

The construction of number concept in the perspective of a student inclusion with Jacobsen Syndrome

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ABSTRACT

This article is an excerpt of the Doctoral thesis in progress, in the Graduate Program in Science and Mathematics Teaching (PPGECIM) ULBRA Canoas/Brazil, in order to investigate educational interventions that can be used with a student with Jacobsen Syndrome in order to build concepts and develop their potential as learning Math. The purpose is to understand the student math learning processes, the central research participant, diagnosed with Jacobsen Syndrome, a rare syndrome, and limitations in learning. The research methodology consists of a case study performed with monitoring the student trajectory, from regular school to special school. In this article, we present a discussion of the data obtained from the analysis of the objectives and descriptive opinions of the fourth year, as well as data on the survey and activities in the first trimester of the Primary School fifth year, aiming the construction of the number concept by the student. However, we conclude that the student failed to relate the number symbol with the number shown without the teacher and assistant mediation with concentration difficulties in carrying out the proposed activities, so that they are taken up constantly in other classes.

Keywords: Jacobsen Syndrome. School Inclusion. Mathematics Teaching. Case study.

A construção do conceito de número na perspectiva da inclusão de uma aluna com Síndrome de Jacobsen

RESUMO

Este artigo é um recorte da tese de Doutorado, em andamento, do Programa de Pós-Graduação em Ensino de Ciências e Matemática (PPGECIM) da ULBRA Canoas/Brasil, com o intuito de investigar intervenções pedagógicas que podem ser empregadas com uma aluna com Síndrome de Jacobsen visando à construção de conceitos e o desenvolvimento de suas potencialidades quanto à aprendizagem da Matemática. O objetivo consiste em compreender os processos de aprendizagem matemática da aluna, participante central da pesquisa, diagnosticada com Síndrome de Jacobsen, uma síndrome rara, e com limitações na aprendizagem. A metodologia de pesquisa consiste em um estudo de caso realizado com o acompanhamento da trajetória da aluna, da escola regular à escola especial. Neste artigo apresentamos uma discussão dos dados obtidos com a análise dos objetivos e pareceres descritivos do 4º ano, bem como, dados relativos à sondagem e atividades

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realizadas no 1º trimestre do 5º ano do Ensino Fundamental, visando a construção do conceito de número pela aluna. Contudo, concluímos que a aluna não conseguiu relacionar o símbolo do número com a quantidade representada sem mediação da professora e auxiliar, com dificuldade de concentração na realização das atividades propostas, fazendo com que as mesmas fossem retomadas constantemente em outras aulas.

Palavras-chave: Síndrome de Jacobsen. Inclusão Escolar. Ensino de Matemática. Estudo de Caso.

INTRODUCTION

The numbers are present in the daily activities that we exercise in several ways in helping to visualize the hours, counting objects, in distances observation, among others. The idea of number, one of the fundamental concepts in Math, brings with it the possibility of performing the mathematical reading of the world, providing opportunities for people to meet, interact and live in the environment in which they operate.

This article presents a cutout of a doctoral thesis, reporting the thoughts on the number concept construction by a student with Jacobsen Syndrome, the central participant in the research, which aims to understand the Math learning processes from her, through educational interventions targeting the development of her potential in the construction of mathematical concepts for society inclusion.

Grossfeld, Mattina, Perrota (2009) classify Jacobsen Syndrome, also known as 11q, as a rare syndrome associated with a complex phenotype with multiple congenital anomalies and mental retardation caused by deletion or duplication of the long arm of chromosome 11. The most common clinical characteristics of the subjects diagnosed with the syndrome can highlight the developmental delay.

Morél (2011) states that the children clinical evaluation with this syndrome are made in a multidisciplinary way including pediatricians, cardiologists, neurologists, ophthalmologists and physiotherapists, behavioral changes being reported including compulsive behaviors, attention deficit, and hyperactivity.

In this context and conniving with the idea that the child needs to touch, feel, see, group, modify the objects, it is essential that Math learning and, especially, the concepts formation is related to the lived reality (EBERHARDT; COUTINHO, 2011).

For Nunes, Bryant e Watson (2007), Math child learning occurs before their entry into the school informally and some childhood periods are important for the creation number idea. At school, children can learn about the quantities and the relationships between them, in addition to mathematical symbols and their meanings, relating the informal knowledge and formal learning, ensuring through the Math teaching, understanding of quantities, relationships and symbols.

Considering the representation knowledge of numbers and quantification, among other possibilities, we can locate us in time with the recognition of the hours in space, with the possibility of measures, or simply conduct counts that allow us to perform Math everyday readings.

From the perspective of inclusion in Math classes, the teacher should be more attentive to the particularities in the classroom, to provide means to develop the students' skills needed for their learning process, considering the potential of each student and providing opportunities for knowledge allow experience Math in their daily lives. Thus, the work with the research participant student analyzes the process of Math literacy from the recognition of the number concept in activities of her daily life.

Curricular adaptation in the context of Jacobsen Syndrome

The inclusion in the regular school seeks to develop an education network that offers a guarantee of necessary support for everyone to have the opportunity to develop their potential, regardless of their difficulties and differences, respecting the individual capacity of each student with disabilities.

It is understood by including the guarantee to all continuous access to the common area of life in society, society that it should be guided by human relationships, acceptance of human diversity, acceptance of individual differences, a collective effort in ensuring equal development opportunities quality in all dimensions of life. As part of this process and essential contribution to the determination of its direction, it is the educational inclusion and ensuring access to basic content that schooling should provide all individuals, is a major challenge of current education (BRASIL, 2001).

According to Camacho (2006), in recent decades there were many proposals and changes about inclusive education, prevailing intention to seek effective teaching methods to facilitate learning and assist in learning and the search for a new, flexible and open model that responds to the educational needs of all learners. Thus, the practice of inclusion in the regular network should be rethought every time due to their commitment to the human being, with education, with learning and with the instruments that subjects need to build to live and live together in society.

Canepa (2012) states that school inclusion faces many barriers, including fear of the unknown and exclusionary society we live in, which makes the addition of a challenge for everyone. For the author, it is the school paper to offer responses and different and appropriate tools and for the singularities, treating everyone with respect and promote their independent development despite of intellectual or physical differences, moreover, the teacher promote classroom an exchange, aid, support, encouragement, and acceptance environment, to students with disabilities.

In inclusive school is not the student who fits the school, but the school is aware of its function, is placed at the disposal of the student, making it an inclusive space (BRASIL, 2001). In this context, planning and consistent and continuous improvement of the structure and functioning of education systems to (or "intending to") increasing qualification of the pedagogical process for education in diversity, involving actions of different kinds, among which is the training of teachers for education in diversity and teamwork, this essential for effective school inclusion.

Teachers in this perspective can create times and spaces that encourage inclusive practices in their classrooms, in their schools, in their communities, redesigning their practice, facing their fears, seeking new ways to teach and learn from their students, to see all in a unique way and developing their individual capacities (CANEPA, 2012).

Students learn in different ways and teachers must be prepared to deal with diversity in the classroom, and, in the case of inclusion in the regular classroom, they need to promote adequate adaptation of activities while respecting the time and limit each feature and offering each student conditions to achieve the goals set for each school year.

The Brazilian Education Guidelines and Bases Law – LDB, (BRASIL, 1996), in its fifth chapter, which deals with the Special Education brings in Article 59 that the education systems will ensure students with special needs¹ curriculums, methods, techniques, educational resources and specific organization to meet their needs. It is up to schools perform necessary curricular adaptation to enable disabled students to be included in the regular class, with learning objectives to be addressed and achieved in each school year.

Teachers, aware that his students differ in the way they learn, whether disabled or not, can articulate proposals for interventions in the classroom that contemplate the search for the development of all students, providing diverse resources and evaluating each from the objectives outlined within their capabilities. The school and the teachers are responsible for providing an education that, according to Heredero (2010), ensures access for all students to education, including their stay in school and the quality of education offered, enabling their independent growth of individual deficiencies.

Still, according to Heredero (2010), the learning process of disabled students to the manifest in different ways, ranging from temporary situations, liable to educational interventions through the development of methodological strategies used daily, even more serious and permanent situations that require the use of resources and specialized services to overcome them, and appropriate educational responses, involving including the curricular adaptation of the contents worked in class. This curricular adaptation can set various changes in teaching practices aimed at promoting learning and participation of students who have difficulties in their schooling process.

The movement for inclusion in the regular school system constitutes an active approach to identifying barriers that some groups are in access to education, and also in the search for resources to overcome them, consolidating a new educational paradigm for building a school open to differences (HEREDERO, 2010).

The National Curriculum Guidelines for Special Education in Basic Education, (BRASIL, 2001), in its eighth article, establishes that schools of the regular school system must do to provide inclusion. It is up to the school to perform flexibilities and curricular adaptations which consider instrumental the practical meaning of the basic

¹ Over the years many names have been used to describe people with disabilities, for example, disabled, with special needs, special or with special rights needs, and currently, the term used is a person with disabilities.

content, teaching methodologies and different teaching resources, beyond performing evaluation procedures appropriate to the development of students with disabilities, in line with the pedagogic project, respecting the mandatory frequency in classes. The quest for inclusive education pass through then the curricular adjustments and, considering adapting a curriculum is not to draw up a parallel education plan, one should consider content and activities for students with disabilities, adapted from this plan, respecting their limitations and aiming at their effective learning.

The process of inclusion in mainstream schools highlights the education professionals the need to respect the time, skills, and abilities of each student, therefore, the curriculum adaptation in regular schools should include not only the different learning development of the curriculum components but also the pursuit poor student development, favoring its concomitant autonomy learning the curriculum components.

We are all different; we are all unique beings with skills and abilities that can and should be leveraged at school. In the research context presented here, we seek information to help work with the student L. so that you can on a daily basis assist it in developing their potential, as individuals diagnosed with Jacobsen Syndrome, according to Grossfeeld, Mattina, Perrotta (2009), have among its features mental retardation or mental disability.

Mental disability corresponds to an intellectual functioning significantly below average, coexisting with other limitations in two or more of the following areas of adaptive skills: communication, self-care, social skills, family and community participation, autonomy, health and safety, academic functionality, leisure, and work, manifesting itself before the age of eighteen (D'ANTINO, 1997, p.97).

The manner in which one faces the demands of life, and the degree to which it implements personal independence according to age are used, according to Henriques (2015) as a reference for the adaptation of individuals with mental retardation and is influenced by several factors, including personal characteristics, social opportunity, motivation, education, training, as well as their practical needs and their general medical conditions.

From the perspective of effective students with mental disabilities inclusion, Anache and Martinez (2011) claim to be critical to have goals, resources and diversified strategies for that learning occurs, which involves the transformation of all those participating in the construction of the teaching process, noting that every person with mental disability has a different personality, which requires deepening on the size of individual subjectivity.

Morél (2011), brings individuals with Jacobsen Syndrome may have beyond mental retardation, some behavioral changes, including Deficit Disorder Attention Deficit Hyperactivity Disorder (ADHD), as can be seen with L. student during the research. By receiving children with ADHD, the school should be supported in the parameters of inclusive education to make these not feel stigmatized or labeled and not lose interest in education, feeling well integrated into the school environment (AFONSO, 2011).

It is believed, in the context of this investigation, the curricular adaptation should prioritize the reformulation of content sequence, eliminating secondary issues, and promoting specifically in Math classes, the materials adaptation.

The concept of number construction

According to the Salamanca Statement (UNESCO, 1994),² the inclusion in the regular school requires a school organization that provides objective learning opportunities to all students. In this sense, most of the research carried out in Brazil is focused on Elementary School, with blind or deaf students, with a wide field open for research to collaborate with the Math teacher, which has the inclusion challenge in their teaching practice (ZUFFI; JACOMELLI; PALOMBO, 2011).

Skills such as reasoning, attention span, problem-solving and connections with other areas of knowledge are required in Math and the teacher, respecting the potential of their students, must provide means so that everyone can develop such skills. For Zuffi, Jacomelli and Palombo (2011), the teacher, to promote the students' education in the regular class, should provide room for difference, with widespread support and supply of specialized materials and tools for the development of all, promoting diversity and customization of teaching in their classes.

The idea of number was built and refined over many centuries from the human need to know the world and it survive, using counting objects. The construction process of this concept, one of the fundamental concepts in Math has been studied by researchers such as Piaget and Szeminska (1981), Fuson (1991), Nogueira (2007; 2011), Yokoyama (2012), Nunes, Carraher and Schliemann (2011), among others, pointing out different possibilities for mathematical literacy.

Piaget and Szeminska (1981) stated in their researches that the counting process is progressive and inner way, considering the child's ability to count the objects successfully, and shows consolidated when it can classify, serialize and perform, among others, matches in order to quantify the numbers. For researchers, knowledge of the sequence of words used in the count does not mean that the child has already built the concept of numerical structure.

Gelman and Gallistel (1978) bring in their researches that the counting activity starts from five principles, which are respectively principle of stable order, the principle of correspondence term to term, cardinal principle, the principle of abstraction and principle of irrelevance order, where the first three set counting procedures. For them, the child since little possesses implicit knowledge of the five principles, consisting of preformed skills that would guide their performance.

² World Conference on Special Educational Needs Product, promoted by Spain government and UNESCO in June 1994, which representatives of about 100 countries signed including Brazil, and various international organizations.

Fuson (1991) investigated the counting and cardinality development, in children ranging from two to eight years. His results made clear the importance of empirical procedures for the establishment of measuring and counting for the number construction, as for the researcher, long before building the number of a logical point of view, the child finds the words-number in a variety of situations from which will connect.

To count, the child must first be able to establish a “unity,” which is a property that is added to the objects when it equalizes the differences and which are made from abstraction before being named, as do the correspondence, classes and arrangement, and the entire system manipulated before actually named. When considering the abstraction, the counting tasks or to encourage the number of concept construction is facilitated by language (NOGUEIRA, 2007; 2011).

The child, to live in a world in which the figures are part of daily life, brings with numeracy and thus, Math learning in the classroom is a moment of interaction between Math organized by the scientific community in a formal way, and Math as human activity informally. While human activity, mathematics is a particular way of organizing the objects and events in the world that allows us to establish relationships through counts, measures, and operations, checking results in different forms of organization (NUNES; CARRAHER; SCHLIEMANN, 2011).

Children need to learn about Math in order to understand the world around them, as this is an important part of their lives and, to Nunes, Bryant and Watson (2007), without it children will be uncomfortable not only in school, but in a large part of their daily activities, because they notice the existence of numbers in various locations, such as telephone keys, house number, hours on the clock, calendar dates.

The construction of the numerical concept embraced by the ability to translate numerical quantities by continuous or discrete sets which respectively are those that can be measured such as the volume of water in a container, or counted, such as money and time. For Yokoyama (2012), the term quantification is used in logic, mathematics, science and natural language quantifiers are the elements that represent the quantifications.

Throughout the study presented here, it was considered as part of the quantization a discrete set, in other words, has the objective of carrying out the counting and understanding of the quantities involved in this process. Nacarato (2000) states that there are three methods for quantification of discrete sets that are counting, and *subtilizing*³ estimate and, in this case, considered only the counting process.

Brissiaud (1989) describes two ways to represent quantities by counting:

a) a witness collection: is carried out by correspondence term to term between the elements of a group that wants to quantify and a collection that records that amount, for example, the use of hands to represent amounts associating each finger to an element that if you want to count;

³ Ability to quantify a discrete set, without using a counting process, first mentioned in 1949 in the article “The discrimination of visual number” Kaufman, Lord, Reese and Volkman (YOKOYAMA, 2012).

b) by the numbers: is performed by one-to-one of the elements of a given set, and the last number represents the amount of the mentioned set of objects concerned.

To perform the counting of numbers, Yokoyama (2012) describes that there is a need to perform one-to-one, besides memorizing the oral sequence of numbers that is the cardinality of the same. As for performing counting by witness collection simply be held correspondence term-to-term, making it easier for the count numbers.

Given the importance of the concept of number and count in society, it seeks to rethink the curriculum and strategies that respect the uniqueness and encourage learning.

THE RESEARCH

The clipping of the research presented here originates from the Doctoral thesis⁴ in progress, developed at the Post Graduation Program in Science and Mathematics Teaching (PPGECIM/ULBRA), consisting of qualitative research, a case study, by observing the reality of student L. According to Yin (2003), this methodology enables the investigation of reality preserving its characteristics from the real life events of knowledge, but without manipulating them.

Still, to Yin (2003, p.32) the case study “is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly defined”.

The student L. was diagnosed with Jacobsen Syndrome shortly after his birth and in 2014, to begin the research, was enrolled in the fifth grade of elementary school aged 11, attending the same regular school since the first grade of Elementary School. In May 2015, the family moved her to a special school, promoting changes in the conduct of implemented interventions.

The research involves the student school monitoring in the years of 2014 and 2015, and still contemplates interviews with those involved in the different contexts of her school life as parents, teachers, auxiliary responsible for student tracking in the regular school and responsible for the Educational Guidance Service (SOE) and the Educational Guidance Service (SOP), through interviews, observations and interventions in the classroom. This article describes and analyzes the survey steps on this student Math learning as well as activities for the construction of the concept of number by L. during the fifth year of Elementary School.

⁴ *Mathematics Teaching Strategies Theory: A Case Study with a Student with Jacobsen Syndrome* is part of the LEI – Inclusion Studies Laboratory, integrating the project “Teaching strategies and learning with students from inclusion in basic education: interventions teaching in the field of mathematics”, approved in UNIVERSAL-MCTI/ CNPq No. 14/2013, in order to present and analyze pedagogical action taken in view of the inclusive school, reporting reflections on curriculum adaptations, for the basic concepts construction and development of their potential as learning of mathematics.

DATA ANALYSIS

To better understand the student L. cognitive development stage, considering difficulties and potential in relation to mathematical concepts, it was analyzed the descriptive opinions generated from the goals of the fourth year of Elementary School.

By observing Figure 1, we highlight two objectives related to Math: identifying notions of high and low and perform correspondence between number and quantity to 10.

FIGURE 1 – First Quarter Objectives.

1st Quarter Objectives – 4th year
Express yourselves orally in order to be understood by all;
Identify letters of your names;
Identify your name in different contexts;
Identify notions of high and low;
Recognize and name the colors;
Explore and be located in space;
Acclimatize yourself with your routine;
Be located in spaces frequented within the School;
Make match between the number and amount of up to 10;
Paint within the limit;
Position and properly handle materials such as scissors, brush, and pencil;
To feed yourself independently;
Practice hygiene habits;
Practice values such as respect, care, friendship, and joy;
Interact positively with classmates and teachers;
Participate in commemorative activities with the class.

Source: The research.

From the pre-established goals, the opinion points out that in carrying out the proposed activities the student L. was resistant at times to carry out the tasks and distracted easily with what was happening around her. Depending on the student's resistance to perform all activities that have been proposed, some objectives would remain part of the work in the next quarter. The presented descriptive opinion does not refer at any time to Math goals.

With the objectives of the first quarter being kept, there was an increase of new targets for the second quarter (Figure 2). The descriptive opinion meant that this was a period of many advances, with the student fully adapted to the school environment and the daily routine of the classroom. Among the aspects observed by teacher fourth year, there is the development of the oral language of the student, with the expansion and diversification of vocabulary. L. student continued to show resistance to complete the proposed tasks, being stimulated to carry out, among them free paintings, paintings with

limits, cuts, and collages, an initial letter identifying your name, recognition of designs and color identification. Again, there was no reference to the Math objectives.

FIGURE 2 – Second Quarter Objectives.

2nd Quarter Objectives – 4th year
Correctly assemble the own name using movable letters;
Recognize the first letter of the own name as initial letter also of other words;
Demonstrate knowledge of the sequence of activities of the school day;
Using different materials in your work (paint, E.V.A., colored glue and colored paper);
Dramatizing scenes;
Participate in moments of socialization issues with classmates.

Source: The research.

Just as previously, figure 3 only shows the new goals, keeping all other related to the first and second quarters. Looking at Figure 3, it is noted the objective of Math: group amounts to 10, using the concrete material. In the presented descriptive opinion, the teacher pointed out that, through play and concrete material, were provided several times to work with the student amounts to 10, and the student has achieved quantities of groups up to 10, with the help of the teacher, assist and classmates.

FIGURE 3 – Third Quarter Objectives.

3rd Quarter Objectives – 4th year
Knowing the topography of the letters of your name and differentiate them from the other letters of the alphabet;
Identify notions of inside and outside;
Color using color as reality (objects, food, human figure, the elements);
Develop temporal notions;
Identify elements that characterize the sequence of the days of the week;
Group amounts to 10, using concrete materials;
Use prints magazines to compose drawings;
Handle children's books and listen to stories read.

Source: The research.

It is important to note that, according to the opinion, the student reproduced in her talk the count, and was not specified in any of the quarters if the student succeeded in achieving the aim described in the first quarter to identify notions of high and low. Among the issues highlighted by the teacher for progression to the fifth year were: student's resistance to carry out the activities, difficulty concentrating with repeated requests for termination of tasks.

The difficulties with concentration highlighted by the teacher in the opinions of quarters report the fact mentioned by Morel (2011) as ADHD and behavioral changes related to Jacobsen Syndrome.

After analyzing the opinions of the fourth year of Elementary School, the work with student L. began with a poll period, in order to verify the real understanding about the knowledge of numbers and correspondence regarding the represented amount described in opinions analyzed. This time, with monitoring of Math fifth grade teacher and a helper, focused on the count of objects using concrete materials such as popsicle sticks, polystyrene balls and bottle caps. According to Nogueira (2007), the object count favors the child the serial aspect of the numbers that allows building numerical equivalences and establishing correspondences.

It could be seen that the student performed with difficulty oral reproduction sequence number up to 7, and, when requested to represent a certain amount of concrete material, she delivered the material had on the table, showing not understand the meaning of the numerals and what were represented by the same amounts.

The work in the classroom with students diagnosed with ADHD can be done by the teacher with the aid of use memory games, crossword puzzles, find errors, computer activities, and other resources (TAVARES, 2008). Thus, the activities proposed for student L. employed concrete material, representation of numbers and their amounts through figures and drawings made by the teacher, games like puzzle, dominoes and memory game (Figure 4), the latter with in order to verify the association of the number of objects and the numerical symbol referring the represented quantity.

FIGURE 4 – Memory Game Model.



Source: <http://www.smartkids.com.br/atividade/numerais-memoria-1-a-5>.

Among the activities, there is the memory game, in which the student L. should find the pairs observing and number corresponding amount. What it is observed is in line with that described by Colling and Geller (2015), as the difficulty of the student to relate the number of representation to the amount that it represents, as well as difficulty concentrating during the completion of the proposed activity. To perform the activity was necessary the help of the teacher and the auxiliary and the same has not been completed by the student, being taken up in the next class.

With the completion of the activities proposed in the survey period, it was observed that the student L. has not demonstrated to relate symbol and quantity, performing the count always with the mediation of the teacher or assistant, with great difficulty to observe in numerical sequence and with much difficulty to concentrate.

To Colling and Geller (2015), the polling period has verified the existence of numerous limitations on learning, such as difficulty with speech and fine motor skills of the student, as well as holding the count without understanding its meaning, its representation in quantification. Also, the time required for the proposed activities should be reconsidered due to the difficulty of the student to remain for a long time in the same activity, losing concentration and making the same have to be constantly reproduced.

After the application and analysis of the activities of the survey period with student L., it was held the verification of the objectives of the fifth year of Elementary School regarding the discipline of Math, shown in Figure 5:

Figure 5 – 1st Quarter Objectives – 5th year.

1st Quarter Objectives – 5th year
Read and write numbers up to the class of billion;
Analyze, interpret and solve mathematical stories involving the four operations;
Exercising the logical mathematical thinking, creativity, and oral calculation;
Solve calculations and numerical expressions, involving the four operations;
Perform calculations involving natural numbers and the four operations division from two digits in the divisor and multiplying two digits in the multiplier;
Recognizing the Brazilian monetary system, carrying out operations involving our currency.

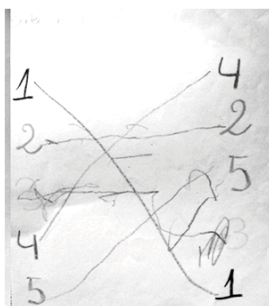
Source: The research.

Heredero (2010) affirms that the curricular changes intended by the application of the principle of inclusion of all, offer students include the maximum possible training opportunity in the school context and give a response through the principle of attention to diversity, to needs that manifest themselves in their educational process. In curriculum adaptations seeking to understand, with an adapted curriculum to keep some common elements with materials of the current step, an appropriate methodology, with changes in their groups, and new temporal organizations to account individual needs and learning, the most and possible significant functional. Thus, there were the necessary curricular adaptations, with the proposition of working goals for the first quarter of student L., respecting their potential. The objectives were:

- 1) Read and recognize the natural numbers up to 10;
- 2) List the natural numbers up to 10 with its representation in the form of sets;
- 3) Exercising the numerical writing of natural numbers up to 10;
- 4) Develop reasoning.

Among the activities carried out with the student L., to meet the objectives proposed in the quarter, they used white and colored leaves, concrete material, games, among others. We highlight the activity 1 (Figure 6), where L. student should call the same numbers. The purpose of this activity was to observe if it recognized the form of equal numbers 1 to 5, for the activities performed probing was observed that it counts performed until the numeral 7.

FIGURE 6 – Connect the same numerals.



Source: The research.

The student could do the activity, but she showed much difficulty in performing the route to connect the numerals, receiving help from the assistant responsible for its follow-up in the classroom, for viewing the same strokes and drawing the trace itself. The only trace performed by the student was the number three (3) in which it is possible to observe the motor difficulty of the student, as described by Colling and Geller (2015) as one of the difficulties presented by the student during polling.

The time required to perform the activity was higher than expected since at various times to assist and the teacher had to call the attention of the student to focus on the proposed activity. Thus, there were limitations both in learning and in the student's motor skills, such as difficulty concentrating, to express themselves orally and in tracing lines.

Due to the dispersion of the student in making written or printed activities we chose to, in most cases, the use of the concrete material. Nogueira (2007) brings how important it is for the process of construction of number that the child performs counts, things, and objects, pointing and saying the word-number, to build and establish equivalences matches. The second activity (Figure 7) indicates part of the activity that the student L. should put the number of elements in each set shown in the sheet using for this beans, involving the number and amount ratio using the concrete material.

FIGURE 7 – Represent the quantities in each set related.



Source: The research.

To carry out this activity, the student should get the amount described in each set in a pot with beans. The activity was carried out with the help of mediation, and the student was encouraged to perform the reading of the represented number and after, take the amount of beans representing that number in the pot.

The student is observed representing the number 1, indicating it using the fingers (figure 8).

FIGURE 8 – Represent the quantities in each set related.



Source: The research.

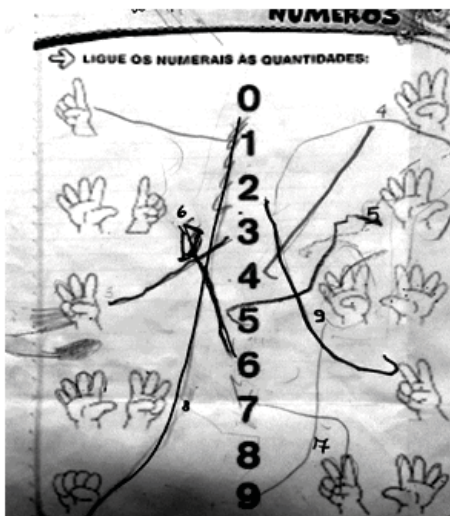
In Activity 2 the student L. made the reading of the numbers represented with the help of mediation, demonstrating very difficult to pick the beans in the pot and the amount relating to the number represented, for example, the student could read the number 1 but not I knew to catch the amount 1 to represent the same with beans and yes, it was picking beans in the pot and delivering the assist everyone who took.

The difficulties of learning in more severe situations, for Heredero (2010) require, besides the use of specialized resources and services to overcome them, appropriate

educational responses as curriculum adaptation and the search for resources to overcome the barriers of the way, to promote the Learn.

The Activity 3 (Figure 9) shows a count of activity with the student using a witness collection, for this effect to Yokoyama (2012) the attainment of the count by witness collection due to matching term-to-term it becomes easier for children than the count of numbers.

FIGURE 9 – Connect the numerals with the amount represented in each picture.



Source: The research.

In the survey, it was observed that the student performed count to 7 because of this the proposed activity considered the numbers up to 10. In carrying out this activity was observed that, with the aid, the student performs the count up to 5 and relates the number represented on the sheet. As the number demonstrated difficulty in recognizing them and related them to the image represented by the fingers.

With the proposed activities it sought to achieve the proposed objectives through curricular adaptations, according to Heredero (2010), are the adjustments that are made on the objectives, content, criteria and assessment procedures, activities and methodology to take account of differences individual student, flexible and subject to review and evaluation constantly. Thus, the student was encouraged to recognize the natural numbers up to 10 and relate them to their representation in the form of sets, exercising numerical writing with the mediation of the teacher and assistant.

The validation of working with student L., as the learning of concepts, was held primarily with the observation of the proposed activities. It is noteworthy that, just as in interventions and analyzes by Colling and Geller (2015), there were difficulties regarding

the student stay focused during the proposed activities, losing concentration and making the activities were resumed in most situations.

FINAL CONSIDERATIONS

The path of school inclusion is long and full of possibilities. In this survey research, difficulties and expectations were experienced, knowing that inclusion in regular education is a challenge for all involved, as a family, students, principals and teachers.

This research, given Jacobsen Syndrome, has enabled those involved to learn and discover possibilities facing the unknown, the obstacles that arise in the course of work, especially as regards the lack of information about the teaching and learning of people with this diagnosis.

Learn yourself and learn to always review and discuss possibilities that favor the development of the potential of inclusion students that among the main difficulties presented in Math is the difficulty of abstraction in understanding numbers. Highlighting the need to respect particularities and singularities, there are the curricular adjustments that prioritize goals designed individually with teaching strategies defined from these goals.

Much of the challenge experienced throughout this research is to find ways to encourage the pursuit of autonomy via inclusion, thinking and rethinking about building a resume that from objective adaptations, activities and strategies, assist his journey towards learning math for their life in society.

REFERENCES

- AFONSO, D. R. *Aprendizagem de alunos com transtorno de déficit de atenção e hiperatividade: o orientador educacional como potencializador do processo*. Artigo – Curso de Pós-Graduação em Administração, Supervisão e Orientação Escolar, Faculdade Redentor, Três Rios, 2011. Disponível em https://www.posgraduacaoredentor.com.br/hide/path_img/conteudo_542b2127974d6.pdf. Acesso em: 15 mar. 2016.
- ANACHE, A. A.; MARTINEZ, A. M. O sujeito com deficiência mental: processos de aprendizagem na perspectiva histórico-cultural. In: JESUS, D. M. et al. (Org.). *Inclusão práticas pedagógicas e trajetórias de pesquisa*. Porto Alegre: Mediação, 2011. p.43-53.
- BRASIL. *Lei de Diretrizes e Bases da Educação*. MEC: Brasília, 1996.
- _____. *Diretrizes nacionais para a Educação Especial na Educação Básica*. Brasília: MEC, 2001.
- BRISSIAUD, R. *Como as crianças aprendem a calcular*. Lisboa: Instituto Piaget, 1989.
- CAMACHO, O. T. Atenção à diversidade e educação especial. In: STOBÄUS, C. D.; MOSQUERA, J. J. M. (Orgs.). *Educação especial: em direção à educação inclusiva*. Porto Alegre: EDIPUCRS, 2006.
- CANEPA, L. As barreiras da inclusão. *Revista da ANEC*, São Paulo, p.46–51, 2012.

COLLING, A. P. S.; GELLER, M. Intervenções no Ensino de Matemática com uma aluna com Síndrome de Jacobsen. In: XIV CIAEM-IACME – XIV CONFERÊNCIA INTERAMERICANA DE EDUCAÇÃO MATEMÁTICA, 2015, Chiapas, México. *Anais...*

D'ANTINO, M. E. F. A questão da integração do aluno com deficiência mental na escola regular. In: Mantoan, M. T. E. (Org.). *A integração de pessoas com deficiência: contribuições para uma reflexão sobre o tema*. São Paulo: Senac, 1997. p.97-103.

EBERHARDT, I. F.N.; COUTINHO, C. V. S. Dificuldades de aprendizagem em matemática nas séries iniciais: diagnóstico e intervenções. *Vivências: Revista Eletrônica de Extensão da URI*. v.7, n.13, p.62-70, 2011.

FUSON, K. Relations entre comptage et cardinalité chez les enfants de 2 à 8 ans. In: BIDEAU, J.; MELJAC, C.; FISHER, J. P. *Les chemins du nombre*. Lille: Presses Universitaires de Lille, 1991. p.159-179.

GELMAN, R.; GALLISTEL, C. R. *The child's understanding of number*. Cambridge, Massachusetts, London: Harvard University Press, 1986.

GROSSFELD, P.; MATTINA, T.; PERROTTA, C. S. *Síndrome de Jacobsen*. 2009. Disponível em: http://www.orpha.net/consor/cgi-bin/OC_Exp.php?lng=pt&Expert=2308. Acesso em: 15 mar. 2014.

HENRIQUES, R. M. *O currículo adaptado na inclusão do deficiente intelectual*. 2015. Disponível em: <http://www.diaadiaeducacao.pr.gov.br>. Acesso em: 15 abr. 2015. p.1-23.

HEREDERO, E. S. A escola inclusiva e estratégias para fazer frente a ela: as adaptações curriculares. *Acta Scientiarum Education*, Maringá, v.32, n.2, p.193-208, 2010.

MORÉL, P. S. *Doença genética rara: Síndrome de Jacobsen e uma aprendizagem linda*. São Leopoldo, 2011. Disponível em: <http://espacodomquixote.blogspot.com.br/2011/12/doenca-genetica-rara-sindrome-de.html>. Acesso em: 15 mar. 2014.

NACARATO, A. M. O conceito de número: sua aquisição pela criança e implicações na prática pedagógica. *Argumento*, Faculdades de Educação, Ciências e Letras e Psicologia Padre Anchieta, Jundiáí, Ano II, n.3, p.84-106, 2000.

NOGUEIRA, C. M. I. *Classificação, seriação e contagem no ensino do número: um estudo de Epistemologia Genética*. Marília: Oficina Universitária Unesp, 2007.

NOGUEIRA, C. M. I. Pesquisas atuais sobre a construção do conceito de número. *Educar em Revista*, Curitiba, n. Especial 1/2011, p.109-124, 2011.

NUNES, T., BRYANT, P.; WATSON, A. *Key understandings in mathematics learning*. Nuffield Foundation; University of Oxford, 2007. Disponível em: <http://www.nuffieldfoundation.org/sites/default/files/Introduction%20and%20summary%20of%20findings.pdf>. Acesso em: 20 set. 2015.

NUNES, T.; CARAHER, D.; SCHLIEMANN, A. L. *Na vida dez, na escola zero*. 16.ed. São Paulo: Cortez, 2011.

PIAGET, J.; SZEMINSKA, A. *A gênese do número na criança*. 3.ed. Rio de Janeiro: Zahar, 1981.

TAVARES, H. V. *Apoio pedagógico às crianças com necessidades educacionais especiais DISLEXIA e TDAH*. Monografia – Curso de Pós-Graduação Lato-Sensu em Distúrbio de Aprendizagem, Faculdade de Medicina do ABC, São Paulo, 2008. Disponível em: <http://www.crda.com.br/tccdoc/43.pdf>. Acesso em: 15 abr. 2016.

UNESCO. *Declaração de Salamanca, Salamanca, 1994*. Disponível em: <http://portal.mec.gov.br/seesp/arquivos/pdf/salamanca.pdf>. Acesso em: 10 mar. 2014.

ZUFFI, E.M.; JACOMELLI, C. V.; PALOMBO, R. D. Pesquisas sobre inclusão de alunos com necessidades especiais no Brasil e a aprendizagem em Matemática. In: XIII CIAEM-IACME – XIII CONFERÊNCIA INTERAMERICANA DE EDUCAÇÃO MATEMÁTICA, 2011, Recife. *Anais...*

YIN, R. K. *Estudo de caso: Planejamento e métodos*. 2.ed. Porto Alegre: Bookman, 2003.

YOKOYAMA, Leo Akio. *Uma abordagem multissensorial para o desenvolvimento do conceito de número natural em indivíduos com Síndrome de Down*. 2012. Tese (Doutorado em Educação Matemática). Universidade Bandeirante de São Paulo. Programa de Pós-Graduação em Educação Matemática. São Paulo. Disponível em: http://www.matematicainclusiva.net.br/pdf/uma_abordagem_multissensorial_para_o_desenvolvimento_do_conceito_de_numero.pdf. Acesso em: 12 maio 2016.