International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 7; Issue 9(D); September 2018; Page No. 15499-15504
DOI: http://dx.doi.org/10.24327/ijcar.2018.15504.2831

Research Article

PERCEPTIONS IN THE FIELD OF VISUAL DEFICIENCY IN THE CONTEXT OF EXPERIMENTAL LESSONS

André Luis dos Santos Menezes[1] and Paulo José Menegasso[2]

[1]Federal Fluminense University. Rio de Janeiro Brazil
[2]Federal University of Rio Grande do Sul, Porto Alegre, Brazil

A R T I C L E I N F O

Article History:

Received 13th June, 2018
Received in revised form 11th July, 2018
Accepted 8th August, 2018
Published online 28th September, 2018

Key words:

Visual deficiency, experimental classes, perceptions.

A B S T R A C T

This article is the result of an investigation carried out during the period of two months in interdisciplinary activities, motivated by the process of insertion of two students with visual impairment in regular high school classes, in a public school in Brazil, with a proposal of experimental activities for the production of perfumes, focusing on the subjects of Chemistry and Mathematics, based on the theory of mental maps and its application in the field of visual impairment. The objective was to understand how the perceptions occur in a blind student, a partially blind student and another with, normal sight by having contact with experimental classes measuring volumes and performing mathematical calculations. Some concepts emerged spontaneously and were transcribed and investigated through Discursive Textual Analysis. The first results point to the relevance of experimental classes in the face of the reality of visual impairment, refraining, constructing and reconstructing the process of formation of concepts in the field of Chemistry and Mathematics, contributing to the inclusion and being able to be extended to other areas of knowledge.

INTRODUCTION

This research is the result of a study that results from the insertion of blind and low sight students into regular primary school. Thus, in this investigation, in the form of a case study, the research was carried out on the basis of a sample of three students enrolled in a regular class: one blind from birth (congenitally blind), one with partial sight (low vision) and one with normal sight (normal sight).

Faced with this, teachers, the school and the students themselves experienced challenges. The insertion was established by law without the school and teachers having any previous preparation. The determination was provided for by Law 10,098 / 2000 and subsequently regulated by Decree No. 5296/2004 in Brazil.

Based on the difficulties encountered by students with visual impairment included in the regular system of education, in relation to certain disciplines, in particular Mathematics and Chemistry, we present in this research a view aimed at the cognitive development in some specific contents of these two disciplines. The research was based on the analysis of the limits and possibilities in which the school environment ceases to be the common classroom, and a sample of students experience the space of a laboratory with experimental classes, where this space modifies the teaching practice, resignifies contents and indicates new methodological resources that can be used in the teaching-learning relationship within this group. The experimental classes are presented as a space for study and support, composed of interfaces based on opportunities for tactile and haptic experiences to develop skills that are related to the cognitive development of the subjects. The research has methodological bases of analysis in the construction and interpretation of mental models for the development of skills in geometry, in the case of blind and low sight students, supported in the Discursive Textual Analysis Theory. Thus, in this work, it is argued that experimental classes are spaces that contribute to the inclusion process, where blind people, those with normal sight and low-sight students can interact together, constructing concepts with meaning and enabling new constructions and elaborations of practice.

This was necessary for the school, and especially for teachers, to look for alternatives to learning methodologies that would serve these students once they were already in the regular classroom. While school and teachers should respect the rights of students, on the other hand there was a great difficulty in securing the rights of blind students, since no previous preparation was envisaged by either the law or the state government.

Another challenge was the difference in the insertion of students with visual impairment and integration in the teaching process, creating an enormous difficulty for teachers to ensure

Corresponding author:* **André Luis dos Santos Menezes
Federal Fluminense University. Rio de Janeiro Brazil

that they were not treated with any kind of discrimination either in the activities or by the other students.

Thus, the authors, one professor in chemistry teacher and one mathematics teacher opted for the introduction of joint methodologies in these two disciplines, aiming to integrate blind and low sight students in the context of the classroom without any differentiation except the individualized activities aiming to adapt the conditions of each one to reach learning objectives. Therefore, insertion is not enough, but inclusion in regular activities, and this is a long way to go so that the activities developed can go beyond content and contribute to the values of citizenship, equal rights and socialization.

Regarding social inclusion, some authors affirm that it is a process in which [...] contributes to the construction of a new type of society through small and large transformations in physical environments (internal and external spaces, equipment, appliances and utensils, furniture and means of transport) and the mentality of all people, therefore also the student with special needs, Sassaki (2006, p.40).

Thus, in addition to inclusion, it is important to understand other issues that are related to this context, such as the need for changes in paradigms, spaces and values.

The formation of concepts in the context of Visual Impairment Understanding shows the process of concept formation is constructed through perceptions, which is so natural and instantaneous in the world of psychics that the importance of the visual field is often not assessed as one of the senses that directly act in the construction of cognitive aspects.

As the "sight" no longer exists, and in view of the need to live in the "world of theose with normal sight seers," visually impaired subjects need to position themselves in space, understand the context of their everyday life with objects, forms, figures, shadows, concepts and knowledge that are also necessary for your formation and relationship with the world, as well as for a subject with narmal sight.

It is argued that each individual is unique and that his construction and world - view are established as he or she interacts and interprets reality and the degree of importance and meaning in the face of what he constructs and experiences as his reality.

Authors such as MANTOAN, 2001; CAPELINI, (2008) Apud Bello (2017) emphasize that "educational institutions must take into account the different ways of learning and that this makes the educational process more enriching".

In order to reach the objective of this investigation, a case study was used from the inclusion of a blind student and another with partial sight in regular classes.

Based on experimental classes the production of perfumes was used as a form of mental abstractions and measurement of volumes in chemistry and calculations in mathematics, activities were developed that aimed as a central axis application of mathematical calculations in the context of experimental activities of Chemistry.

Therefore during the experimental activity of producing perfumes what interests less was the perfume produced by the students themselves. The attendance of the proposed activities was evidenced, but the teaching process the skills and competences for the activity was the greater than the objective, to learn with the process and with the environment of the experimental classes. Both the teachers and the students signaled that they were experiencing a process that made it possible for them to learn, breaking down barriers and meeting new challenges.

The presence of two blind students in regular high school classes was the main reason that disturbed two teachers and this research project was born. According to him, inclusion is considered "[...] a political, social, and cultural action," social and pedagogical, unleashed in defense of the right of all students to be together, learning and participating, without any kind of discrimination "(BRASIL, 2008, p.1).

Based on the research and the understanding of inclusion laws and particularities of the scenario involving the field of visual impairment, we sought to understand the formation of concepts in the field of visual impairment, and new methodologies and resources that could support both teachers and students and that they contributed to the fact that the classes actually happened within what was foreseen in the inclusion process.

In the research it was felt the need of the presence of a subject with normal sight to participate also in the experimental classes and thus increase the capacity of the analysis when compared also in the field of visual domain.

Thus, the group that participated in the experimental classes, in this case study, was composed by a blind student, one of low vision and another sith normal sight. The perceptions reported from the "vision" variable in this context were compared.

MATERIALS AND METHODS

For this activity adaptations were made in the chemistry laboratory of the public high school using a specific bench free of any risk of accident, always accompanied by two teachers. One of chemistry and another of mathematics and an assistant technician as a monitor.

It is noteworthy that the laboratory is accessible with a handrail. Thus, security and accessibility of blind and low sight students were guaranteed.

The meetings were weekly for 1 hour and 30 minutes and took place during a two-month period.

The qualitative research used a questionnaire with open questions. Some perceptions of the subjects constructed from experimental classes in the production of perfumes were investigated.

It was recorded that both students with visual impairment used the Braille code. The research is based on the construction of mental maps and Discursive Textual Analysis, interpreting the students' speeches.

Profile of subjects investigated:
Student A - 18 years - Congenital blindness.

Student B - 17 - Partial loss of sight - The period of sight loss is not exactly remembered.

Aluna Student C - 15 years old - Normal sight

Below are some transcribed considerations of the subjects before the open questionnaire that answered.

Research development

In this investigation as a first approach, we sought to find out what understanding the three subjects possessed about the concept of chemistry, since this was one of the sciences they were studying, and that is part of the high school curriculum.

In the legislation of Brazil [1] through LDB 9394/96, it was already emphasized that all should be included in school, but the reality of the public school is strained between including and integrating blind students. The preparation of the school and the teachers to work on this new reality was not foreseen in the legislation.

Many researches currently discuss the teaching of chemistry and the expected objectives with this discipline. However, the emphasis in this research was on thinking the chemistry turned to the everyday and re-signified within a social context.
But what do our students think about this science?
How do they define it?

These were some of the questions raised during the investigation.

The construction of Concepts and Meanings in Chemistry and Mathematics

For some authors, such as Lieberman [2] and Houston-Wilson (2009), the construction of meanings in chemistry by blind students is associated "directly to teaching practice, when teachers establish more than one teaching strategy", taking into account the different "forms" of the students construct meanings.

Thus, in this research sample, we chose to establish the notion of volume in different experiments in chemistry, with different strategies, based on the ideas of Lieberman and Houston-Wilson (2009) to indicate four other methodological adaptations:

1. modification in equipment;
2. modification of the rules;
3. modification in the environment and
4. change in instruction.

In the first case suggested by Lieberman and Houston-Wilson, as equipment modification, different materials were used, such as: pipettes, beads, beaker, magnifying glass, and test tube, in order to adapt to each student the type of material to facilitate their activity.

Some comparison parameters were initially established for large volume measurements: one liter, one half liter and one quarter liter.

For small volumes, it had been defined that volumetric pipettes and common pipettes that has the degree of volume registered in the outside of the glass in milliliters and with tenth of milliliters would be used. The students were offered the use of graduation in the pipettes with the use of measures indicated in embossed rubber.

In the measurement of small volumes with the blind student the teaching staff in line with it, it was defined that an eyedropper could be used since the information on the use and measurement of volume by drops of liquids was previously provided.

One milliliter contains about 0.05 milliliters, so with twenty (20) drops are estimated at one milliliter under normal conditions of temperature and pressure, one atmosphere and 25 degrees Celsius in temperature. Thus, this mathematical calculation was used with the student.

Through these aspects the subjects could establish comparison criteria, measurement of similar understanding saved the specifications of each case.

It was not initially thought that the measurement of small volumes had great differences as found.

It was presented for glassware such as beakers, pipettes that allow measuring from 1 to 10 milliliters and other smaller materials such as beaker cup from 10 to 30 milliliters, and some droppers, where a ratio between the amount of drops and milliliter.

Each of the subjects had the freedom to use the materials available and to adopt the best way that suited their way of interpreting and measuring volumes. Subject A chose to use a dropper, listen to and record how many drops would equal each milliliter, and did a mental calculation.

In larger volume measurements, the one-liter beaker was used as reference. This method adopted for measurements of large and small volumes by subject A allowed the construction of his own mental map and structured his thought for mental calculation, achieving his goal.

This pedagogical context is in agreement with the thought of Sánchez [4] (2010), when he affirms that mental maps are models that people construct to represent states (physical or abstract) and are in constant movement, being able to be modified and reconstructed.

Subject B, with low sight did not present great difficulties, since it was easy to measure large or small volumes, from liters to milliliters.

As one of the resources used was the magnifying glass that made it possible to measure by visualizing the measurements, the said that he felt this way safe when using pipettes and test tubes.

It is emphasized that both subject A and subject B had specific care with the materials used and created through the use of hearing and tactile action their way of orientation during the activity.

The increase of brands in glassmaking has become necessary and significant in both cases.

Subject C, with normal sight, used the small volume beakers and pipettes and beaker cups for large volumes.

There was no proposal of changing the environment, Since all activities were carried out in the same laboratory, only the benches were adapted to each student according to their degree of difficulty.

In the fourth case established by Lieberman and Houston-Wilson (), the instructions were specific to each student according to their characteristics.

The answers below were transcribed from the report of the three students of the investigation, where the integrity of their answers was prioritized. Three categories of analysis emerged from the responses, based on the Discursive Textual Analysis: conceptualization, experimentation and comparison, which will be described as follows:

- Category 1 - Conceptualization

Questao1: What concept do you have of chemistry?
Subject A - "Chemistry is a science that prepares various products, with a strong smell that is bad for the health and those of pleasant smell that are good for health".
Subject B - "I understand chemistry as a science that uses formulas to improve technologies, discover the cure of diseases. I see chemistry as a good science. "

Subject C - "It studies things in general, it's an interesting subject, there are things" that we know and can do and see to become professionals in some area of knowledge. "

Establishing themselves from the subjects' speech, three distinct subcategories for the concept of chemistry would have: smell science; formula science and knowledge science.

Observe the relevance given to the sense of smell according to the "speech" of subject A as one of the responsible and deterministic senses of the construction of the concept to classify a product of good or bad by the smell that it feels.

It has established a proper parameter between the production of a product that does good to the health associated with a good smell and the product that does not smell good will harm health.

The subject B perceived the chemistry associated with the formula, but even with this relation to the formulas he is able to establish a meaning for this association, that is, he elaborates a purpose for the use of these formulas, which in his conception is related to the use of technologies and these, in turn, are associated in the quest for cure of diseases, which makes the chemistry is seen by him as a good science.

Subject C presented the chemistry in a very general way. In fact he did not exactly express his perception directly about chemistry.

He signaled things he knew and set out for a generalization in other areas of knowledge. The meaning he used to express his understanding of chemistry was directly associated with vision by associating "doing" and "knowing" as the fruit of cognitive construction by that sense.

- Category 2 - Experimentation
Question 2: "Have you ever imagined conducting chemistry experiments in class?" Which one have you experienced?

Subject A - "I've never done an experiment, but always thought of doing it." "Today in the production of perfumes was my first experiment and what I liked the most was to have smelled what I could produce."

Subject B - "I never thought of doing it, I always thought nothing would stop me from doing experiments, they just never gave me that chance and this is my first."

Subject C - "No, I never did. Besides, I do not have much contact with this area. " "I remember, however, on a visit to a science fair where I saw a lamp powered by chemical energy that shone imitating solar energy."

As far as experimenting in laboratories is concerned, there is an absence of this experience common to the three subjects, which is independent of the condition of the student that we have in the classroom.
The subject A emphasizes once again another sense (smell) within the cognitive process that is relevant to him, reaching even his "ego" and self-esteem, when he feels capable of producing something that smells good (the perfume) and says never had accomplished, but there was in it the desire.

I wish this also demonstrated by subject B and both signal that the blind does not view the absence of vision as an obstacle to experiencing an experimental class.

It is within the pedagogical structure of teachers and schools that this obstacle needs to be reviewed and discussed.

Again, subject C (seer) emphasizes and values the sense of sight when he points out the experiment in which the brightness of the lamp is emphasized.

- Category 3 – Comparison

The use of the pedagogical resource was based on the thinking of Manzini [3] and Deliberato (2007), who conceptualized "the pedagogical resource as a concrete, manipulable stimulus and that this stimulus is attributed one or more pedagogical purposes due to the inclusion of a disabled student ".

In the chemistry class it was established by the teacher for the three students that a few drops of water contain about 0.05 milliliters in normal conditions of temperature, so with (20) twenty drops they are estimated at 1 milliliter.

For the experiment of measurement of small volumes a dropper was used where it facilitated the measurement of 1 ml. For larger volumes the comparison would be proportional up to the desired volume.

Measuring volume involving different forms and materials to determine quantities, constitutes a strategy that can contribute to the experimental activities for the blind student to make their comparisons in their cognitive structure. The following question arises:

Question 3 - Given a bottle, how much water do you think would fit in that bottle?

Subject A - "It would fit a large liter [...], because the measure is a large and full glass ..." (he said after the hands contact that holds a large liter).

Subject B- "The bottle should contain about a liter, I make 500 ml by touching half of the glass and another 500 ml" (he touched the hand, half of the bottle up).

Subject C - Contains approximately one liter.

In observing the model used to answer this question, it is emphasized that:

Subject A- states that he makes a comparison of his manual perceptions with the notion he has in his mental structure comparing the notion he developed at home with the notion of volume in the school

Subject B - To measure volume he used a magnifying glass ten times to visualize the volume in the beaker, the pipette and the burette, so he used the volumes defined by the glassware since he only sees in size 16.

Subject A demonstrates that his mental process for measuring large volumes comes from the process of comparing a standard 1-liter container he owns in his home.

When it comes to comparing small volumes, such as a milliliter, it uses comparison by means of "bead drops." Thus, by means of hearing and drop counting, a parameter was used

to define the volume of perfume essence and other components during the experimentation process.

Subsequently using mathematical calculations, measurements, proportions, volume calculation, rule of three and percentages made the transformations arriving at the desired proportional volume in the experiment.

Subject B obtains the volume by comparison compared to another volume previously defined in milliliters. He always sought during the process the comparative method in his cognitive structure and mentioned lived facts recorded in his memoirs, where he presented references of volume and methods of comparison.

A magnifying glass was used to visualize the markings of the pipettes, beakers and burettes. He did not use the dropper used by student A, even though he was in front of him.

The form of comparison used by subject B demonstrated some residual knowledge and that his experiences possibly facilitated their activities and were resented.

The subject C, seer, in this experiment did not present any form or procedure different from the other students that in similar condition usually present.

He used the glassware, such as: pipette, beaker and burette to measure volumes necessary for the preparation of the perfume which was the medium used in this experiment and not its purpose. It was intended to understand and emphasize the process and not the results of the perfume.

It should be noted that subject C spent the same preparation time to develop the experiment as subject A, although subject A had the need to use an eyedropper and mathematical calculations to identify the measured volume.

The mathematical contents that emerged from the environment of the experimental classes and the activity of the production of perfume gave a new look to the students about the use of some mathematical concepts and during the meetings came to say that they now perceived the importance of studying transformations of units, measures of capacity, volume and proportion.

RESULTS AND DISCUSSIONS

In light of this experience, which was constituted in a first activity with experimental classes aimed at inclusion, it was observed that there are possible paths to be sought for inclusion purposes, from a commitment between teachers and facing reality in the search for new methodologies.

It should be emphasized that the authors chose to emphasize the process aiming at the inclusion of students in activities for learning purposes in the cognitive structure of students with intrinsic motivation, that is, with motivation of the apprentices themselves.

Some mathematical contents such as: calculations of volumes, proportions, measures of capacity, rule of three simple could be understood and signified in concomitance with Chemistry, and that for the subjects made a great difference and valuation. It was also observed that the formulation of mental schemes is facilitated by the experimental activity in which the production of perfumes was only an activity whose focus was in the process. However, during the experimental process it was the framework for the elaboration of mental maps, material handling, perceptions and elaborations that interfered positively in the relationship between teaching and learning and cognitive development.

The research points out new possibilities and methodological challenges for the pedagogical practice regarding the presence of students with blindness and low vision in the context of regular classes and warns us that the absence or visual difficulty at no time during the investigation became obstacle in order to achieve the goal in relation to the proposed learning. This record is relevant and can be extended to new thinking by teachers receiving students with visual impairment or any other disabilities in their classrooms. The report of this investigation instigates us to seek new strategies, changes in environments, search for resources, new reflections based on challenges in the issues of inclusive education, and points to evidence that however small the advance may seem, it is still worth reviewing and our teaching practice.

CONCLUSION

The study also signals evidence that the absence of vision or part of it challenges us to understand how constructions of some concepts occur and leads us to understand that the mental process for cognitive development does not have to happen in the same way between the students, even in the case of sighted students, where vision plays a deterministic role.

The process of relating teachers, contents and disciplines to the same end in the context of the classroom valued the thinking and strategies elaborated by the subjects on other looks and the teachers themselves when offering the conditions so that these thoughts were manifested not only in an area of knowledge.

This research allowed the continuity of other activities aimed at the integration of the blind students in the school context being researched.

It is intended to present shortly from this, other results ongoing studies aiming to expand the sample and involve other disciplines in high school.

References

BELLO, Márcia Miranda Silveira. Inclusion: conceptions of the teachers of the Education Department of the State of São Paulo Education Magazine, v.42. n, 3 set./dez.2017 Available in: https://periodicos.ufsm.br/reveducacao.

BRAZIL. Constitution of the Federative Republic of Brazil of 1988.

BRAZIL. Declaration of Salamanca and Line Action on Special Educational Needs. Brasília: Corde, 1994.

_____ Ministry of Education. Law guidelines and bases of national education. LDB 9,394 of December 20, 1996.

_____ BRAZIL. DECREE No. 5,296 OF DECEMBER 2, 2004. Regulates Laws 10,048, of November 8, 2000, which gives priority to attendance to the persons it specifies, and 10,098, of December 19, 2000.

Available at https://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2004/Decreto/D5296.htm. Accessed on: 06/10/2018.

_____. Ministry of Education. Secretariat of Special Education. National Guidelines for Special Education in Basic Education. Brasília, DF, 2001.

_____ BRAZIL, Ministry of Education. Secretariat of Special Education. National Policy on Special Education in the Perspective of Inclusive Education. Brasília: MEC / SEESP, 2008.

CAPELLINI, V. L. M. F. Practices in special and inclusive education in the area of mental retardation. Bauru: MEC / FC / SEE, 2008.

LIEBERMAN, L. J .; HOUSTON-WILSON, C. Strategies for inclusion: a handbook for physical educators. 2.ed. Champaign: HumanKinetics, 2009.

MANZINI, E. J .; DELIBERATO, D. Technical aid portal: equipment and educational material for education - adapted resources II. Brasília: ABPEE / MEC / SEESP, 2007.

MANTOAN, M. T. E. All children are welcome at school. Journal of Educational Psychology, University of California, Berkeley, v.1, n.2, p.1-19, May / 2001. Available in: <http://www.revistas.uniube.br/index. php / rpd / article / view / 32/515>. Accessed on: 19 Jul. 2018.

SÁNCHEZ, J., Sáenz, M., Pascual-Leone, A., Merabet, L. Enhancing navigation skills through audio gaming. Proc. CHI EA '10, ACM, New York, NY, USA, pp. 3991-3996 (2010)

SASSAKI, Romeu Kazumi. Inclusion: building a society for all. 7. ed Rio de Janeiro: WVA, 2006.

How to cite this article:

André Luis dos Santos Menezes and Paulo José Menegasso.2018, Perceptions in The Field of Visual Deficiency In The Context of Experimental Lessons. *International Journal of Current Advanced Research,* 07(9), pp. 9(9), pp.15499-15504. DOI: http://dx.doi.org/10.24327/ijcar.2018.0909.2831

****