Modification of Learning Materials for Students with Visual Needs

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  Supporting students with Visual Impairment

- Modification of written information

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- 2D/3D ABC

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- Modification of various materials for learners with sight problems
Introduction

● A need for **respect for braille** as the literacy tool for students who are blind, as opposed to its relegation as a second-class communication system.

● The need for an assured educational placement continuum, including residential, resource room, special class, and itinerant programs, which allows for the changing needs of visually impaired students throughout their academic careers.

● The need to honor and provide time for **compensatory skill development with respect to the unique learning needs** of all children who are blind or have low vision.

● The need for equal access to computer technology both **academic and vocational opportunity** for students with VI

Source: S.J. Spungin, Vice President, Education and International Programs, AFB
Main Principles

**Partially sighted students:**

- Areas that might require adjustments in the effective functioning of the low vision (Bishop, 1996):
  - Materials must be of high contrast;
  - use bright colors not shades
  - lighting;
  - space and location;
  - size and distance;
  - low vision aids;
  - modifying of the working space;
  - modifying of the “big” space (halls, classrooms)
  - specially prepared materials, suitable choice of fonts;
  - double time for tasks.
Main Principles

*Blind students:*

- The study of the material should be given twice more time than it takes to children with normal vision.
- Learn to correctly use touch, encouraged to do so independently (one arm the leading, the other one – controlling), observe tactile images with both hands.
- Associate images with real objects.
- In a descriptive way tell students what is depicted in the tactile graphics illustration.
- Use written records and age-appropriate explanations to the images.
Low Vision Optical aids

- A wide variety of rehabilitation options are available to help people with low vision live and/or work more effectively.

- Hand-held or spectacle-mounted telescopes – These miniature telescopes are useful for seeing longer distances, such as across the room to watch television, and can also be modified for near (reading) tasks.

- Hand-held and stand magnifiers – These can serve as supplements to other specialized systems. They are convenient for short-term reading of things such as price tags, labels, and instrument dials. Both types can be equipped with lights.
Electronic Optical aids

1. The Boreal Digital 1000 SKope Plus Digital microscope;
2. OPTRON Mobile video magnifier image adjustment features of the Optron observer, including distance viewing function with 360 degree surround view capability;
3. Portable Video Magnifier fast and powerful real time video magnification. Its duel use allows for both distance and document reading.
Electronic Optical aids

- CCTV technologies in the learning process, the text of the book can be increased as needed, without scanning it.

- On the computer screen magnifier-enhanced light filter that helps clarify and sharpen the text and images can be seen in details.

Video magnification – Table-top (closed-circuit television)
Modification of written information

- Printed teaching materials are still the main information and knowledge sources for blind people.

- The printed information is available in various editions and formats – books, magazines, booklets, business pages in newspapers and a variety of goods (such as medicines) /environmental object labels.
Modification of written information

- Screen reading and Braille translating Software
  - JAWS;
  - Cobra;
  - Braille Translating Software Duxbury;

DAISY (started in 1994) during last 10 years had developed both Software (promote the DAISY Standard for Digital Talking Book) and Hardware (DAISY readers) for informational providing for people who are blind or print disabled.

In Latvia we don`t use DAISY system in Latvia because we do not have enough money and there are small amount of users, therefore there is no opportunity to enter DAISY, but we are trying to find partners and start using the system.
Modification of written information

Braille printer
**Modification of written information**

- **Refreshable Braille displays** are electronic devices used to read text tactually that is seen on a computer monitor. The refreshable Braille display is connected to the computer by a serial or USB cable and produces Braille output (with small plastic or metal pins that move up and down to display the Braille characters) for the reader. Possible providing only text, graphical information is not available, **a minus is the high costs of the device.**

- **Portable note taking Devices** PDAs (Personal Digital Assistants) may have a refreshable Braille display built into them, for example, The Braille Note
Modification of visual information

- Modification of **visual information** (pictures, maps, charts, plans) for the needs of blind people is a complicated step-by-step process, which includes not only modification of visual images into tactile-haptic forms, but also meaningful development of students **graphic literacy**.

- **Graphic literacy** (non-visual graphic competence) the ability to perceive the 2D/3D representation of the visual phenomena applied in the forms of suitable for haptic perception.

  *Aldrich, Sheppard, 2000*

Source: *Celia* library, Helsinki, Finland

**haptic perception** active manual exploration
Modification of visual information

Graphic images can be transformed and reproduced in a form of tactile graphics or 3D models.

Microcapsule or swellpaper
(Strazdumuižas internātvidusskola)

Termoforming
Celja library, Helsinki, Finland
Exercises for Development of haptic perception

- This is the first step in formation and purposeful development of
  - graphic competence,
  - reading and writing skills (Braille competence)

- We should start developing haptic skills in early childhood with very simple tasks – recognition of lines, shapes and textures.
Exercises for Development of haptic perception

Source: TG; swellpaper
(Strazdumuižas internātvidusskola)
Exercises for Development of haptic perception
Development of haptic perception

Source: TG; swellpaper (Strazdumuižas internātvidusskola)
Development of haptic perception

improves ● creativity, ● imagination,
● the tiny hand motor skills
● orientation on the microspace
**Development of haptic perception**

- **Pre-maps** – simple plans for orientation & mobility
  give main information about spacial relationship of objects

- “Pre-maps: An Educational Programme for Reading Tactile Maps.”
  
  Author: Helina Hirn, University of Helsinki
“multisensor box” for the students with visual impairments and additional disabilities.

- children can get notion about different characteristic features of various objects,
• A non-visual multimodal environment object for simultaneous development of Braille literacy and graphic literacy of the blind children aged 5 to 7.

• Different kinds of 3D objects are attached to the page. On the opposite side the tactile picture of the object is placed.

• The book is used vertically, both sides of the page are actively explored by a student under a teacher’s supervision.
Since 2000-s the concepts of teaching and learning has been changing;

- *Textbook tradition* in education is replaced by digitally based multimodal learning (*digital tradition*);

- Science and technology innovations have come both to mainstream and special schools;

- Carries different digital applications into the learning process. These applications are: digital graphics, hypertext, animation and video, digital libraries, 3D visualization, virtual simulations, video games, online daily media, e-learning systems etc. The usage of these applications brings the reality of the daily living closer to the educational process, and helps students to gain acquirements important for successful personal development in future.
Multimodal learning environment

- **Multimodal learning** uses digital information media with high semiotic potential as its main structure.

- **Multimodal learning environment** is the practical application of the multimodal learning concept and it:
  - includes **three basic information modalities** - visual, auditory and haptic, with visual being the predominant one;
    
    | about 80% of all information perceived by people in their lifetime come from visual source |
    
    - Causes a new type of meaning making and construction of school knowledge, based on **multiple literacies and competencies**;
Multimodal learning environment for the blind

- Braille print
- Tactile Graphics
- 3 D models
- Haptic displays
- Refreshable Braille displays
- Portable note taking devices
- DAISY
- Audio books
- Screen reading
- PPHANToM™
- Talking Tactile Tablets

- Haptic Interactivity
- Auditory Interactivity
- Kinesthetic Interactivity

- haptic information is normally included in form of Braille, but the role of tactile graphics is increasing significantly along with technological innovations.
Learning materials for integrated studies

● Several particularities of multimodal learning environment for the blind are unique – among them, tactile applications, communication devices, multisensory gadgets etc.

● *Talking Tactile Tablet 2* is a computer peripheral device designed to be used as a “viewer” for tactile materials with simultaneous audio addition. In order to use it, the users need TTT Applications, for example World Map, SAL2 Mangold Braille Reading Program for Teens & Adults, which is designed for students who are fourteen years of age or older.

● *PHANToM™* is the most commonly used force feedback device; it is regarded as one of the best on the market.” (Nikolakis, et al.). This device allows the user to explore details of the object - shapes, virtual materials, magnets.
Learning materials for integrated studies

A4 Multiple choice frame

- tasks with text and TG
- interactivity
- suitable for use in different subjects

Source: www.hungryfingers.com
Learning materials for integrated studies

Boardmaker Activity Pad

- tactile and auditory modality
- **interactivity**
- suitable for use in different subjects

Electronic multimodal device
Learning materials for integrated studies

- raised line drawing board
Modification of Geografy learning materials
Modification of Geografy learning materials

- Braille print; TG
Modification of Geografy learning materials

TG swellpaper (Strazdumuižas internātvidusskola)

Modification of visual information
MAPS
Modification of Geografy learning materials
Modification of Geografy learning materials

- vizuālās informācijas taktilo analogu veidošana.
Modification of Geografy learning materials
Plan of the school building in tactile graphics

Source: TG; swellpaper (Strazdumuižas internātvidusskola)
Modification of Maths learning materials
Modification of Maths learning materials
Modification of Maths learning materials
Modification of Biology learning materials

Tactile Biology Models
Modification of Chemistry learning materials
Modification of Chemistry learning materials

Saliekamā (mozaīkas tipa) Mendejejeva ķīmijas elementu periodiskā sistēma.
Modification of Biology learning materials
Modification of Biology learning materials
Modification of Biology learning materials
Modification of Arts learning materials

- The adaptation of Visual Arts is a great challenge not only for blind students but also for educators and “translators”.

- It is a process that with variable success trying to replace visual semantic system with tactile (haptic semantic system) elements.

Source: TG Center University of York, UK
Modification of Arts learning materials

Source: TG; swellpaper
(Strazdumuižas internātvidusskola)
Exploring the wall of the church in Old Riga
PALDIES!