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RESEARCH ARTICLE

Sensorial book: playfulness as a learning strategy in inclusive education in the teaching of natural sciences

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ABSTRACT

Playful activities in science education are important tools in the context of social inclusion, especially to develop motor activity and cognitive development of students. Thus, this study aimed to verify if the sensorial book as a playful activity is a viable strategy in the inclusive education of natural sciences. This research aimed to conduct pre-elementary students to act in playful activities and was divided into three stages: I) assessment of prior knowledge, II) explanation of the theme and sensory book and III) post-intervention assessment. In step I, we observed that most students represented only pets on their mind maps. In step II, all students showed to be more participative in handling the sensory book. The visually impaired student had no difficulty in handling the book, showing that the adoption of instruments such as this kind of book promotes the inclusion in a classroom. In stage III, it was observed that the diversity of vertebrate animals drawn after the intervention increased, a consequence of greater knowledge about the group and better fixation of the topic addressed, presenting the sensorial book as a great didactic resource for students with disabilities or not. Thus, the sensorial book as a didactic tool provided the majority of the participation of the students and their inclusion in the classroom, highlighting the importance of inserting pedagogical resources in the school curriculum.

Keywords | Playful. Teaching and learning. Early childhood education and visual impairment.

RESUMO / RESUMEN

Livro sensorial: a ludicidade como estratégia de aprendizagem na educação inclusiva do ensino de ciências naturais

Resumo | As atividades lúdicas no ensino de ciências são ferramentas importantes que podem ser utilizadas no contexto da inclusão social, principalmente para desenvolver a atividade motora e o desenvolvimento cognitivo dos alunos. Desta forma, este estudo teve por objetivo verificar se o livro sensorial como uma atividade lúdica é uma estratégia viável na educação inclusiva de ciências naturais. Esta pesquisa foi conduzida com alunos do pré-fundamental e dividida em três etapas: I) avaliação do conhecimento prévio, II) explicação do tema e livro sensorial e III) avaliação pós-intervenção. Na etapa I, observou-se que a maioria dos alunos representaram apenas animais de estimação em seus mapas mentais. Na etapa II, todos os alunos mostraram-se mais participativos por manusear o livro sensorial, o aluno com deficiência visual não teve dificuldade em manusear este livro, evidenciando que a adoção de instrumentos como tal livro pode promover a inclusão em uma sala de aula. Na etapa III, observou-se que a diversidade de animais vertebrados desenhados após a intervenção aumentou, consequência de um maior conhecimento sobre o grupo e de uma melhor fixação do tema abordado, apresentando o livro sensorial como ótimo recurso didático tanto para alunos com deficiência ou não. Portanto, o livro sensorial como instrumento didático proporcionou a maioria participação e inclusão dos alunos em sala de aula, evidenciando a importância de inserir os recursos pedagógicos no currículo escolar.

Palavras-chave | Lúdico. Ensino e aprendizagem. Educação infantil e deficiência visual.

Libro sensorial: la ludicidad como estrategia de aprendizaje en la educación inclusiva de la enseñanza de las ciencias naturales

Resumen | Las actividades recreativas en la enseñanza de la ciencia son herramientas importantes que se pueden utilizar en el contexto de la inclusión social, principalmente para desarrollar la actividad motora y el desarrollo cognitivo de los estudiantes. Por lo tanto, este estudio tenía como objetivo verificar si el libro sensorial como actividad lúdica es una estrategia viable en la educación inclusiva de las ciencias naturales. Esta investigación se llevó a cabo con estudiantes pre-elementales y se dividió en tres etapas: I) evaluación de conocimientos previos, II) explicación del tema y libro sensorial y III) evaluación post-intervención. En el paso I, se observó que la mayoría de los estudiantes representaban sólo mascotas en sus mapas mentales. En la etapa II, todos los estudiantes fueron más participativos en el manejo del libro sensorial, el estudiante con discapacidad visual no tuvo ninguna dificultad en manejar este libro, lo que evidencia que la adopción de instrumentos como tal un libro puede promover la inclusión en un aula. En el paso III, se observó que la diversidad de animales vertebrados diseñados después de la intervención aumentó, consecuencia de un mayor

conocimiento sobre el grupo y una mejor fijación del tema abordado, presentando el libro sensorial como un excelente recurso didáctico para ambos estudiantes con discapacidad o no. Por lo tanto, el libro sensorial como herramienta de enseñanza proporcionó la participación mayoritaria y la inclusión de los estudiantes en el aula, lo que evidencia la importancia de insertar recursos pedagógicos en el plan de estudios de la escuela.

Palabras-clave | Juguetón. Enseñar y aprender. Educación en la primera infancia y discapacidad visual.

Introduction

The Inclusive education started to overlap the segregated model of Special Education (EE) and triggered several challenges in restructuring the educational system by aiming at transforming regular education institutions into a democratic and competent space to work with all students, without any distinction (CAMARGO, 2017). For this, it is necessary to understand that the changes in the current educational system depend on the social, economic and cultural aspect in which the school is inserted, as well as on the social conceptions and representations related to disability and the material resources and financing available (MENDES, 2006).

Among the challenges of school inclusion in Brazil, the training and performance of the teaching staff stands out as a crucial factor in the structuring and functioning of the educational system (SANT'ANA, 2005; ROSIN-PINOLA; DEL PRETTE, 2014). However, teacher training still goes hand in hand with the traditional model, which based on the lecture is not enough to meet the demands in favor of inclusive education (PLETSCH, 2009). For, according to Glat and Fernandes (2005), the resources and methods applied by the most effective teachers are those that provide the highest degree of social adaptability, driving the overcoming of difficulties and the integration of people with disabilities.

In student learning, strategies should be adopted that motivate and provide the inclusion of everyone in the classroom, together with continuous observation by the teacher for adjustments in the teaching methodology, always considering the educational needs of the students (ROSIN-PINOLA; DEL PRETTE, 2014). Because, according to the National Curriculum Parameters, it is essential that there are curricular adaptations to pedagogical practice to meet the particular learning needs of the students (BRASIL, 1998).

Playful activities emerge as an efficient methodological proposal in the context of social inclusion in the educational system of science education, being considered as a quality tool for teaching and learning even for special students when relating motor activity and the development of cognitive structure (AGUIAR, 2006). These activities reinforce the importance of using didactic resources in science teaching as a facilitator in understanding the contents (COSTA; BATISTA, 2017), since learning through games and play results in pleasure, fun, motivation and enables the involvement of students actively as a whole (ANTUNES, 2003).

Science teaching is fundamental in early childhood education to begin the formation of scientific thinking, which will assist the student in making decisions and in understanding the existing relationships between science, technology, society and the environment of his daily life (NASCIMENTO, 2012). Thus, it is essential the teacher seeks strategies to awaken in the student the interest in the subjects taught, especially the natural sciences, in which the active participation in the activities develops the students' learning (GOMES et al., 2016). Moreover, it becomes evident the need and importance of adding recreational activities and the basic knowledge of the natural sciences in the inclusive education of children.

Based on the perspectives mentioned above, our central question was: is the use of the sensory book a viable strategy in inclusive

education to improve the learning of students in science discipline in a children's teaching class? Our expectation is that students will be more participatory in class with the sensory book, since, the playthings relate to both motor activity and cognitive development, making students active in the teaching-learning process (AGUIAR, 2006). In addition, science education collaborates with the logical and rational development of the child by facilitating the understanding of the facts that permeate their daily life (CRAVO, 2015), contributing to the critical and creative thinking of the students in relation to science. In this sense, this study aims to assess whether the sensory book contributes to social inclusion and learning in the teaching of natural sciences in a children's education class in the municipality of Guarantã do Norte, state of Mato Grosso.

Material and methods

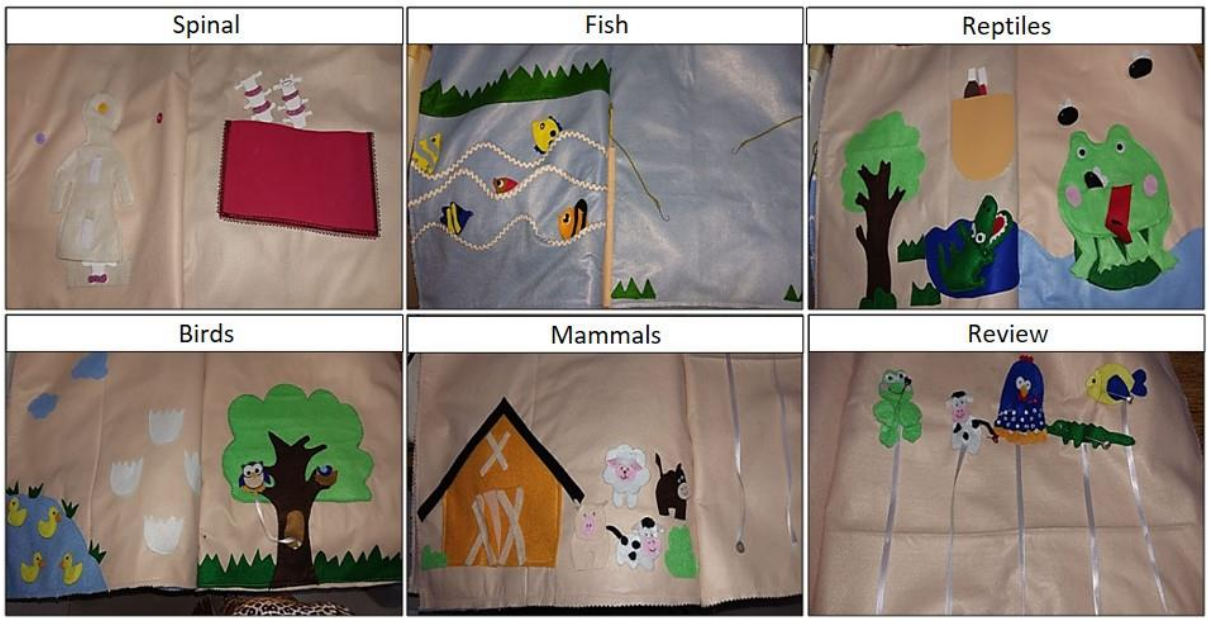
Object of study and modality of the research used

This study was carried out at Inovação School located in the municipality of Guarantã do Norte, state of Mato Grosso. With the focus on childhood education through high school, with a proposed pedagogical work. In this proposal it is not the simple transmission of knowledge that is sought, but the involvement of the teacher with the students in the teaching-learning process. This research is called as exploratory and qualitative case study (GIL, 2002), where it was sought to verify whether the use of a sensorial book, as a playful activity, is a viable strategy in the inclusive education of natural sciences, as well as, their potential. The method of direct observations was applied, which it is possible to "capture information through the five senses, judge it without interference and record it faithfully" (BARBOSA, 1998).

Data Collection and Delineation

The research was carried out with 12 students from the Pre-Elementary class, with an average age of 4 years, and one of the students was visually impaired. The sensorial book was adapted from the one proposed by Brandão (2016), with a context focused on the areas of the natural sciences, especially on vertebrate animals, from what characterizes a vertebral animal, going through fish, reptiles, birds and mammals, as seen in Figure 1.

Figure 1. Structure of the sensory book addressing the theme of vertebrate animals.



Source: authors.

The work was divided into three stages, as described below and summarized in Table 1:

I- Pre-intervention: where we tried to assess students' prior knowledge on the topic "vertebrate animals", where questions such as "Do you know what a vertebrate animal is?", "Do you know what a reptile is?" and "Do you know what an amphibian is?" using the mind map.

Mind maps allow the inclusion of subjective elements, which are not usually present in traditional maps, allowing the illustrator to express his affection. "This characteristic makes this representation of the hand richer, as it includes contexts that can broaden the understanding of space" (RICHTER, 2011).

II- Intervention: where there was an explanation of the content addressed to promote better understanding of students on the subject and the application of sensory book as a playful activity for students as a complement to the theoretical approach.

III- The post-intervention: students being asked to express what they understood about vertebrate animals also in the form of mental maps.

Table 1. Activities and their respective methods developed at each stage of this study.

Step	Activity	Method
I	Assessment of prior knowledge of the students	Mind maps
II	Explanation of the theme "vertebrate animals" and use of the sensory book	Expository class and sensory book
III	Knowledge assessment after the intervention	Mind maps

Source: authors.

Ethical aspects

The school principal, who signed all documents in agreement with it, authorized this research. Subsequently, the Free and Informed Consent Term (ICF) and the Term of Assent (TA) were passed on to the students' legal guardians and to the class teacher, where it was signed by everyone and thus guaranteeing the preserved identity of the interviewees (TEIXEIRA, 2011).

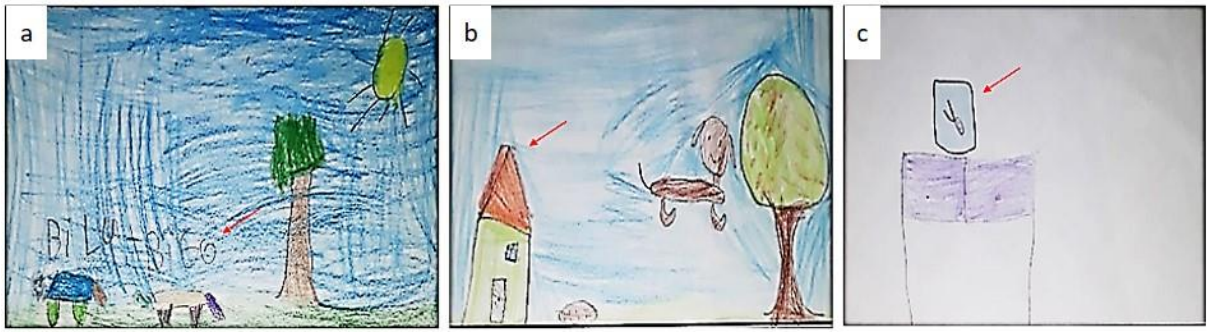
Results and discussion

Previous intervention

With mind maps, before the intervention with the sensory book, it was observed that nine students represented only pets in the framework of exemplification of vertebrate animals. Although this factor demonstrates the students' affinity with the theme, there is a limited perception of the variety of vertebrate animals present in the biosphere. Silva et al. (2017), in his study in the application of the game Wild Animal, also noticed a certain limitation of students in the knowledge of vertebrate animals, in addition to diagnosing errors regarding the classification in vertebrates and invertebrates, which differed from this study where students did not make mistakes in this classification of the animals.

Another interesting fact was that the students included the name given to the animal in their drawing (Figure 2A) or included figures that return to the idea of home as a house (Figure 2B) or an aquarium (Figure 2C). According to Batista et al. (2016), in the situation of a mind map, the mapper registers the elements of the space that have the greatest significance for him. The mapper identifies himself and elements that he most uses in his daily life and that most call his attention because they are exotic, for its historical value or for simply having an affective relationship.

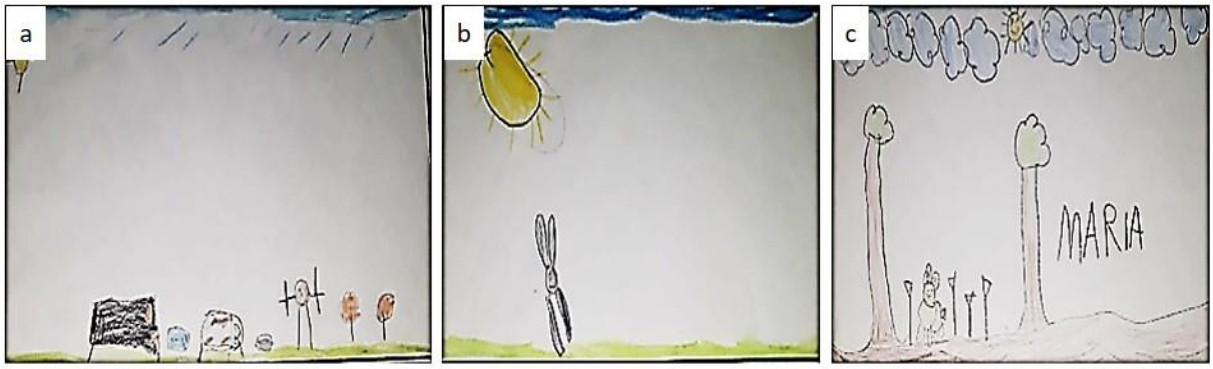
Figure 2. Mind maps of the perceptions of students: a, b and c - Characterization of vertebrate animals before intervention with the sensory book.



Source: authors.

In relation to the other elements inserted in the mind maps, in addition to the representation of vertebrate animals, it was observed that nine students included the animals in a scenario with elements of the environment such as sun, clouds, trees, and soil (Figure 3). According to Santos and Fofonka (2015), this perception is the result of everyday experiences and daily living that add deeper meanings to the place where you live, which explains this association.

Figure 3: Mind maps of students' perceptions: a, b and c - Inclusion of natural elements.



Source: authors.

Intervention

After the step I, we ministered a class about the "vertebrate animals" theme, where the students could learn more and be next with some concepts about the diversity of those organisms.

The students, organized into pairs got the knowledge of the content of the sensory book together with the tutor. At that moment, the great interest was observed by the students when they handling the sensory book for dynamism, such as brushing the teeth of the crocodile (reptile - Figure 4). Also, when the students placed the birds in the eggshells (birds) and keep the cow, sheep, and pig in the barn (mammal) and the sensation and contour when touching structures such as the mouth, tail, and eyes of the animals.

Figure 4. Students brushing the alligator's teeth, fulfilling one of the activities of the sensory book.

Source: authors.

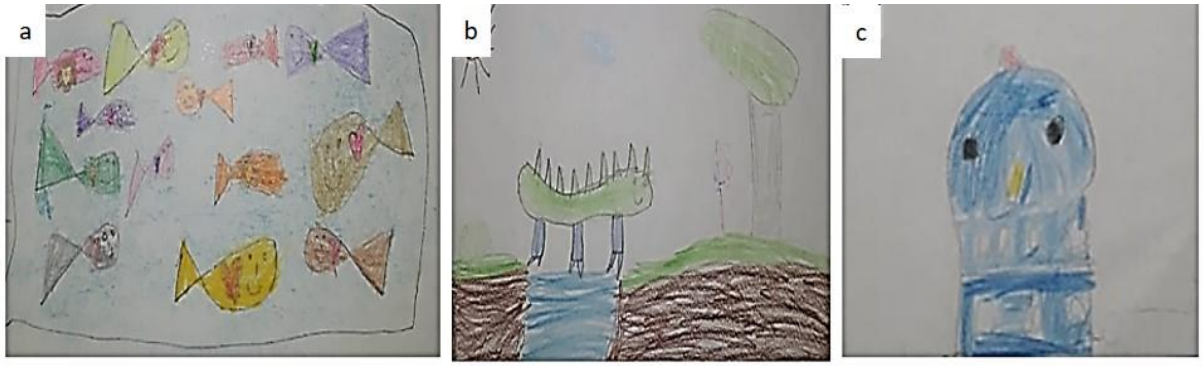
Playful activities, which involve games and play, result in pleasure, fun, motivation for students (SANTOS, 2014), which justifies the students' enthusiasm for the sensory book. According to Alves (2009), playfulness is of great importance in making learning more pleasurable for students and for promoting greater ease in the exercise of work as an educator by enabling greater involvement in a more active and dynamic way.

The visually impaired student, like the others, expressed a lot of interest and had no difficulty in handling the sensory book, showing that the adoption of instruments such as the sensory book can promote inclusion in a classroom. Castro and Berajano (2012) confirmed the importance of sensory books in inclusion, when these authors state that books were created in an attempt to have a more inclusive character, as they can be appreciated in many ways, so people who have or not sensory deficiencies can use them. We understood the concepts presented by the visually impaired student, which may indicate that inclusive education will not be achieved if different instruments are not used in the classroom. Sanches (2005), corroborates stating that students with disabilities need adequate educational programs and in conjunction with other students of the same age group in the perspective of more efficient inclusion.

Post-intervention

After the intervention with the sensory book, we proposed to the students to draw a vertebrate animal again. In this stage, six students chose the fish to represent as an animal of this classification, three chose to draw alligators and two, the birds (Figure 5).

Figure 5. Mind maps of students' perceptions: a, b and c - Representations of vertebrate animals after intervention with the sensory book.



Source: authors.

We observed that the diversity of vertebrate animals drawn after the intervention increased a consequence of greater knowledge about the group and a better fixation of the topic addressed, presenting the sensory book as a great didactic resource for students with or without disabilities. Playfulness is of great importance in making learning more pleasurable, less mechanical and repetitive for students and for promoting greater ease in exercising and fixing content, being essential for meaningful learning (ALVES, 2009).

Such fact indicates that the book was an important instrument in fixing the subject presented to students and highlights the importance of playful activities in the teaching process. This situation also corroborates with the assumption of theory of meaningful learning, defended by Moreira (2014), who says:

> [...] the knowledge network is built through the association of new information, which is being seen for the first time, with knowledge already learned and experienced, that is, the new information must be included in a wealth of previous knowledge. [...] By adding, in this process, the experimentation to the stimulus and interaction with the learner, there is a greater chance of obtaining a truly meaningful learning (GOMES et al., 2008, p. 107).

Another positive aspect observed in the maps, after the intervention, was that the vertebrate animals represented were in their correct habitat, such as fish in rivers or lakes (Figure 5A), the crocodile between the aquatic and terrestrial environment (Figure 5B) and the birds in mid-air or flying (Figure 5C). The perception of the environment is directly related to the approach of animals as a fundamental constituent in the maintenance of life in the biosphere, as there is a fundamental relationship between these themes and the association between these issues is of great importance (GONÇALVES et al., 2017).

Conclusion

The experience of teaching with the sensory book, in the subject of vertebrate animals, proved to be a viable strategy in inclusive education in the context of natural sciences for students of the School of Innovation in the municipality of Guarantã do Norte, State of Mato Grosso.

The sensory book aroused in all the students the perception of nature, which made it possible to know new vertebrate animals that are not so common in their daily lives. Thus, the sensory book highlights the importance of the use of didactic tools that contribute to the inclusive process in the school.

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