European Journal of Special Education Research
ISSN: 2501 - 2428
ISSN-L: 2501 - 2428
Available on-line at: www.oapub.org/edu

10.5281/zenodo.55074 Volume 1 | Issue 2 | 2016

AN APPROACH FOR THE TEACHING OF NOTABLE PRODUCTS IN AN INCLUSIVE CLASS: THE CASE OF A STUDENT WITH VISUAL DISABILITIES

Lúcia Virginia Mamcasz Viginheski[1], Sani de Carvalho Rutz da Silva[2]
Elsa Midori Shimazaki[3], Cleverson Sebastião dos Anjos[4]
[1]PPGECT UTFPR, Faculdade Guairacá, APADEVI, Guarapuava, Paraná, Brazil
[2]UTFPR, Ponta Grossa, Paraná, Brazil
[3]UEM, Maringá, Paraná, Brazil
[4]IFPR, Irati, Paraná, Brazil

Abstract:
The present article is an excerpt of a developed research about Mathematics teaching and the inclusion of students with visual disabilities in regular education. It deals specifically with one possibility of methodological and didactic adaptation for the Notable Products teaching. It presents a qualitative approach, using the case study as a strategy. Its main objective is the development of methodological and didactic procedures that enable students that are visually disabled and are included in regular education to appropriate mathematical knowledge, together with other students. It was based in the plans of Vygotski´s historic-cultural theory for the development of a pedagogical intervention in an 8th grade class of basic education in a public school in Parana, when some mathematical concepts in Geometry, Algebra and Quantities and Measurements were approached, with inference to the Notable Products. The activities were carried out from the teaching stages proposed by Galperin. It was possible to verify that the proposal allowed the students to elaborate the mathematics concepts involved during the didactic sessions, and mainly, that it is possible to teach Mathematics to students that are visually disabled together with the others and that all of them, despite their limitations, are able to organize necessary concepts in order to achieve autonomy and practice their citizenship.

Keywords: mathematics teaching, inclusion, visual disability

1. Introduction

Nowadays, it is common for teachers in classrooms of regular education to find students with disabilities; however, for a long time it was believed that the education of such people was responsibility of the Special Education, through specialized education, which replaced the regular one (BRASIL, 2008).

The Special Education National Policy in Perspective of Inclusive Education (BRASIL, 2008) was developed with the objective of forming public policies that promote, in regular education, an education of quality for all students, including those with disabilities.

This document lists others that have been elaborated in the pursuit of effective inclusive education, such as the Federal Constitution of 1988, which states access to education to be a fundamental right; the Statute of Children and Adolescent, which assigns parents the obligation to enroll their children in regular education and the National Educational Bases and Guidelines Law - LDBEN 9394/96, which assigns to the education system the responsibility to ensure the curriculum students, methods, resources and adaptations to meet their specific needs, among others. Nevertheless, excluding practices are found in schools, when the specific needs of disabled students are not taken into consideration, when the opportunity to participate actively in the activities is not given to them, leaving them aside of several situations inside the classroom.

Upon contact with math teachers who taught students with visual impairment, it was possible to notice different attitudes towards inclusion, most often, unfavorable.
For many teachers the difficulty in teaching included students occurs by a number of factors, such as the lack of specific training, both in academic and continuing education, the difficulty to address the students with disabilities in the midst of overcrowded classes and the lack of resources, materials, teaching aids, among others.

The issues raised by the regular school teachers led the researchers to choose as a backdrop of this research a classroom with a student with visual impairment, in order to develop a research that met the wishes of the teachers, that contributed to the teaching practice of mathematics, that respected the diversity of individuals in the classroom and promoted an approximation between research and practice.

The presence of students with visual impairment in the classroom makes the teacher wonder how to teach mathematics to them, so they can actively participate in the knowledge development process. From this survey, the research presents the following problem: What didactic and methodological procedures are needed so students with visual impairment included in regular education, as well as other students, take ownership of mathematical concepts?

By considering that the school has the function to promote access to knowledge to all those who seek it, this research aims to verify whether the development of educational and methodological procedures tailored to the particularities of visual impairment enables students with this limitation and the other students of regular education to appropriate mathematical knowledge, more specifically, the mathematical knowledge associated with notable products.

2. Literature Review

Since the earliest times, man seeks ways to relate to nature, their peers, and, in order to address their basic needs, created instruments and developed strategies and actions, which were passed down over time.

This knowledge, built historically, was systematized in different areas of knowledge, the sciences. Schools are the institutions responsible for the dissemination of this knowledge and the development of others, through formal education. To Leontiev, Apud Núñez (2009, p. 67), "*…the school is an important pathway in which the child experiences a set of different experiences of everyday life context that makes it possible for them to appropriate scientific knowledge.*"

School education is a process of internalization and appropriation of historically constructed and systematized knowledge; it is an intentional action, and in addition to allowing everyone access to this knowledge, it should open paths to the exercise of citizenship. (BRASIL, 2006; D'ambrósio, 1996; Saviani, 2009).

For Vygotski (1998), the interaction among people is an important factor in the development of the human being, thus justifying the education of these people with others. In order to achieve this, it is necessary to recognize and respect their differences, contributing to their training as participating citizens in the society in which they belong.

Among people with disabilities attending regular education, are the visually impaired, which are divided into two groups: blindness and low.

According to the World Health Organization - WHO[i], from the review performed in 2006, visual levels came to be classified into four levels, namely:

[i] World Health Organization – WHO. **Visual impairment and blindness**. Available in: http://www.who.int/mediacentre/factsheets/fs282/en Accessed in 03/15/2016.

1) normal vision;
2) moderate visual impairment;
3) severe visual impairment and
4) blindness.

The term low vision is used to describe the moderate and severe visual impairment levels. As well as other disabilities, blindness can manifest in people from birth or later in life, from organic or accidental causes. It is a severe or total change in the ocular structures, affecting the ability to perceive color, size, distance, shape, position or movement (Sá et al, 2007).

Regarding low vision, the same authors (2007 p. 16) consider that the definition of low vision (amblyopia, low vision or residual vision) is complex due to the variety and intensity of visual function impairment. These functions range from simple light perception to the reduction of the acuity and the visual field that interfere or limit the execution of tasks and overall performance.

Students with visual impairment, included in regular education, present specific conditions for the appropriation of knowledge. Thus, the recognition and the attitude of the teacher as an educator promoting an education that respects the different paces of learning and considers other aspects besides the cognitive one, can contribute so that qualitative changes may happen in the educational setting.

By considering the dialectical process among men, the action and instruments in the building of knowledge, social life contributes to the formation of concepts. Thus, a concept is socially formed by the activity of the intellectual process, the use of the sign or the word and it contributes to the communication, understanding and problem solving.

The concepts are formed not only by a specific point of view, but also by a particular system determined by action, which, together with the operations, represent the psychological mechanism of the concepts. Without the actions and operations, the concept cannot be assimilated, nor later used in problem solving. (Talizina, 2009)

Galperin noted that the formation of concepts by different students happened at different levels. Some performed the action mentally; others only through speech and others even by making use of materials or materialized situations. For this theoretician, the action orientation determines the formation of mental actions and the formation of concepts. Each type of orientation corresponds to a given process of action formation and to a specific quality of the final product. (Galperin, 2009c)

Núñez (2009) and Talizina (2009) stress that Galperin's theory considers the study a system of certain targeted activities that lead students to new knowledge, skills, habits, attitudes, values, or their improvement.

The action shifting process from external into internal, according to the teachings of Galperin, happens through the following steps:

1) motivation;
2) establishment of the action guiding basis (BOA);
3) action shaping on the material plane or materialized;
4) action formation in the external language and
5) action on the mental plane.

In the motivational stage, the motivation of students is necessary, both externally and internally. The BOA scheme establishment stage is constituted by the visualization of the subject's action, the action project, the final product's image; it refers to the procedures and the condition system required by the action. It involves orientation, execution and control.

It must ensure understanding (meaning) and motivation (sense) of the students to prepare the learning object and promote the student's conscious reflection in this process. According to Talizina (2009), during this stage, the students become familiar with the new activity and knowledge involved in it.

The action formation on the material or materialized plane is constituted as another stage. The difference between material or materialized refers to the representation mode of the study subject; in the material form, it makes use of the subject itself, while in the materialized form, we use the representation of the subject, considering its essential aspects. At this stage, the student's action over the object begins, in pairs or in groups, mediated by the teacher (Núñez, 2009; Talizina, 2009). The formation stage in the maternal language plan is constituted as a medium that promotes interaction between students and teacher.

According to Núñez (2009, p. 111):

> *…while learning, language is an important condition for mental development, because the content of the historical experience of man, the social-historical experience, is not consolidated only in material things, but is also distributed and reflected in verbal language.*

Still, according to the teachings of Galperin, language, transposing the exterior plane, allows operation with signs on the mental plane, allowing people to reflect, establish connections and complex relationships, form concepts, draw conclusions and solve activities. Lastly, in the mental stage, the communication turns into internal language, which has the function to provide the students new means for thought. The action at this stage is internal, allowing the student to solve the activities independently, revealing externally only the final product, the result of the activity.

The actions, in its different forms during the process of knowledge internalization, are not eliminated; they are preserved by establishing a link between the stages, from the initial one to the final one. This way, from external to the internal, it is possible to reverse the direction, i.e., from the abstract and internal plane to the external plane. The teacher, by providing a teaching where knowledge is being prepared by the different stages, in which the student participates as an active subject in this construction, being guided and interacting with peers and teacher, contributes so that the student will take ownership of the knowledge.

Thus, a methodology based on the steps of teaching proposed by Galperin (2009) was chosen seeking the inclusion of a student with visual impairment in all proposed activities, along with the other students in the class.

3. Methodology

This research had a qualitative approach, being case study used as a strategy. The educational sessions were developed in an eighth grade class of a public elementary school in the State of Paraná, Brazil. There were 41 students enrolled in the class and a student with visual impairment, which will be referred here as T. A. At the time the intervention was developed, T.A. presented no light perception in the right eye and less than 10% of vision in the left eye, registered by an ophthalmological report.

3.1 Procedures

In order to conduct the research, in which the content discussed was Notable Products, lesson plans were developed following the teaching stages proposed by Galperin.

In the motivational stage, it was sought to raise the interest of students to carry out the activities through the use of games. The game contributes to the development of mathematical concepts in a playful manner and according to the teachings of Mendes (2009), there is a mathematical structure to be discovered by the action of the student at the time they play. The guiding basis for action was established from the overall analysis of mathematics itself, in a historical-cultural approach, of the ownership by the students of their generalized relations and the grasp of the new action procedures, in order for them to recognize themselves as historical-social subjects capable of transforming reality, as well as the application of knowledge in specific tasks: perimeter, area, volume, notable products and the formation of the special action with the execution of particular tasks.

The action formation in material or materialized plane took place from the use of concrete materials and their representations as tools to establish the link between Geometry and Algebra. For the verbal stage, activities were offered that promoted the externalization of language, oral or written, providing them with reflections on their actions, how to design concepts, draw conclusions, and also contributing to the transformation of the verbal into mental.

In order to facilitate understanding, ownership and generalization of algebraic concepts by students' knowledge relating to Greek geometry was used, which developed demonstratively, constituting itself as a binding instrument between the arithmetical and algebraic knowledge involved in the studied content.

The lesson plans were executed in eighteen classes. The activities were divided into two blocks, named Block A and Block B, as shown in Table I:

Block	Contents Addressed	Motivation	Goals
A	Perimeter Area Square of the sum Square of the difference Product of the sum and the difference	"Prenda o Rei" game.	Explore the area and perimeter concepts. Calculate the areas of squares and rectangles from a chessboard. Establish a relationship between the change in the dimension of a geometric shape and the resulting area. Explore situations of increase and decrease in the dimensions of squares and rectangles. Calculate areas with algebraic dimensions. Recognize and calculate the square of the sum, square of the difference and the product of the sum and the difference between two terms.
B	Volume Cube of the sum Cube of the difference	"Nunca dez solto" game.	Explore the concept of volume. Calculate the volume of polyhedrons such as parallelogram and hexahedron. Establish a relationship between the change in the dimension of a polyhedron and the resulting volume. Calculate volumes with algebraic dimensions. Recognize and calculate the cube of the sum and the cube of the difference between two terms.

Table I: Activity Blocks

Source: researcher's collection

Before the beginning of the activities, an initial test was applied, in order to assess the knowledge the students had on the geometric concepts *area* and *volume*, with the following questions:

1. How do you define area?
2. According to the Department of State Health (SESA Resolution n. 0318, 07/31/02), a classroom must have an area of 1.20 m^2 per student, and a height of 2.80 m. Considering a 42 student class, determine:
   a) What should be the classroom's minimum area?
   b) Which dimensions could the classroom have?
   c) Given the suggested dimensions, what is the volume of the classroom?

Upon completion of the educational sessions, this evaluation was reapplied and it was established a comparative parameter among the results to measure the conceptual changes in the students.

3.2 Material Adaptations according To T. A.'S Needs

For activities of Block A, shown in Table I, the pre-chess game *"Prenda o Rei"*, of unknown origin, was used in order to explore the perimeter and area concepts and, subsequently, the development of notable products square of the sum, square of the subtraction and the product of a sum and a difference.

In this game, played in pairs, it was necessary to use the chess board, kings and chips. In the game *"Prenda o Rei"*, the king's movement is the same as in the regular chess game, one house at a time, in any direction. The player moves their king and places a chip on the board, covering a cell, which can no longer be occupied by kings, in order to lock the opponent's king.

Following the guidelines of Reily (2004) and Sá et al (2007) for material adaptations for students with visual impairment and considering T.A.'s visual residue, a chessboard, rectangles and squares were made using Ethyl vinyl acetate, or EVA, which, when added to the board, formed a new square with contrasting colors such as black, white, yellow and red.

The geometric shapes that make up the total square had a checked side and one without it. Figure I represent the material developed.

Figure I: Chess board adaptation

Source: researcher's collection

For the development of the concept of volume and the development of activities in Block B, shown in Table I, we used the Golden Beads developed by educator and Italian physician Maria Montessori apud Fernandes, et al (2006), which is made up of smaller cubes, representing the units, bars, worth 10 units, cards, whose value is 100 units and the largest cube with 1,000 units.

The material has graduated measurements, constituting an alternative to work measures with students with visual impairment, it can also be used to work the decimal numbering system, potentiation, root extraction, area, among other concepts (Fernandes *et al*, 2006).

Another game used in teaching sessions was "Nunca Dez Solto" used as a motivational tool for the activities in Block B. The game needs the Golden Beads and a numbered die. The next player throws the dice and picks up the number of units that were drawn. When the player accumulates ten units, they will trade for a dozen, ten tens must be exchanged for a hundred and ten hundreds should be replaced by a thousand units. Wins the game who first conquers the thousand unit.

To address the concept of volume in different solids, the researchers crafted solids made out of wood, which together formed the cube of the Golden Beads material. For the algebraic stage, the solids were adjusted with textures and contrasting colors, so meeting the T.A.'s visual needs, represented in Figure II

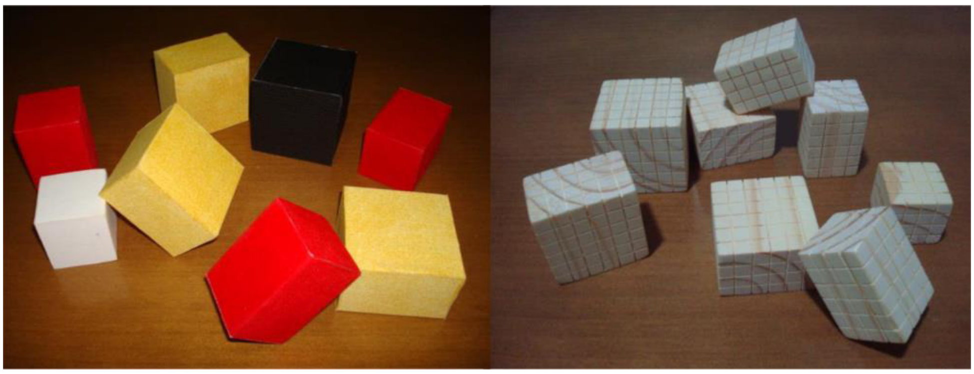

Figure II: Solids

Source: researcher's collection

The adapted materials used in the research were made for all students in the class, providing them the same opportunities for the development of the worked concepts, because we believe that in inclusion, the teacher can develop the same activity for all students, making the necessary adjustments to the student with a disability and the use of adapted materials will also be of benefit to the other students, given that, for Galperin (2009c), they constitute the teaching material stage, as important as the other stages in the teaching process and content learning.

4. Results and Discussions

From the results obtained in the initial evaluation, it was possible to verify that the students had as grasp of the concept of area. Some of the definitions given by students to area were: *a measurement of a place, a marked space, the measurement of things, a space or place that can be measured in squared meters*.

Other students made use of expressions such as width x length, height x side, these expressions are specific to the area of some quadrilaterals and not the concept of area of any surface. Among the students, some of them failed to conceptualize area.

T. A. defined the concept of area as: *area is used to define something straight, is it straight ??? The entire half of 360°.*[ii] This answer was probably associated with other content covered by the class' mathematics teacher, which used only orality to teach it. According to the document Knowledge and Practices of Inclusion (BRAZIL, 2006), using only this method affects the assimilation and understanding of content by students with visual impairment, given that it is insufficient for concept appropriation. However great the student effort, gaps can arise between what is taught and what is learned.

Similarly, it was possible to notice in the students' answers that the concept of volume was not consolidated for many students. Several of them, including student T. A., made use of terms such as tall, small and large, to define volume, which led to the understanding that they referred to volume as intensity of sound rather than its mathematical concept.

It was assessed in the initial evaluation that it was not just the T. A. student who had difficulties in appropriation of mathematical concepts, but the vast majority of the students. To Talizina (2009), the fact that the student has the knowledge of a definition does not mean that this knowledge was assimilated and internalized by them.

[ii] The question marks are used to replace a word that was not understood in the student's handwriting.

Pavanello apud Fernandes and Healy (2010) believes that for the elaboration of the concept of area, the student needs to realize that the area can be measured from the use of a square unit, checking how many times this square unit fits on the surface and also by comparison between surfaces, by superimposing or decomposition/composition of the image, without making use of the area unit.

Following the guidelines of Galperin (2009c) in the material or materialized stage the concept of area was approached by the game "*Prenda o Rei*", in which the colored chips being placed on the board by the students during the game constituted the area units.

The addition of rectangular, checked and non-checked pieces, which increased the area of the board, allowed students the elaboration of the concepts related to notable products, namely, square of the sum, square of the difference and the product of a sum and a difference

These pieces were used as a means for the abstraction of the concept of area, since its dimensions could take any value, allowing the generalization of the concept.
The results obtained by the actions of the students in the activities were justified and discussed through the external language and, subsequently, transformed into internal language, which allowed students to solve individually written exercises related to these notable products, according to the teachings of Galperin (2009b). In addition to the concept of area, it was also addressed the concept of volume. The volume of a prism can be calculated by the method of parallel cross sections, which breaks down the solid into equal portion areas.

According to Dolce and Pompeo (2005), the mathematical sentence $V = A_b . h$, where A_b is the prism's base area and h its height, can be justified through Cavalieri's Principle. To the authors (2005, p. 93),

> *For any data prism, we can consider a rectangular parallelepiped which is based on the same plane and has the same area of the prism base, with a height equal to the prism located in the same half-space where the prism is, relatively to the considered plane.*
> *If the basis of the given prism and rectangular parallelepiped are in the α plane, every plane β parallel to α, when intercepts solids, determines into them sections that have areas equal to the bases. Therefore, by the Cavalieri principle, the two solids have equal volumes. Since the volume of the rectangular parallelepiped is given by $V = A_b . h$, we conclude the volume of the prism is also given by $V = A_b . h$.*

The "*Nunca dez solto*" game, executed in ten groups, with four students each, allowed students to develop the concept of volume from Cavalieri's Principle, since the solid hexahedral was built in the game for portions of equal areas. From the calculations for the cube volume formed by all the solids, the cube of a sum and sub of a difference notable products were covered.

The groups were asked to record the strategy used to calculate the volumes, promoting the forming stage action in the external language plane (Galperin, 2009b). The texts represent the records of the groups. The answers are presented as the students wrote them, including the spelling:

> *Calculate how many times the number of the area of a side could fit. (Group 1).*
> *Using the edges, adding by the volume, and reacting summing the sides joining the cubes. (Group 2).*
> *Using our mind: doing all the multiplications, adding all the cube and parallelepiped shapes and making observations with big cube and small cube and big and small parallelepiped (Group 3).*
> *Side x Side (Group 4).*
> *One side times the other (Group 5).*
> *Multiplying one side by the other and the result by the height (Group 6).*
> *We calculated the value of the base multiplying it by the number of sides (Group 7).*
> *Counting each little square and then multiplying it by the number of sides (Group 8).*
> *Taking the result of number 1's question B and multiplying it by the side number. (Group 9).*
> *Multiplying the numbers from one side and multiplying by 6. (Group 10).*

It was observed through the records made by the students the difficulty in expressing their actions, even though they correctly calculated the solid's volume. This difficulty was also observed in other activities. This may be due to the fact that the students are not used to express through oral or written language their mathematical actions. According to Núñez (2009), when the students get the opportunity to verbalize their actions, one of the pathways of the formation of the logical consciousness degree and of the action structure is instituted and, to Galperin (2009b), the absence of this step undermines knowledge development.

It was observed that T. A. actively participated in all the activities that were proposed in the material or materialized stage, i.e., in determining the size of the chessboard and the calculation of the perimeter, area and volume of the material that was used.

However, when it was asked of the students individually to develop the notable products algebraically, T.A. failed to do so. This difficulty may have been the result of an education based on orality, where the operations with monomials and polynomials were only exemplified orally by the class teacher in teaching activities previous to the application of this research, as well as the lack of opportunities where she could register these operations in some way, either through extended writing or braille code.

Another difficulty presented by T. A. referred to the calculations. She presented skills for mental calculations with up to three digits integers. However, in some of the activities proposed in the intervention, she could not perform operations mentally even by making use of the written algorithm.

Such difficulty is associated with her visual limitation; however, it was found that other students also presented difficulties in operations, especially with decimal numbers.

According to Viana (2010), these difficulties can be a consequence of a mechanical teaching of rules that must be memorized and do not provide the students with an understanding of the actions in the algorithm. In the algebraic stage, other students also presented difficulties related to that content, such as sign errors in multiplication and errors inside the multiplication itself.

The difficulties presented by T.A. as well as by the other students were discussed, providing them moments where they could make use of oral language, reporting and justifying the procedures used by the groups formed in the classroom to carry out the activities, constituting so the action formation stage in the external language, according to the studies of Galperin (2009b).

At the beginning of the activities, it was observed that students had a common sense knowledge about the concept of area, which was not consolidated for the majority of the class and many of them found it difficult to conceptualize volume.

At the final evaluation, 26% of the class considered area as a measure of the size of a space or a place. To 41% of the students, the concept of area was still associated with specific formulas that calculated the area of certain shapes and not as measure in square units; 33% considered area as a measure of a place in square units. T. A. came to define area as "*the school is a place that has a space in height and width and length*". Although the concept isn't yet consolidated, it can be noticed in her answer the presence of elements related to the concept. Just as the concept area, most students showed changes related to the concept of volume.

Establishing a comparison between the initial and final evaluation, it was found that, in the final evaluation, 49% of students correctly calculated the volume of the classroom, while at the initial evaluation, 6% of them performed different calculations in an attempt to find the volume, whose results were not approximated to the correct result, and only 14% tried to multiplicate the room area by an arbitrary value, different from the room height.

According to Núñez (2009, p. 95) "…*qualitative changes take place in a series of moments whose logical replacement is the process of the external, material, in psychic and internal activity*." The conceptual changes indicate qualitative changes in the learning of mathematics.

Thus, conceptual changes about the concepts of area and volume were observed in the students. The concepts of notable products between two terms were approached from concepts of area and volume developed by the students from discussions between them and the teacher and by the use of instruments, such as games and other materials. Answering the initial question that led to this investigation, i.e., which didactic-methodological procedures are required to teach mathematics to students with visual impairment so they can take ownership of scientific knowledge, for this research specifically, concrete materials were used, adapted by the researchers to meet the needs of the student T.A., which were also made available to the other students It was possible to verify that usage of these resources by all the students contributed to the learning/teaching process of the contents covered.

By proposing a methodology for the teaching of mathematics that included students with visual impairment, it was possible to verify conceptual changes in the students, from the interaction between the researchers and the students, the prepared material and the activities developed by them. The use of assimilation stages of knowledge proposed by Galperin, for the organization of educational process, contributed to the process of internalization of the external activity.

5. Final Considerations

Frequently, the teacher, when faced with a student with visual impairment in his class, may feel unprepared. It must be known that visual impairment does not prevent the student's development of knowledge with the other students. The limits are usually determined by the teaching practice, by not considering the diversity in the classroom and by developing activities believing that all students learn in the same way.

The concepts of education and, mainly inclusive education, lead to the need of offering all students, regardless of social, cultural, physical and intellectual backgrounds, favorable conditions for the appropriation of knowledge. The school becomes inclusive from the moment it believes that everyone can and should learn together, respecting the individuality and needs of their students and ensuring them an appropriate curriculum.

The inclusion of students with visual disabilities in regular education requires from the teacher a plan of activities to be developed and which methodological resources will be used, so that the necessary adjustments are made in advance, and the visually impaired student has the material available simultaneously with the other ones, participating in the actively in the process of knowledge development.

Thus, an inclusive teaching of mathematics depends on the performance of the teacher as a mediator between students and knowledge, providing opportunities for an active participation of the students in the process of appropriation of knowledge, promoting the necessary adjustments and the use of specific educational resources. The teacher, in some way, may feel alone in process of inclusion. When they encounter any students with disabilities, they must request aid to the teaching staff and management team, the professionals of Special Education and the public agencies responsible for inclusion.

Special Education support services are present in many cities, and people working in this area are available to help them as needed. However, even provided with the support of Special Education, it is necessary to clarify the function of teaching mathematics in regular education is, specifically, of the math teacher. From this research, others may be developed in order to contribute to education, so that students with visual disabilities have the same opportunities as the others in the classroom, making effective their inclusion in the educational setting, as well as supporting teachers by providing them specific knowledge required for the teaching of Mathematics.

For this research, teaching materials adapted to address concepts of area, volume and notable products were developed. Similarly, other suitable materials can be developed to teach other types of content to students with visual impairment.

References

1. BRASIL. Ministério da Educação. Secretaria de Educação Especial. (2008) **Política nacional de educação especial na perspectiva da educação inclusiva**. Brasília: MEC/SEESP.
2. BRASIL. Ministério da Educação. Secretaria de Educação Especial. (2006) **Saberes e práticas da inclusão: desenvolvendo competências para o atendimento às necessidades educacionais especiais de alunos cegos e de alunos com baixa visão.** Coordenação Geral SEESP/MEC. 2 ed. Brasília: MEC, Secretaria de Educação Especial.
3. D'AMBRÓSIO, U. **Educação matemática: da teoria à prática.** Campinas: Papirus, 1996.
4. ________. **Etnomatemática: elo entre as tradições e a modernidade**. 2 ed. Belo Horizonte: Autêntica, 2005.
5. DEMO, P. **Pesquisa: princípio científico e educativo.** 13 ed. São Paulo: Cortez, 2009.
6. DOLCE, O.; POMPEO, J. N. **Fundamentos da matemática elementar 9:** geometria plana**.** 7 ed. São Paulo, Atual, 1993.
7. ________. **Fundamentos da matemática elementar 10: geometria espacial.** 6 ed. São Paulo: Atual, 2005.
8. Fernandes C.T. et al., **A construção do conceito do número e o pré-soroban**. Brasília: Ministério da Educação, Secretaria de Educação Especial, 2006.
9. FERNANDES, S. H. A. A.; HEALY, L. A Inclusão de Alunos Cegos nas Aulas de Matemática: explorando Área, Perímetro e Volume através do tato**. Revista Bolema**, v. 23, n37, p. 1111 – 1135, 2010.
10. GALPERIN, P. Y. La formacion de lãs imágenes sensoriales y los conceptos. In: Rojas LQ, Solovieva Y (2009 a). **Las funciones psicológicas en el desarrollo del niño**. México: Trillas.
11. ________ La formacion de los conceptos y las acciones mentales. In: Rojas LQ, Solovieva Y (2009 b). **Las funciones psicológicas en el desarrollo del niño**. México: Trillas.
12. ________. Tipos de orientación y tipos de formación de las acciones y los conceptos. In: Rojas LQ, Solovieva Y (2009 c). **Las funciones psicológicas en el desarrollo del niño**. México: Trillas.

13. KASSAR, M. C. M. (2011) **Educação especial na perspectiva da educação inclusiva: desafios da implantação de uma política nacional.** *Educar em revista. n. 41*, p. 61-79 Curitiba: UFPR.
14. MENDES, I. A. **Matemática e investigação em sala de aula: tecendo redes cognitivas na aprendizagem.** São Paulo: Livraria da Física, 2009.
15. MOYSÉS, L. **Aplicações de Vygotsky à Educação Matemática**. Campinas: Papirus, 1997.
16. NUÑEZ, I. B. **Vygotsky, Leontiev e Galperin**: formação de conceitos e princípios didáticos. Brasília: Líber Livro, 2009.
17. REILY, L. **Escola inclusiva:** Linguagem e mediação. Campinas: Papirus, 2004.
18. SÁ, E. D. et al. **Atendimento educacional especializado:** deficiência visual. Brasília: Ministério da Educação, Secretaria de Educação Especial, 2007.
19. SAVIANI, D. **Educação: do senso comum à consciência filosófica**. 18 ed. Campinas: Autores Associados, 2009.
20. TALIZINA, N. **La teoria de la actividad aplicada a la ensenanza**. Puebla, 2009.
21. VIANA, C. R. **Operações fundamentais**: história e ensino – parte I e II. Educação Matemática em foco. Ano IV, n. 13, 2010.
22. VYGOTSKY, L. S. **A formação social da mente.** 6 ed. São Paulo: Martins Fontes, 1998.
23. ________. **Pensamento e Linguagem**. 3 ed. São Paulo: Martins Fontes, 1991.