THE PERCEPTUAL MEDIATED LEARNING PROGRAM FOR THE BLIND CHILDREN

Claudia Veronica MARINACHE*

Abstract

Tactile exploration is very important for the blind children and the development of the tactile sensitivity must begin from preschool period and must be realized step by step during a long period of time. As a therapist I was interested in training and developing the tactile perception regarding spatial relations in blind children. As a result I created *The Perceptual Mediated Learning Program* in order to stimulate tactile sensitivity from preschool to the fourth grade. *The Mediated Learning Experience* (MLE) was introduced by the theory's author of the *cognitive structural modifiability*, Reuven Feuerstein. This concept (MLE) underlies my program. *The Perceptual Mediated Learning Program* uses the dots and lines and their combinations and consists of the different sections: the dot, the group of the 6 dots, the line, the angle, the shapes, the draws with lines and shapes. Tactile exercises are graduated as difficulty. The program allows to find out how important the early education and preschool stimulation are for the development of the tactile sensitivity in blind children and their preparation for school, for Braille reading and writing.

Key-words: blind children, tactile-kinesthetic behaviour, the perceptual mediated learning program, early stimulation.

1. Terminological delimitation

When the child is blind, the sensory compensation has the expected results if it is involved in a perceptual learning program where the emphasis is on the stimulation of all intact senses. Although the sensory education covers all valid sensory modalities, it addresses, in particular, to the senses with priority compensatory: tactile-kinesthetic and auditory senses. *The perceptual learning* is the form of human learning that assures the improvement of the *sensitivity* and *discriminative acuity*, the training of the *exploration strategies*, the creation of the *generalized perceptual schemes*.

Mircea Stefan (2006, 175) considers that *mediated learning* is a modern pedagogical thesis that highlights and analyzes the role of the educator (and of other educational factors) in mediating of the child relationship with the learning content. The author does not deny the importance of direct and active relationship of the child with the object of knowledge, but "that mediated action

* Claudia Veronica MARINACHE is a PhD Candidate at the Doctoral School of Sciences of Education, University of Bucharest. E-mail: veronicamarinache@yahoo.com

is necessary for the stimulation of the motivation, for the focused learning on essential and for the arming the children with effective learning strategies [...] Forms and degree of mediation depends on age of children". *The Mediated Learning Experience* (MLE) was introduced by the theory's author of the *cognitive structural modifiability*, Reuven Feuerstein (1979/2006). In his opinion, the mediated learning experience involves interposition between student and learning content of a mediator (parent, teacher, etc.) in order to facilitate learning. The relationship created between the mediator and (mediated) student is based on the intention to mediate of the first and the aware and motivated engaging of the latter. The purpose of mediation is arming of the children with effective learning strategies that serve in any situation.

If we relate the two concepts (*the perceptual learning* and *the mediated learning*), we can introduce the expression *the perceptual mediated learning* that is defined as a form of human learning that has as goals the creation of the perceptive schemes, of the perceptive exploration strategies, of the perceptual discrimination capacity, of the perceptive-spatial reasoning with support or guidance from a mediator adult. *The level of support provided to solve the task (verbal support,* physical support *or combined) offers the indicators through which the perceptual mediated learning can be operationalised.* If the child solves correctly and independently the task means that the *support is nulle.* The support appears when the child solves the task with verbal/physical support or with the both offered sporadically or continuously. *The Perceptual Mediated Learning Program* is created in order to stimulate, in a *mediated, supported way*, the *tactile-kinesthetic behavior* in the blind preschool and schoolchildren. Such program provides the training to acquire writing and reading skills in Braille for preschool children, but also their optimization in young schoolchildren. The therapeutic approach focuses on the transition concrete-action plan to the imaging, allowed for the conquest of the symbolic (allowed in the symbolic conquest). The fields/dimensions of *tactile-kinesthetic behavior* practiced by the tasks of the program are: *fine tactual motor activity* involved in tactile exploration, two-handedness (or *bimanual coordination*), *tactile exploration strategies* (haptic strategies), *tactile identification* and *discrimination* of the different elements like: points, lines, dots group, angles, geometric figures, *spatial orientation ability*, *perceptive-spatial reasoning* and *tactile representations*. All these dimensions are, in fact, *the indicators* through which *the tactile-kinesthetic behavior* can be operationalised.

2. Pre-Braille guides and their valences

A *perceptual learning program* is *mediated*, given that it is designed, initiated, implemented by an adult (parent, therapist), according with the needs of the child. We must keep in mind that each child is unique, has its individual

characteristics due to heredity, but also to the experience of family life, has its own abilities and "minuses" that have to be, if not eliminated, at least ameliorated. Brunner's theory regarding the cognitive structures and how they are formed underlies the conception of such perceptual learning program. Learning can be complete and effective, if only we go through three modes of knowledge of reality: active (concrete plan), iconic (imagery) and symbolic. In the case of blind children, the teachers were often passed from active to the symbolic, iconic way being "missed".

Not by chance in pre-Braille activities carried out with blind preschoolers we start from concrete manipulation of objects, therefore from the three-dimensional plan to the bi-dimensional one (formboard), continuing with the perception of tactile images with *full contour* (as *silhouette*) and reaching to the perception of an *outline picture* (*naked contour*). The crossing scheme from the three-dimensional objects to the perception of the contours in relief, owned by Morgan (Preda, 2004), is helpful in conducting educational activities and the achievement of pre-Braille books for the preschool blind children.

In the case of blind children, this learning focused on objects and imagery perception creates conditions for the development of the perceptive analysis of the images, of the perceptual and spatial reasoning, forming the basis for simple operations of thought. To browse iconic way, the pre-Braille guides were used and developed. They can be considered true programs for learning in tactile-kinesthetic plan. These pre-Braille guides permit development of the tactile exploration strategies and crossing of the tactile graphics elements with facilitator role in the training of reading and writing skills in Braille. The subjects receiving training throughout the preschool period present precision, speed, safety in Braille reading and writing. For the blind children, the lack of tactile exercise is most often associated with hesitation and slow and delayed discrimination of the Braille symbols. In a recent study (Marinache, 2008b, 84), achieved on the blind subjects in stimulated and not stimulated in Preschool is mentioned: "Enrolled in a tactile-kinesthetic the stimulation program started early, sustained and continuing, blind children achieve the representations, skills and abilities that allow them to learn in time (end of first grade) and with very good results the skills of reading and writing in Braille, in comparison to those deprived of this stimulation from causes such as: indifference/overprotection, excessive indulgence, inadequate environment".

3. The International experience

Research focused on tactile images, effectuated over time, permitted the creation of appropriate and more efficient materials for the tactile exploration, leading to performances in tactile-kinesthetic plan. We present below some of the achievements in this area of tactile images.

Arnold (2004) mentions *the perceptual learning programs* in tactile-kinesthetic plan, existing in England, designed as pre-Braille guides:

- Pre-Braille pack *Feeling ready to read* (Farnsworth and Lumley, 2002) was launched at the *International Conference on Tactile Graphics* in July 2002, at the University of Hertfordshire, England. The package was developed in order to form a series of pre-vocabulary skills and abilities in blind children. *Feeling ready to read* is based on *Snow White's* story, providing a pleasant working context for children. Using these pre-Braille materials, the preschoolers experience a series of activities designed to encourage reading. To avoid the development of the pseudo compensatory mechanisms (such as, scrub with a fingernail or finger pads of the book, resulting in removing or flattening of the dots), it is very important and required pre-Braille exercises which develop the skills to follow a text fluently, tactile discrimination and easy tact. Besides the necessary skills training in literacy in Braille, these tactile books offer the opportunity to develop tactile-kinesthetic exploration strategies of the images in relief, imagining interpretation, tactile representations and various concepts.
- *Abi Books*: *The Adventures of a young blind girl* is a set of books designed for the schoolchildren in primary, which learn to read using the sense of touch. Having as central character of the story a blind child of school age, it was hoped that students empathize with the character and some of his experiences. The stories are short, giving children a feeling of success. At the end of each book, there are some control questions to check understanding of story content. Books are written in capital letters, but also presents Braille version of the texts.
- *Reading Together series* includes a set of stories for young schoolchildren who are learning to read Braille. The purpose of these books is to permit the training of the vocabulary skills to be applied in the context of some meaningful reading experiences. The main objective is to raise the motivation for reading, to develop fluent reading and comprehension. The series is divided into five levels, for each level there are books and texts in the printed and Braille versions.
- Other pre-Braille guides have been developed in Germany, in Berlin, with the support of the Blind Association (Der Verein zur Förderung der Blindenbildung). The first initiative of this kind took place in 1965 for blind subjects in the School for the Visually Impaired Paul Kniese und Charlotte (Preda, 2009, 47). Subsequently, they made other versions, some of them being used today. These guides are used during pre-literacy. They are divided into five volumes (tomes) with different themes. The first two tomes (Kniese, 1988) contain a summary of the types of exercises identification/tactile discrimination made in the preschool period, using as the elements of differentiation *the dot*, *the line*, *the angle*, *the geometric shapes* and *tactile images* on thematic categories. Tactile images are made at thermo

on special plastic sheets, the resulting shapes being in full contour (as silhouette), intensely colourful and, most often, smooth. The images are accompanied by words to name, printed in ordinary *black and white* (print version), but also in Braille version. The third volume (Kniese, 1990) is centred on lines, dots, the lengths and widths, placed in different parts of the page, on spaced and close rows and columns. The exercises are aimed at training tracking skills on row/column specific to reading in Braille with the use of both hands. Latest books include short texts and are intended for practicing reading in Braille (Kniese, 1990).

4. The Romanian experience

In literature pre-Braille guides are real programs for the development of the tactile sensitivity , applied early, aiming to prepare preschool children for the school debut. Preda and Cziker (2004) have presented some pre-Braille guides made at Cluj with special software. The tactile images are grouped in 11 volumes for blind preschool children and school-aged children. Each of these books aims to develop the capacity of tactile-kinesthetic perception of the various graphs in dots (with vertical, horizontal, oblique, curved lines), which combined lead to the complex elements: simple geometric shapes and tactile images.

The Perceptual Mediated Learning Program has the format of a work-guide that addresses both teachers in schools for the visually impaired and parents of blind children, referring to an expanded target group: normally intellectually developed preschool blind children; blind schoolchildren who weren't stimulated in tactile-kinesthetic behavior during preschool; blind students who were stimulated in preschool and/or in the primary school. In formulating this program, I had to analyze works of literature such as: *Program to Develop Efficiently Visual Functioning* - program of "visual training", owned by N. Barrage (1998); *The psycho-pedagogy of visually impaired children* by M. Ştefan (1999) contains designed, structured and well-publicized exercises for visual education; *The Feuerstein Instrumental Enrichment Program– instrumental enrichment program* whose author is Reuven Feuerstein (2006), *The haptic test battery* (Ballesteros, Bardisa, Millar and Reales, 2005) and *The Tactual Profile* (Withagen, Vervloed, Janssen, Knoors and Verhoeven, 2009), the real tools used to assess the tactile functioning of children who are blind.

The Program is similar to the *visual training* made by N. Barraga, each section is presented individually and consists of: targets, tactile tasks, working procedures, materials, complementary procedures and notes, comments or observations. Through the tactile tasks which a child is involved in, somebody aims to achieve goals at the beginning of each learning activities/therapy. The reference objectives at the beginning of each section are reflected on operational

objectives that are to be achieved by sequences of learning/short-term therapy. There is a detailed description of procedures, methods, tools and materials used, the entire strategy used to achieve the proposed objectives. The expected target is described at the end of each working procedure and constitutes, in fact, criteria to evaluate the behavior that the subject is shown at the end of the procedure. Furthermore, at the end of each chapter there are additional procedures through which someone can achieve other objectives. I added some suggestions and explanations (notes and observations) regarding the categories of blind children, the type of used exercises and the know-how of making didactic materials in relief. *Visual discrimination exercises* proposed by M. Ştefan (1999) have been a landmark in the development of tactile discrimination exercises. Given these patterns, I have created my own education tactile exercises, using different elements for tactile discrimination (dots, lines, angles, geometric shapes), taking into account the age of subjects with blindness, their tactile stimulation and their intellectual level. I created exercises of tactile identification and discrimination both of them presented on the row and the column, according to the direction of Braille reading and writing and to the orientation on the plate.

This program is structured into three parts. The first (*Tactile* elements) includes the following sections: *the dots*; *the fundamental group*; *the lines*; *the angles*; *the shapes*. The second part – *The draw with lines and shapes* – is meant to build the capacity for the identification and representation in drawing of various aspects of reality, supporting the use of tactile items previously learned. The tactile-perceptual tasks designed for the *Perceptual-spatial Reasoning*, concentrated in the third part of the program, refer to a set of tactile-kinesthetic stimulation strategies of blind children, including elements of *fine tactile discrimination* and *the organization and structuring of the space*, with high degrees of difficulty. Within each party, individual sections are presented as independent units including: objectives, tactile tasks, procedures, notes/comments, appendices with different materials and tactile images. The program contains appendices (over 300 working sheets) with flat drawings that can be achieved in relief (at the thermo). The program involves an approach in small steps with the observance of the principle of learning from *simple to complex*, based on *gradual and focused learning*. It includes exercises of tactile discrimination with high degree difficulty, reported in chronological age, level of intellectual development and level of perceptual stimulation. The increased difficulty of the exercises is both to fill the page with tactile images and the variation of the pattern position in a row/column. Tactile discrimination exercises focus on identifying a pattern (dot, line, angle, geometric figures) on the row /column with more or less similar tactile elements. The tasks of tactile discrimination begin with simple patterns, taken in the first position in a row/column and lead gradually to complex patterns requiring a fine discrimination, with an increased frequency of occurrence on the row/column.

The Perceptual Mediated Learning Program includes too a small section called *Tangram*. Many harmful effects that the lack of vision generates in the spatial orientation are dimmed by applying Tangram technique to the blind preschoolers and students.

The program presents *a strategy* that facilitates learning of the writing and reading in Braille, which is based on the association between configurations of the dots specific to the Braille symbols (letters, numbers, punctuation, etc.) and various elements of tactile discrimination submitted (line, angle , geometric figure). *Associations* Section, contained in chapter *Perceptual-spatial Reasoning*, demonstrates an increased difficulty. Children with blindness who follow the tasks of this section should demonstrate the following acquisitions: very good tactile discrimination, very good capacity for organization, structuring of the space, spatial and tactile-kinesthetic representations about dots configurations that form Braille symbols and, of course, increased ability of spatial perceptual reasoning, without which there can not be correlation of the two plans of knowledge: the imagery and the symbolic.

The Perceptual Mediated Learning Program begins with *The Rating Scale of the tactile-kinesthetic behavior*. The Scale allows for detailed knowledge of how to function a blind subject on different dimensions/levels of this tactile-kinesthetic behavior. The creation of a tactile profile that is characteristic to the blind offers the opportunity to identify the better developed, well compensated dimensions and those lagging behind, which require therapeutic intervention, appropriate education. *The Rating Scale of the tactile-kinesthetic behavior* consists of 52 items, measuring tactile skills required for performing everyday tasks at home and in school. The items are divided into eight dimensions: *fine tactual motor activity*, two-handedness (or *bimanual coordination*), *tactile exploration strategies*, *tactile identification* and *tactile discrimination*, *spatial orientation ability*, *perceptive-spatial reasoning* and *tactile- kinesthetic representations*. The results are registered on the observation sheet on five performance levels according to the given support level and the correct resolution level.

The Perceptual Mediated Learning Program is designed to prepare the preschool blind children for the beginning of school, to build skills and abilities necessary for the Braille writing and reading. The valences of training are not reduced to "prepare for Braille". Through this program of development of the tactile sensitivity, applied in early childhood, we try to achieve goals related to the formation of tactile-kinesthetic representations, the ability of orientation in limited space and other skills that refer to the bimanual coordination, the ability of orientation, organization and structuring of space, the ability to identify and discriminate through touch correctly, promptly, accurately, without hesitation, the ability of understanding both reception of orders and operating messages with specific concepts, the psychomotor ability.

5. The motivation research

The presence in schools for the visually impaired of a large number of blind students, not stimulated in the tactile-kinesthetic aspects during the preschool period and the need to find solutions to optimize the strategies for stimulation the tactile-kinesthetic behavior in the children with blindness were starting points in carrying out an experimental research on the issue of the impaired visually psycho-pedagogy. These were *the premises* of an *experimental research* that has aimed, through the introduction of a *PERCEPTUAL MEDIATED LEARNING PROGRAM* focused on the practice of the tactile-kinesthetic component, at the making a comparative analysis between the blind subjects regarding their *tactile-kinesthetic behavior*, *reading and writing skills* and level of *cognitive development*, in relation to the *type of the blindness* (*total/partial*). In parallel, I designed and implemented a *Rating Scale of the tactile-kinesthetic behavior* in the students with blindness as an evaluation tool, used in various stages of assessment (pre-learning, respectively, post-learning). However, I had also in mind the identification of the *formative valences of such a program*, especially in terms of *tactile-kinesthetic behavior*, *reading and writing skills*, but also in *cognitive plan* in the children with blindness.

In this article, I will present only a part of the research, reflecting the results of the comparative analysis between blind students related to their tactile-kinesthetic behavior and the formative valences of THE PERCEPTUAL MEDIATED LEARNING PROGRAM in this respect.

Not incidentally, some of the **objectives of the research** involve: making a Rating Scale of the tactile-kinesthetic behavior in the blind children of school age; designing and implementing a PERCEPTUAL MEDIATED LEARNING PROGRAM for the blind schoolchildren.

The present research was started from the following **hypothesis**: it is assumed that through a PERCEPTUAL MEDIATED LEARNING PROGRAM the totally blind children of school age achieve the highest performance in terms of tactile-kinesthetic behavior compared with those who have relative or partially blindness.

The research was conducted over a school year (2009-2010) at the School for the visually impaired in Bucharest. **The target group** of the research consists of *male* and *female* blind students, *normal developed intellectually* and *mentally limited* (liminary intellect), *the school age* (grades I-IV), *stimulated* and *not stimulated* before starting school. Some students have an *absolute* or *totally blindness* and others, *relative* or *partial blindness*. The latter are either *near totally blind* students (*almost completely blind*: with *light perception* in one or both eyes) or schoolchildren that see *more than light* (shadows, colors, and so on).

6. Applied design research

Given *the limited number of students* with blindness in a special school (a school for visually impaired), *the heterogeneity of the cases* in relation to the level of intellectual development, the type of blindness (total/absolute blindness and partial or relative/practice blindness), *the moment of its installing* (congenital and acquired blindness), the presence/ absence of early stimulation (stimulated and not stimulated), *the purpose of the research*, I opted for *an experimental design* that takes the form of *an experiment with one independent variable, with one experimental group, with measurement before and after the introduction of independent variable*. The present research was conducted in **three stages**:

- **Pre-learning** or **pre-formatted stage** characterizing *the first time* (t ^{1}) of the research, the time *before* the application of the independent variable. In this *ascertaining experimental phase,* it was achieved the initial assessment of the sample subjects regarding tactile-kinesthetic behavior, reading and writing skills and cognitive plan.
- **Learning process** corresponding to the *formative experiment*, starting with the time when the independent variable was applied over a period of six months.
- **Post-learning** or **POST-formatted stage** reflects *the second time* (t ^{2}) research, the time *after* the application of the independent variable when the final assessment was achieved, using the same tests as in the initial assessment.

Designed as an **independent variable** of the research, *THE PERCEPTUAL MEDIATED LEARNING PROGRAM* is a factor introduced into the experiment in order to change/influence certain parameters reflected in the *dependent variables*. **The dependent variables** acquire certain values from the influence that the independent variable exerts on them (Chelcea, 444). In the case of the present research, I used the following dependent variables: *the dimensions/levels of the tactile-kinesthetic behavior*; *the cognitive functions* (sensory-motor functions, spatial processing, attention and executive functions, language); *the reading and writing* skills. Among the **instruments** used in this research is included *The Rating Scale of the tactile-kinesthetic behavior in the blind children of school age*. The tactile-kinesthetic behavior is operationally defined by the eight identified dimensions that are indicators of performance by which this behavior can be measured: *the fine tactual motor activity*, *the bimanual coordination*, *the tactile exploration strategies*, *the tactile identification* and *the tactile discrimination*, *the spatial orientation ability*, *the perceptive-spatial reasoning* and *the tactile representations*. *The Rating Scale of the tactile-kinesthetic behavior* concerns the *eight dimensions* that are defined and concrete (operationalized), in the form of characteristic indicators, each

indicator/item of the scale being analyzed both in terms of *the degree of accuracy* at which that is achieved and *the level of support* provided to solve the task. Thus, it accords: *5 points*, if the child solves the task/ item correctly and independently; *4 points,* if the child solves the task/ item correctly and with verbal support, offered sporadically; *3 points*, if the child solves the task / item correctly with verbal and/or physical support, offered sporadically; *2 points* if the child solves the task / item relatively well with the verbal support and /or physical support, offered continuously; *1 point* if the child doesn't resolve properly the task/the item whatever the level of offered support. The Rating Scale of the tactile-kinesthetic behavior allows for a detailed knowledge of how a blind subject can function on the different dimensions/levels of this behavior. For every dimension of tactile-kinesthetic behavior the blind student gets a score that places him within certain parameters on the extent to which that ability or skill is mastered.

7. Conclusions regarding the tactile-kinesthetic behaviour

In both groups of blindness, after applying THE PERCEPTUAL MEDIATED LEARNING PROGRAM, were recorded increases of the mean total scores at each level of the tactile-kinesthetic behavior, the most spectacular results being at the dimensions: *tactile discrimination*, the *perceptive-spatial reasoning* and across the *entire tactile-kinesthetic behavior*. Statistical tests *(Samples T Test)* applied for a comparative analysis between the results of two evaluations reveal significant differences between the two moments: *before* and *after* applying *THE PERCEPTUAL MEDIATED LEARNING PROGRAM.* The values of sig. ≤ 0.01 are still an evidence of the significant differences on the results achieved in the two times of evaluation and on the substantial changes occurred in the entire behavior of its dimensions, except for *motility* and *coordination.* In both groups of blindness is observed the progress in all dimensions of the *tactile-kinesthetic behavior*, but the dimension that imposes itself in this respect differs in *totally blind schoolchildren* comparatively to the students with *relative-practice blindness*. Thus, *in the totally blind subjects* are noticed obvious changes regarding *tactile-kinesthetic representations.* In contrast, the subjects with *practice blindness* are highlighted by the improvements in terms of *perceptive-spatial reasoning*. The mean total scores obtained in various dimensions of tactile-kinesthetic behavior and the applied statistical tests (*t test*) show that between the two groups of blind students there aren't significant differences regarding the dimensions of the tactile-kinesthetic behavior and regarding the entire behavior. In conclusion, the hypothesis is not confirmed.

The research highlighted, in fact, the *formative valences* of *The Perceptual Mediated Learning Program*, proving its efficiency. The stimulation

of the different dimensions of tactile-kinesthetic behavior leaded to the intensive development on the following plans: a better *fine tactual motor activity* involved in tactile exploration; a better *.coordination of both hands* in different contexts that require tactile-kinesthetic exploration (the haptic exploration of the objects, images and texts in Braille); *haptic strategies* adapted to tactile context; *a more accurate, more precise* and *faster tactile identification* of the objects, of the pictures in relief comprising different tactile elements (dot, line, their combinations: the group of six dots, angles, geometric shapes) and of the symbols in Braille; *an increased capacity for tactile discrimination* of the details; *a correct orientation* in a narrower space (such as the *Braille cell*); *an increased capacity of the organization and structuring of the space* proved in the tasks such as *the representation in drawing* of the various aspects of the reality and *the perceptual synthesis*; *a better perceptual-spatial reasoning ability* reflected in the tactile-kinesthetic exploration tasks, including elements of *fine tactile discrimination* and *the organization and structuring of the space*, with high degrees of difficulty; rich and sufficiently covered sensory tactile-kinesthetic representations about familiar objects, sizes, shapes, textures, thicknesses, Braille symbols; *an increase development of the ability of orientation in a limited space* and the formation of spatial representations. These spatial representations are required for Braille writing and reading.

In conclusion, this program led to a *better structured tactile-kinesthetic behavior*, offering premises for the training and the improving of the writing and reading skills in Braille.

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