personal space by sitting on the arm rest of their wheel chair or pushing them from behind. It is always best to ask the person politely first, if they require any help or not, rather than take for granted that they might need help, or try to help them out of pity – which by the way, is the LAST thing they want! These little things do go a long way in helping the person who is differently abled to feel more comfortable and at ease in the workplace.

In conclusion, I would like to say that each one of us is a unique individual, and especially the person who is differently abled, although he or she might be hindered by certain limitations, are just as capable and efficient as the next person. They may be slower than most, perhaps, but they are more than equal to the task at hand, if given the right opportunities, understanding and help when they require it.
By Prashanth Kamath
MindTree, Bangalore, Karnataka, India

Prashanth is an AT Enthusiast – He has been working with MindTree for the past 3 years (past 1 year in R&D Services). His goal/passion is to develop New types of AT products – this he believes, will be his contribution in trying to make the world a much better place to live in.

This is a true story. I’d like to tell you about my friend Ananth, he is a brilliant young man. There is a problem - he is unable to express himself without the use of assistive technologies. Back in school, he had a custom made device that he had to use in order to communicate in class. The device was good for basic communication and he soon outgrew it. The next logical phase would be to put him on the computer.

Ananth was more than ready to try the computer. His brilliance was such that he could master the computer in a matter of days. So his parents decided to get him a PC. They even had a local technician visit them and take a good look at the boy - so that he could make a fair assessment of his special needs.

The computer was purchased. Ananth was definitely ecstatic. He had got an entire new life. But again there was a small problem. He could press only one key at a time. They contacted their vendor - who was unable to get a solution. The problem was - he didn’t know a solution even existed for this kind of a problem. He was not alone. Even Ananth’s parents were also unaware. So they reached out to people in his school. Maybe they knew that something could help.

And so in a couple of weeks - a possible solution came up. There was this mechanical device that had to be fitted to the keyboard. It provided a sort of raised key near the Modifier keys. This key when pressed could lock the modifier key in place until the next key was pressed. The problem was solved. So Ananth’s parents got in touch with the vendor of the device (which happened to be in the United States). They had to import the device - which took about a month. The device itself cost something like $50/- . This is quite a lot of money for a simple and small mechanical assistive device.

As it turned out - Ananth himself would discover something - that was a much better solution. Barely a month after the device had been fitted on his PC - Ananth figured out a way to accomplish the same results - without using the mechanical device. How? Quite simple, every Windows PC comes with an accessibility feature called ‘Sticky Keys’. This feature has been specially designed for those who cannot press more than one key at a time. It is there on all versions of windows - but is not enabled by default. Even to this day, not many people know that such a feature exists.

This story highlights one important point. There was general ignorance with everybody here – be it the parents, the computer vendor or the people at his school. Of course I imagine that things have gotten better since then. **But the point is this - Especially where it concerns assistive technologies - people are unaware of the availability of different solutions in the market.**

As a result people often end up paying more for a particular product or even worse they go for a solution that doesn’t fit their needs quite well. The only way out is to network with as many people as possible and to share one’s own experiences with everybody.

I also want to touch upon a couple of interesting aspects............

**First** - is the built in Sticky Keys feature in Windows better than the Mechanical device which was
suggested? Well, it can be argued in both ways. The device is better because it works irrespective of whether the Sticky Keys feature is enabled or not. It can work equally well on a Linux box without a GUI - [console accessibility has been one area where Linux is still to pick up]. On the other hand, the Sticky Keys feature is better because it doesn’t need any specific hardware component [which could be the cause of a potential injury]. Moreover sticky keys is a standard built in feature of windows [now even on some of the more popular Linux desktops] - while the device had to be purchased at an extra cost.

**Second,** just because something exists as a built in feature somewhere - doesn’t necessarily mean that further development of any kind is forbidden in that area. In fact it can prove to be a much more lucrative prospect. The vendor of the mechanical device charged $50/- for something that was being offered free of cost by others.

However one thing must be kept in mind. If you develop something as an alternative implementation of something that already exists - your product has to be at least as good as the alternatives. If it is better in some way - you can build a name / brand for yourself and if the product is attractively priced from the consumer’s point of view - all the better. That’s perfect business sense.
A long wish list..............

On behalf of many other parents like me

Kavita Sharma, A Parent /Professional, Coordinator, Foundation for the Prevention of Disability

While I am writing this article for the column “User’s wishes”, I feel privileged having been a mother of two sons with Autism Spectrum Disorders who brought me to this field.

Having been a mom to these two kids and done a course in Special Education gives me a different insight in to various aspects of disability. My wish list as a user is really long:

**Right Reinforcers**

Let me begin with computers/ software. While teaching a child; I noticed that the reinforcers used by some soft wares are very nice; eg: a lovely sound output with “Well done” or “Good Job” or “Excellent” etc, and these are non –threatening. A mom/ dad/ teacher may just add emotions/ gestures to a positive or negative reward; eg. “You can’t do any thing” loudly, or “Why can’t you learn” or “Oh God” etc. whereas reinforcers like “Try again” etc. are consistent and non –threatening.

Persons with Autism Spectrum Disorders have sensory deficits as the core concern. So, creating a reinforcer which is liked/ understood by an individual is very important.

**Built in system for Assessment and Evaluation**

I think all the soft wares which are used in early intervention and training should have built in system for assessment and evaluation for an individual’s achievements. This may satisfy a parent’s anxiety towards their ward’s progress.

**Adjustable Speed for Speech synthesizing Devices**

*An anecdote to share: A few months ago I was on a SKYPE call with Bridget, Priya and Shobha, all of them had a head phone except me; I was only able to type my thoughts.*

On this day, for the first time I felt that I had all the comprehension needed; thoughts were clear but the speed to which I could express had to match. I could understand the frustration of those individuals who are speech impaired, non-verbal kids with Autism Spectrum Disorders and Cerebral Palsy; they can understand all but can express very little.

*A little bit of work is needed to be done on SPEED of the soft wares related to “Text to Speech”.*

**Help for the kids with Learning Disabilities**

Generally speaking, kids with Learning Disabilities suffer from reversals and rotations of alphabets and numbers; some have problems in writing too. This affects their spelling and sentence formation and also comprehension; the latter is needed for all the subjects.

Their cognitive performances get affected because of this difficulty.
Do we have such soft wares which can help them learn spellings?

Can the soft wares like JAWS made available to regular schools; where a classroom having 50 kids may have 5 kids with LD(10% LD Prevalence) can have 5 computers and these kids can work independently.

If this soft ware, which is being used by the school while teaching, is allowed to use during exam with only one option (Radio Button) of reading, perhaps kids may not have to drop out from the schools.

**Government has a role in making a policy in this matter!**

**Infrastructure**

A teacher who came for a contact class said that he has to travel 60 miles to write an e-mail. Mobiles have reached millions; perhaps internet providers can help implement AT.

**Medical Diagnostics:** Disability prevention talks about early diagnosis of disabilities. Inborn Errors of Metabolism are the cause of many disabling conditions, these can be tested by TMS; Tandem Mass Spectrometry. NIMHANS does it for Rs. 750/- why is it done by others for Rs. 4500/- +? Are we misusing Technology?

**Role Clarity and collaboration**

Disability figures talk about high percentage of prevalence in low socio-economic strata and in the rural area of the country.

**How do we justify the affordability?**

**Whose role is needed to be looked into? Can Insurance companies help?**

Disability, productivity and poverty have a direct relation!

“Aladdin is needed to grant these wishes; let's find him”!
Some useful links related to Assistive Technology

**Basic phonics**
http://www.softschools.com/language_arts/phonics/games/cvc_flashcards.jsp

**Simple math problems**
http://tutpup.com/plays/new/5-algebra-game

**Make words from**
http://www.eastoftheweb.com/games/Eight1.html

**Math counting**
http://www.softschools.com/countg.jsp

**Prefix and suffixes**
http://www.bbc.co.uk/schools/ks2bitesize/english/spelling_grammar/spelling/play.shtml

**Compound words**

**compound word matching activity**

**Word game blends**
http://pbskids.org/lions/games/pounce.html

**Encoding of words**
http://pbskids.org/lions/games/blending.html

**Lion and the mouse story**

**Spin and spell**
http://www.spinandspell.com/game.swf

**Drag and put the spelling**
http://pbskids.org/clifford/games/index_puppyletters.html

**Learn spelling**
http://www.amblesideprimary.com/ambleweb/lookcover/lookcover.html

**Maths (addition, subtraction vendiagram etc)**
http://www.woodlands-junior.kent.sch.uk/maths/

**maths worksheet**
http://themathworksheetsite.com/
http://www.superkids.com/aweb/tools/math/odds_evens/
maths and English
http://www.onlinemathlearning.com

Opposites
http://www.englisch-hilfen.de/en/words/opposites1.htm

matching
http://enjoyenglish.free.fr/english/primaire/concentration/animals1/animals_.html

days song
http://enjoyenglish.free.fr/english/primaire/daysandmonths/days/daysong.html

days
http://enjoyenglish.free.fr/english/primaire/daysandmonths/days/index.html

tvocabulary
http://enjoyenglish.free.fr/english/primaire/

coloring activity
http://enjoyenglish.free.fr/english/primaire/colours/pageshtm/colours.html

see a rainbow
http://enjoyenglish.free.fr/english/primaire/colours/pageshtm/rainbowsong.htm

bodyparts
http://enjoyenglish.free.fr/english/primaire/humanbody/face/activity1.htm

Punarbhava: web link on Assistive Technology
http://punarbhava.in/index.php?option=com_virtuemart&Itemid=293

We can record our own voice but with the words in software
http://app.dk.mingoville.com/

Resources on Open Source Technology
http://www.oatsoft.org/
http://www.projectpossibility.org/index.php
http://www.instructables.com/about/
http://www.rsc-ne-scotland.ac.uk/eduapps/accessapps.php
http://www.openoffice.org/
http://fullmeasure.co.uk/powertalk/
http://www.cs.unc.edu/Research/assist/TarHeelTyper/index.html
http://www.e-speaking.com/

Technology development for Indian Languages
http://www.ildc.in/Kannada/Kindex.aspx
Communication Device: AVAZ – Making every voice heard

By Invention Labs

Invention Labs is a startup based out of Chennai and incubated at IIT Madras. Voted one of the hottest startups in India by Business Today in 2009, Invention Labs was founded by alumni of IIT Madras. With a diversity of experience gained from working for multinational corporations at different locations worldwide, the founding members of Invention Labs returned to India in 2007 to set up Invention Labs as an organization that invents products for the unmet needs of the Indian consumer.

Introduction

AVAZ is a portable speech synthesizer which can be controlled by gross motor movements of a child with Cerebral Palsy, such as approximate movement of the head or of large muscle groups. These movements are captured by the use of a touch-screen or an external switch, allowing the child to create sentences on the device using predictive software. These sentences are read out by the device and AVAZ thus becomes an ‘artificial voice’ for the child.

The first device of its kind in India, AVAZ has been developed by Invention Labs, a startup based out of Chennai, in collaboration with IIT Madras and Vidya Sagar, formerly the Spastics Society of India. AVAZ was launched in February 2010 and has been warmly welcomed by the community of special educators in India.

Speaking with the help of AVAZ

AVAZ consists of two components – a wheelchair mountable speech synthesizer and text prediction software that runs on this synthesizer. The speech synthesizer has been designed to be usable by children with different abilities and has the following features:

- Large 7” LCD display with Touch screen
- Speakers and Audio Jack – for voice output and audio prompts
- USB and Mono Jack ports - to connect non-contact switches (that get activated when they sense motion) and contact switches (that get activated when pressed)
- Rechargeable battery (in-built)
- Wheelchair mount (optional)

The text prediction software helps children do two things – creating sentences and speaking them out. The child is presented with various options to choose from which assist her/him in creating sentences. The child can select an option either by using the Touch screen or by using any contact or non-contact switch that is connected to the speech synthesizer. In order to speed up text creation, AVAZ features learning and prediction. It is able to remember sentences and words used by the child in the past, and predictive algorithms are used to accelerate the entry of commonly used phrases.

- AVAZ provides a ‘voice’ to a non-verbal child, allowing her/him to communicate with friends, family and teachers.
- AVAZ enables these children to express themselves – children can convey virtually any thought in
their minds by creating messages dynamically and using the speech synthesizer to ‘speak’

- AVAZ helps them become independent - children can interact with the device based on their ability. A number of interaction switches, contact as well as non-contact, are compatible with AVAZ and can be used to operate the device.

- AVAZ allows them to communicate easily - the software adapts to the child’s vocabulary, using words that are most frequently used by him/her as well as allowing the child to create ‘template’ messages for daily use.

- AVAZ is also portable, allowing the child to carry it around and even mount it on a wheelchair for easy access.

**Enabling inclusion for the non-verbal**

Having an ‘artificial voice’ enables non-verbal persons to integrate more meaningfully with their communities. An assistive aid like AVAZ can enable them to:

- **Develop advanced communication skills**
  The ability to communicate their thoughts helps them progress from expressing basic needs to having better and meaningful conversations with almost anyone.

- **Attend mainstream schools**
  Classroom participation and interacting with peers becomes easier, faster and more convenient with the help of an assistive device, helping overcome the barriers in the inclusion of non-verbal children.

- **Take exams and pursue higher education**
  The non-verbal child can communicate complex, abstract concepts and answers with the help of dynamic message generation, allowing them to study subjects of their interest. Communication with scribes also becomes more convenient with the help of an artificial voice.

- **Communicate confidently and participate actively in social settings**
  The ability to communicate with almost anyone creates many opportunities for the non-verbal person to make new friends, participate in conversations with large groups and socialize.

- **Express their creativity**
  Creative expression like poetry and storytelling that require verbal or written communication skills can be augmented with the help of an assistive device.

- **Take up gainful employment based on their true ability**
  Employment opportunities that require complex communication become more accessible to non-verbal persons, enabling them to consider career opportunities that can make use of their true abilities.

Communication plays an extremely important role in our lives and enables us to make friends, influence others and interact with their communities in meaningful ways. Our goal is to enable non-verbal persons with different abilities to overcome barriers in their communication needs with the help of an assistive device like AVAZ. Just like a person with mild visual impairment wears spectacles to correct her/his vision, we envision that most non-verbal persons will have access to and use a portable assistive device like AVAZ to ‘speak’ and communicate.
Product Details

Assistive Technology at SSK-CATELST

The SSK-CATELST Library has low tech, mid tech and high tech devices which are used for assessments & training and parent & child use. Listed below are details of sample devices -

LOW TECH DEVICES: Visual support strategies which do not involve any type of electronic or battery operated device - typically low cost, easy to use equipment, durable and reusable.

Pictures: Pictures are an inexpensive and practical mode by which an individual can communicate. Board maker is a software that can be used to create picture cards, symbols to words and sentences to building these pictures into charts, chat books, communication boards according to the user’s need.

Communication Chart for an Activity  Communication Schedule

Communication book  Chat Books

Grips

Pencils and Pens grips  Finger crayons

Activities for Daily Living:

Plates with grips  Button frame

Buddy Board: An acrylic portable communication board with alphabets set as in a regular keyboard on one side and has printed basic core vocabulary on the other. The user can point out to the letter...
or word to express his/her needs. This can also be personalised to suit the user. This tool assists the user learning to motor plan to allow him/her to move on to using the keyboard.

**Whisper Phone:** Intensifies the sound of ones voice - gives a voice feedback helping learners to hear phonemes, the sounds that compose words more clearly using a strong auditory foundation for learning.

**Wrist band with Pics:** Wrist-O-Pic: Teachers, speech clinicians, rehab workers and parents use Wrist-O-Pic to make motivating behaviour reward charts, portable communication and choice boards, picture schedules and organizers.

**MID TECH AND HIGH DEVICES:**

**MID TECH DEVICES:** Battery operated devices or “simple” electronic devices requiring limited advancements in technology. Example: tape recorder, language master, overhead projector, timers, calculators, and simple voice output devices.

**Electric Scissors and Track Ball Mouse**

**Keyboards with enlarged letters and key guards:** Is a standard size keyboard with 60 inch square keys providing all essential key functions. With large key tops and high contrast lettering, the keys are much easier to see and press. Its great for people with special needs and does not need any extra software, can be just plugged in to use.
Talking Photo Album: Record a message for 10 seconds. Photographs or drawings or pics can be inserted into each page and the situation could be recorded in the form of phrases, words and sentence form, can be used to aid in expression and organizational skills.

Talking Symbols Notepad: Create an environment with a voice for every “thing”. Developed to help teachers engineer classroom environments. It holds 10 seconds of recording time. Easy to carry, comfortably fits in pockets and purses.

Go Talk One: Talking Photo Card: It can record a single message talker with a large picture display and a big play button. Records message retains over one hundred year even the battery is dead or removed. It saves 10 seconds of recording time.

BIGmack and Littlemack Communicator: The BIGmack is a lightweight, easily transportable device that allows a message or a series of messages to be pre-recorded for 75 seconds. When the child touches the device the message is played back. When the pre-recorded message corresponds to the classroom activities, the child is able to participate.
Big Step-by-step Communicator and Little step-by-step Communicator: It is used to set up a social script and provide the opportunity for individuals to experience “real” conversation while actively practicing their communication skills. It is lightweight, easily transportable device allows record a message of 75 seconds.

iTalk2 Communication Aid: A lightweight and easily transportable device, records a message for 75 seconds.

Book Worm: This unique literacy tool is a great way to open the world of books for persons with disability. Easy for educator and the end user. Simply record the favourite stories into Memory Module, upto four stories per module.

Super Talker Progressive Communication Framework: It empowers students to communicate using the 1, 2, 4 and 8 messages in each and every activity throughout the day. Using this structure will encourage students to practice skills in every activity. This step in the framework provides the opportunity to “set the stage” for the activity by labeling the activity and explaining the purpose.

Switch:

Jelly Bean Switch

Cosmo’s Learning Systems: It is an educational product designed to motivate children with and without disabilities to participate more fully in educational and therapeutic activities. It consists of Mission Control and Cosmo’s Play and Learn software. Mission control is an accessible computer interface device with four aFFX activators and a built-in-microphone.
Cosmo’s Learning Systems

Alpha Smart 3000: It is exceptionally well suited for helping students improve the quantity and quality of their “prewriting”.

Magic Touch: Activate touch by pressure using finger, fingernail, gloved hand or stylus. Runs on all mouse-driven programs by touch.

Kids Smart

Leap Frog Tag

Games used for learning at CATELST and now developed into software