

## DEVELOPMENT OF TACTILE STRATEGIES AND USE OF TACTILE RESOURCES IN EMERGENT LITERACY AT CHILDREN WITH VISUAL IMPAIRMENT

ANDREA HATHAZI\*, MIHAELA BUJOR\*\*

**ABSTRACT.** The development of literacy skills in children with visual impairment involves a structured process concerning the development of pre-acquisitions through different strategies and activities such as using tactile books, reading stories aloud, tactile exploration and concept development in an adequate and responsive learning environment. In the present study we discuss the importance of literacy environment and the opportunities created by first hand experiences which form the foundation for learning, meaningful language development out of real experiences, and interaction with adults or peers. The use of tactile resources and the learning of strategies and procedures in tactile exploration within stages that need to be completed will determine the development of emergent literacy skills in children with blindness.

**Key words:** *visual impairment, tactile strategies, exploration procedures, tactile resources, emergent literacy*

**ZUSAMMENFASSUNG.** Die Entwicklung der Lese- und Schreibfähigkeit bei Kinder mit Sehbehinderung besteht aus einem strukturierten Prozess für die Entwicklung der bevor Erworbenen durch verschiedene Strategien und Aktivitäten wie, Tastbücher, Auflesen von Geschichten, Tasterforschung und Konzeptentwicklung in einer angemessenen und ansprechbarer Bildungsumfeld. In dieser Studie steht im Vordergrund die Wichtigkeit des Bildungsumfeldes und die Gelegenheiten der eigenen Erfahrungen die die Basis der Bildung darstellen, sinnvolle Sprachenentwicklung durch echte Erfahrungen und Interaktion mit Erwachsenen oder Kollegen. Die Benutzung der Tasthilfsmittel und das Erlernen der Strategien und Techniken in der Tasterforschung innerhalb von Etappen, müssen abgeschlossen werden, werden die Entwicklung der austretenden Lese- und Schreibfähigkeit bei Kinder mit Blindheit bestimmen.

**Schlüsselwörter:** *Sehstörungen, taktile Strategien, Exploration Verfahren, taktile Ressourcen, Emergent Alphabetisierung*

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\* Babes-Bolyai University, Faculty of Psychology and Educational Sciences, Special Education Department, Cluj-Napoca, Romania, ahathazi@psiedu.ubbcluj.ro

\*\* The Highschool for the Visually Impaired in Cluj-Napoca, Romania, mihabujor@yahoo.com

## INTRODUCTION

The development of literacy skills in children with visual impairment involves a structured process concerning the development of pre-acquisitions through different strategies and activities such as tactile exploration and concept development, tactile resources, using tactile books, reading stories aloud in an adequate and responsive learning environment. The emergent literacy is defined as the developmental process in which children acquire the foundation for reading and writing, including oral language and listening comprehension, concepts about print, alphabetic knowledge, phonological awareness, and the environments within which they develop and learn (Erickson, Hatton, Roy, Fox, Renne (2007) apud Sénéchal, LeFevre, Smith-Chant, and Colton, 2001; Strickland & Shanahan, 2004; Whitehurst apud Lonigan, 1998, 2002). In early intervention, emergent literacy also includes areas of concept and motor development that relate directly to reading and writing skills in later childhood. It is assumed that the development of literacy in children begins long before formal instruction in literacy skills (McKenzie, 2009 apud Teale & Sulzby, 1994).

Stratton, J.M. and Wright, S. (1991) discuss the importance of literacy environment and the opportunities created by first hand experiences which form the foundation for learning, meaningful language development out of real experiences, and interaction with adults or peers. Stratton and Wright (1991) suggest the importance of the following strategies in the emergent literacy:

- direct experiences with the objects in activities of tactile exploration,
- the development of body image,
- the development of hand skills such as reaching, grasping, rotating, manipulating, touching, exploring,
- the use of language in concept development and increase of experiences within the pragmatic function in everyday experiences,
- active participation opportunities within a responsive environment that encourages initiative and curiosity,
- reading aloud to children that is also about developing the listening skills so important when considering children with visual impairment and access of information,
- development of an awareness of print or Braille as an exposure to text and that the words have meaning.

Learning about the objects and exploring the environment must be preceded by the understanding and development of self- awareness regarding body image. Self- representation is important in the development of the concept of self in relation to objects, people and environment. During development, the child gains the ability to conceptualize the physical world through thought, starting with the perception and understanding of the spatial aspects of it (Warren, 1994). spatial information is not the exclusive domain of one sensory

modality. Spatially relevant information is also available through senses other than vision (e.g., through hearing, touch and movement) and this information can form the basis for spatial coding (Ungar, 2000).

The child must be given time to explore, but also adequate descriptions must be offered simultaneously with the hands-on activities in order to form the concept. Exploration of objects can be done initially together with the adult, with the progressive withdrawal of the support from the adult (Chen, 2011). The material and tactile resources that are used in the development of pre-Braille abilities will support also the development of tactile and fine motor skills, perceptions and representations, language, orientation and mobility. The use of these resources must follow the principles from simple to complex, tridimensional to bidimensional, from concrete to abstract.

According to Barraga and Erin (1992) there are five stages in the development of tactile perception in the child with blindness. These are awareness and attention given to different characteristics of surfaces such as texture, temperature and vibration, followed by identification of shape and structure, recognition of relationship of different parts within the whole, recognition of graphic representations and finally recognition of Braille symbols.

Withagen, Ans, Vervloed, Mathijs P.J., Janssen, Neeltje M., Knoors, H., Verhoeven, L. (2010) apud Jones and Lederman (2006), Klatzky, Lederman, and Metzger (1985), and Lederman and Klatzky (1987, 1996) present two phases in exploratory strategies: nonspecific exploratory procedures and specific exploratory procedures. The nonspecific exploratory procedures (like enclosure), give global information about objects, whereas the specific procedures (such as following contours) give more or less exact information about objects. In this view, consideration must be given to the resources that are used, but also to the strategies. McLinden and McCall (2002) describe the term of active touch and identify the sensory information acquired about the object through various exploratory procedures. An exploratory procedure is a stereotyped pattern of manual exploration observed when a particular object property is identified during voluntary manual exploration without vision or sometimes with vision (Lederman, Klatzky, 2009). Thus the lateral motion exploratory procedure (rubbing finger across surface of object) gives information about the texture, the pressure exploratory procedure (squeezing, poking object) about the hardness, the static contact exploratory procedure (fingers resting on object surface) about the temperature, the enclosure exploratory procedure (holding/grasping object) about the shape/size/volume, the unsupported holding exploratory procedure (holding object in hand) about weight and contour following exploratory procedure (tracing along contours of object about the global shape and exact shape. The simultaneous execution of two or more exploratory procedures allows the individuals to integrate redundant properties of multiattribute objects (Lederman, Klatzky, 2009).

The best way to learn the concept of a model is to use a concept that the child had discovered and developed during the experience with the object itself (Wormsley, 1997). These types of activities must become an important part of the structured routines and programmes in early child development. Children with visual impairment sometimes lose different characteristics of the objects they approach in a fragmentary way, so that the concepts and representations forms are distorted. Objects must be approached in a holistic and integrative way (Wormsley, 1997). Children must be taught different exploratory strategies – such as – palm scanning, manipulation with fingers and thumb, moving hands over different parts of the object, moving back and forth over the object to connect the different parts and realize a synthesis.

Experiences build concepts. A concept is a mental representation, image or idea of tangible and concrete objects and intangible ideas and feelings. Concepts link the tactual interpretation of parts to build an entire perception of the whole within meaningful experiences to find patterns and make connections and generalizations (Cleveland, J., Sewell, D., 2009). Fine motor skills are essential for acquiring Braille, so any delay in the development in this area must be approached to prevent further delays. The effects of the delay can become permanent, influencing also orientation and mobility skills and even cognitive abilities (CNIB, 2004). Main difficulties appear when there is no stimulation and training regarding tactile skills and tactile experiences. Consideration must be given to the resources that are used that will facilitate hands flexibility, coordination and dexterity, development of fundamental gestures and specialized movements to complete various tasks. Activities which refer to the development of pre-Braille activities must be included in structured daily programs, that initially last several minutes and then later for 30-40 minutes (Koenig, 2000). The activities rely on active learning, discovery and investigation, observation and exploring of the environment so that children develop skills that are significant and meet their needs. These activities involve active learning, observation and discovery of the environment, but autonomous behaviors do not develop unless educational programmers are implemented, and sensory activities are integrated in daily routines (Chen, 2006).

Tactile exploration of objects must be realized according to the following stages:

1. Stage of searching for the object on the tabletop until it is reached.
2. Stage of making first tactile contact with the object.
3. Stage of detailed exploration of the object, its recognition or building a pre concept of it in case the object is unknown.
4. Stage of making conclusions and picturing the tactile information. (Tzvetkova-Arsova, 2000).

In the use of tactile resources consideration must be given to the age of the child and level of development. These can have a simpler content and progressively become more complex. At the beginning, tactile books can be based on the development of different concepts such as shape, size and texture or real objects from the child's environment can be transformed in tactile images (Cziker, 2011). The use of tactile books requires some steps in the process of learning, starting with the exploration of the pages, orientation in the page, find the elements and identify the characteristics, associate the representation with the written or spoken word, identify characters, enjoy the story and the whole activity and form aesthetic and moral values. The critical factor that encourages the development of literacy consists in exploring tactually while reading aloud the story, so that the meaning is conveyed not only in tactile representations, but also in text. Tactile books can be associated with the use of tactile boxes that contain the elements that are presented in the books, and these can be explored while following the pages of the books or previously. The first book must be simple and explored together with the adult (Skold, C., 2007). The child will learn the concept of a book, learns how to use them, to perceive margins and corners with the use of both hands – fingers and palms, to identify tactile images representing different objects, to identify the presence of texts. Also the different positions and relations between the objects and their display in the environment can be learned.

The use of pre-Braille resources represents an important stage in the emergent literacy. Getting in contact with the Braille symbols, learning techniques to identify and discriminate different displays of the symbols and of the dots, exploring rows and columns of Braille dots, learning to orientate in the page, learning spatial concepts such as left, right, middle, up, down are very valuable for further learning of Braille reading and writing. Even though the children cannot read and write Braille, using these resources, he will get aware of the connections between oral verbal language and written verbal language (Swenson, 1999). The early attempts of the blind children to read can include following a word or a sentence with the fingers, turning the page, identifying tactile elements while the adult is reading, writing with the stylus different Braille symbols. At the beginning, the child is familiarized with the use of stylus and he makes randomly dots on the paper (like the rain is falling), then later makes different kind of lines, horizontal, vertical, different combinations of these, different geometrical shapes, with support of other resources such as dough or wooden pieces and then without support. After the exercise with the stylus and the slate, the child always has to analyze what he has done, verbalizing all the information that he is tactually identifying (Swenson, 1999).

## **RESEARCH HYPOTHESES**

The current study investigates the following hypotheses: the use of tactile resources following a structured model will determine an increase in the development of tactile skills.

## **CASE-STUDY REPORT**

### ***Personal and family background***

The child, with the age of 5 years old is included in the early intervention program at the Kindergarten for the Visually Impaired in Cluj-Napoca. The family of the child works and lives abroad. The first months in the kindergarten were characterized by a period of stagnation in the child's development. Attending a boarding school is difficult for the child to accept and accommodate with. There are no other cases of visual impairment known or registered in the family.

### ***Medical information and diagnosis***

a) *Medical history:* The child was prematurely born at 6 months and 3 weeks, with a weight of 750 grams and a length of 32 cm. Needed incubation for several weeks.

b) *Ophthalmological diagnosis:*

- Retinopathy of prematurity
- Congenital glaucoma
- Retrolental fibroplasia.

Ophthalmological diagnosis was given at the age of 8 months.

### ***Psychological and educational assessment***

a) *Psychological assessment*

The child was assessed with Oregon developmental scale and functional development inventory. According to the assessment, the child communicates relatively easily, responding spontaneously, he plays with other children, but often prefer to stand alone, not expecting to be involved in the activity. He doesn't initiate play activities. He presents negativity and refusal of activities, especially when he is tired. If he fails to do something he gets upset and often starts crying.

If he happens to drop a toy, he makes lateral movements with feet and if it doesn't come in contact with his body, he is no longer looking for it, and remains sitting on the chair.

He is very static, sits mostly on the chair, not moving, and if nothing is given to him to do, he can stay with the head on the desk. He is not motivated

to look for objects and toys, to move and explore new things by his own initiative. Always uses the words „I can't" or „I don't know". He has the habit to keep the hand in the eye constantly.

He likes stories, he listen and then reproduces sequences of the short story, but with additional questions. During breaks, rarely looks for peers, waiting to be looked for and enjoying when his friends ask him to play together. If he is involved in an activity that interests him, he is able to be in the activity for 30 minutes. The vocabulary is quite poor, but he uses sentences to express his needs and interests.

#### *b) Interpretation of results from the initial assessment*

The results of the assessments showed a significant delay in child development at all levels, including motor development. Movements are rigid, poor coordination of movements, exploratory strategies are lacking. He has poor spatial orientation and spatial concepts are not used.

Body image concepts are fairly well implemented; he identifies the main parts of his body, making also transfer to other people. There is a lack of confidence in his abilities, he is afraid to explore, to investigate the environment, lack of curiosity, a reduced need for participation. Exploratory behavior is not systematic; it is rarely planned, with incomplete and imprecise manipulation. Time and spatial concepts are partially formed, but incomplete. He has the concept of size (large-small), but not the concepts of form, composition, texture. At the task of indentifying geometric figures, the child managed to indentify only the circle, without naming its shape (round).

He responds to tactile stimulation, he is pleased to explore tactile images, especially those with moving parts. He presents difficulties in interpreting tactile information of objects represented in items with similar characteristics In order to explore the page, he uses the hand without a specific strategy. The major problems are noted in the development of fine motor skills.

#### ***Intervention program***

The results of the assessment represent the starting point in the development of the individualized intervention plan. The objectives that were set refer to the following areas of development and specific skills: space concepts and structures, orientation, motor skills, bimanual coordination, tactile perception, tactile exploration of objects and tactile images, Braille.

The content of activities was structured on three levels:

- a) Exploring real objects within activities of identifying objects and their characteristics, activities of identifying objects in immediate space and environment, exercises of developing grasping and fine motor skills.

- b) Exploring tactile images and tactile symbols with structures and content that evolve from simple to complex, from the pre-Braille resources to the story. These were also associated with verbal descriptions for the development of listening skills and adequate concepts. The use of tactile representations of real life objects is an important stage for the emergence of tactile knowledge and understanding of tactile symbols.
- c) Use of resources for learning and reading and writing skills in Braille.

The first stage of the intervention program referred to the development of tactile concepts and tactile knowledge regarding objects from the environment. The characteristics of different objects were observed in detail: size, shape, weight, texture. The tactile exploration was made with an emphasis of handling with both hands and identification of the different functions of objects i.e. a rubber ball can be rolled, squised to make a sound, thrown and tapped. Exercises to develop basic motor gestures such as stringing activities, fitting, construction, grading, and modeling were also included in the activities.

For raising awareness and motivation to explore objects with different characteristics, the objects were presented with their other attributes like taste or smell. For example, what we can do with an orange: exploring an orange, smelling fingers and hand, peeling the orange, cutting in into pieces, exploring the whole, perceiving the shape and rough texture of orange peel, roll it on a table, can be likened to a ball. This is an example of activity that incorporates both training and analysis, but also motivation to discover the environment. He always tries to verbalize and describe the activities that he is involved in for a better understanding, but also a need for being reassured.

The next stage in the intervention program consisted in the use of a tactile book. The child was familiar with the concept of „book”, he learned to explore it from the cover. Exploration was done in an organized way, from left to right and top to bottom. Topics explored in the first book: simple geometric forms, representations of lengths, sizes, different textures, and objects could be manipulated (for example. A small booklet glued inside the book, etc.) Exploration in the beginning was difficult; initially he failed to identify the concepts of space on the page, to make the transfer from concrete plan, object, and space on the page.

The child was next presented a narrative tactile book, a story called „The little doll”. The objects in the story were explored initially in the environment. If at first the movements were confusing and disparate, during the exploration of the book he began to acquire more accurate techniques to explore from top to bottom of the page and from left to right. Exploring the book was done in stages, first becoming with familiar with it, then lead to learning spatial concepts and techniques of exploration, handling, identification and then building by exploring the group together with other colleagues.

Then he was introduced to the pre-Braille manuals, realizing the exercises of the first two volumes, on the horizontal and vertical line. Along with these exercises, he was introduced with the slate and the stylus, making Braille dots and symbols on the paper. During the implementation of personalized intervention plan he developed self-confidence and personal safety skills. His refusal and lack of participation in activities was reduced, he became more involved in daily educational activities.

### ***Final assessment***

The implementation of exploration techniques and structured activities determined progress in the development of tactile and motor skills, but also in the development of tactile representations and concepts. At the beginning the exploration was totally chaotic, only with one hand, the other hand touching the eye or supporting the head. The objects were not manipulated using a strategy that will enhance later recognition and development of representations. The lack of tactile strategies was related to reduced understanding of the physical environment, the recognition of objects and their use, but also reduced vocabulary and concepts. The programme determined more precise and coordinated movements, the exploration procedures were formed so that the significant tactile information is identified in order to enhance understanding. The assessment showed that in order to be effective, the learning process must be sequential and well approached. The exploration strategies are not formed in the context of blindness if there is no structured program that considers all these specific skills.

Following the intervention program, there was an increase of interest for the surrounding objects and tactile books, always wanting to „read”, looking for toys to be manipulated and explored. An intensive training program for the development of tactile skills is recommended in kindergarten activities and daily routines.

## **CONCLUSIONS**

All three types of levels and complexity of activities are required to be approached and implemented in the programmes. The skills that are specific to each level, starting with basic tactile discrimination and identification to the more complex tactile symbols and their understanding, must be considered and thoroughly developed so that the Braille literacy skills can be formed properly. The delay in the development of Braille literacy skills must be searched in the previous developmental stages. The assessment of these skills will always refer to what has been learned by the child and the level of

mastery and functionality of the pre-acquisitions. The intervention programme also determined interest and curiosity for the tactile resources and the refusal of participation in the activities reduced in frequency. It is thus recommended in the early intervention programmes for blind children that increased importance to the development of tactile strategies is given within the rehabilitation and educational activities. The development of these strategies and the enhanced exploration of objects and tactile resources is close to cognitive development, language development, social and emotional development and daily living skills. The use of specific tactile resources is essential; they must be available to the children and the teachers. Consideration must be given so that each child with blindness develops from the early years' skills that determine understanding and learning. Abilities can be remained undeveloped, later development of specific skills like reading and writing Braille can be noted, difficulties in learning can be encountered. There is a need to use teaching strategies and activities such as organizing the environment, exploration techniques, pre-Braille exercises that will encourage the development of literacy skills.

Knowing the environment, having strategies that allow exploration and manipulation, accessing tactile resources, developing representations, developing language and concepts are key elements for every intervention program.

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