

## TRAINING AND INCLUSION: THE IMPORTANCE OF PREPARATION TO USE THE LEGO BRAILLE BRICKS KIT IN AN INCLUSIVE CLASSROOM

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### Abstract

There are approximately 18.6 million people with disabilities in Brazil, representing 8.9% of the population (IBGE, 2023), with 1.5 million students enrolled in Basic Education (INEP, 2023). The Dorina Nowill Foundation for the Blind (DNFB), a leading organization in the rehabilitation of people with visual disabilities (VD), conceived the Lego Braille Bricks (LBB) kit, a pedagogical resource including Lego pieces representing the Braille alphabet and its respective letters. This resource is suitable for both people with VD and sighted individuals, facilitating the development of inclusive activities. The LBB kit is produced and distributed globally by the Lego Foundation in Denmark to schools serving students with VD. DNFB has already distributed to 91 municipalities in Brazil, significantly contributing to the literacy process of children with VD. Considering its nationwide impact, this article aims to describe the foundations underpinning the Educators' Training Program for the use of LEGO Braille Brick (ETPLBB) for education professionals to utilize the LBB resource in school practices. The ETPLBB is an online program offered via the Virtual Learning Environment of the Center for Promotion of Digital, School, and Social Inclusion. Since its inauguration in 2018, the program has trained over 4,000 education professionals in 12 Brazilian states. The ETPLBB consists of three modules that include the development and application of an inclusive strategic intervention plan in an inclusive environment for children with and without VD. The ETPLBB utilizes the Constructionist, Contextualized, and Meaningful (CCM) pedagogical approach (Schlünzen, 2000; 2015), drawing on educational theories of Dewey, Ausubel, Papert, Vygotsky, and Freire. The CCM approach emphasizes: the importance of solving real-world problems (Dewey, 1938); knowledge construction through the use of technology (Papert, 1985); the significance of connecting new information with existing knowledge (Ausubel, 1963); the role of social and cultural contexts in learning (Vygotsky, 1998; 1993); student autonomy (Freire, 1997). Through this approach, the ETPLBB aims to create a dynamic and constructive educational environment, where education professionals can develop and reflect on their teaching methods, and students can actively participate in their learning process (Schlünzen, 2000; 2015). This holistic approach to education is integral to the development of literacy skills in children with or without VD, promoting a specialized and inclusive learning environment.

**Keywords:** *Lego braille bricks, constructionist contextualized and meaningful approach, inclusive education, training program.*

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### 1. Introduction

Since the beginning of the 21st century, Brazil has been committed to improving its legislation to promote inclusive education. This initiative aims to ensure that all children, with or without disabilities, are enrolled in mainstream classes. In this context, laws and regulations have been developed that are essential to support such initiatives.

Law No. 9,394/96 (Brazil, 1996) is one of the examples, as it establishes the guidelines and bases of national education, emphasizing the importance of ensuring access and retention of all students in school. It aims to promote inclusion and address the specific needs of each student. To contribute to this process, the National Policy on Special Education in the Perspective of Inclusive Education (Brazil, 2008) guides actions aimed at inclusive education in the school context. This policy encourages pedagogical practices that respect diversity, value human differences, and ensure the learning of all students, thus reinforcing Brazil's commitment to truly inclusive education. Furthermore, Law No.

13,146/15 (Brazil, 2015) strengthens the guarantee of the right to inclusive education, prohibiting discrimination. It also emphasizes the importance of developing accessibility, the use of assistive technology, and reasonable adaptations to enable the full participation of students with disabilities in the school environment. These measures reflect Brazil's commitment to ensuring equal opportunities in education, promoting the inclusion and joint learning of children, regardless of their individual characteristics. In light of the above, the country has been striving to improve pedagogical practices and materials that can facilitate school inclusion. In this scenario, the Dorina Nowill Foundation for the Blind (DNFB), a leading and pioneering entity in the rehabilitation of people with visual disabilities (VD), expresses its concern about the lack of use of the Braille System in the teaching and learning processes of children with VD, as this situation hampers the literacy process of these children.

The literacy process of these children involves successive techniques, comprising interdependent stages throughout the development of the process. These stages encompass the enhancement of specific cognitive, motor, and sensory skills, requiring a deep understanding and approach from the educator. Such a need arises from the fact that the Braille System transcends mere achievement of written and reading language, representing, therefore, more than a literacy process. In response to this concern, in 2016, the DNFB conceived the Lego Braille Bricks (LBB) kit, which consists of original LEGO pieces whose blocks correspond to letters, numbers, and mathematical symbols of the Braille system, as illustrated in Figure 1. Additionally, each piece features a printed representation of its corresponding Braille character on the bottom part, enabling all children to play and learn together, regardless of whether they have visual disabilities or not, and facilitating the development of inclusive school activities.

Figure 1. Example of pieces from the LBB.



Source: Personal collection of the third author (2024)

The kits, each comprising approximately 340 pieces, are manufactured by the Lego Foundation in Denmark (as of 2018) and distributed free of charge to 22 countries, including Brazil. In this country, the DNFB assumes the responsibility of receiving these kits and forwarding them to municipal public schools where children with VD are enrolled. Concurrently with the distribution of the LBB kit, the DNFB, in partnership with the Center for Promotion of Digital, School, and Social Inclusion (CPIDES) at São Paulo State University (UNESP), develops the Educators' Training Program for the use of LEGO Braille Brick (ETPLBB) for education professionals (school managers and education secretaries, mentors and pedagogical coordinators, teachers in regular classrooms and teachers of specialized educational services, and professionals from institutions supporting people with VD).

By the end of 2023, the DNFB distributed 8,131 LBB kits to 91 Brazilian municipalities, covering 12 Brazilian states (including 2,596 public schools and 18 institutions supporting people with VD). During this period, 5,500 education professionals were trained by the ETPLBB. Consequently, 3,328 students with VD and 64,480 students without VD gained access to the kits and the pedagogical practices implemented by participating professionals during and after the ETPLBB.

Considering its nationwide impact, this article subsequently describes the foundations underlying the training process for education professionals to use the LBB resource in school practices and the main contributions that emerge from this process.

## **2. Results and discussions: Contributions of the training program**

The main objective of the ETPLBB is to train education professionals for the development of an inclusive literacy process, teaching the Braille System in a playful, creative, and inclusive manner, significantly contributing to the pre-literacy and literacy process of children with VD, using the LBB Kit, which is a toy designed to educate, entertain, and provide literacy instruction for children. To achieve this goal, the ETPLBB consists of two distinct phases. In the first phase, the DNFB selects Brazilian municipalities with the highest number of students with VD included in mainstream classes. Additionally, it contacts the educational managers of these municipalities, presents the program, and establishes a cooperation agreement. In turn, the municipality undertakes to identify public schools with enrolled students with VD, compile a list of educators interested in the training, and distribute the kits to the designated schools.

The second phase of the ETPLBB is coordinated by the CPIDES team and involves the training of educators from the municipalities previously selected in the preceding phase. This training is conducted via the Virtual Learning Environment (VLE) of the Moodle Platform. The participating educators are divided into groups of approximately 50 members, with each group supported by a pedagogical mediator responsible for assisting participants in their technical and pedagogical activities.

The training program consists of three modules: the first one aims to promote critical reflection among participants on inclusive education and VD, providing an in-depth understanding of the Constructionist, Contextualized, and Meaningful (CCM) approach and examining pedagogical practices for early stimulation; the second module intends to introduce the fundamentals of the Braille System, presenting its relevance in the literacy process of children with VD, and exploring strategies for adapting educational materials; the third module aims to address pertinent aspects of literacy for children with VD, explore audio description, discuss the importance of playing games in the educational context, and develop an Inclusive Strategic Intervention Plan. Each module comprises synchronous meetings for in-depth discussions and guidance on the topics covered with experts in the field, as well as individual and group activities to be carried out in the VLE.

The ETPLBB employs the CCM pedagogical approach (Schlünzen, 2000; 2015), drawing on the educational theories of Dewey, Ausubel, Papert, Vygotsky, and Freire. The CCM approach emphasizes the importance of solving real-world problems (Dewey, 1938) and constructing knowledge through the use of technology (Papert, 1985). Initially, a dialogue is conducted to assess participants' prior knowledge of inclusive education. Following this, the training activities offer detailed insights into VD, the Braille system, and other relevant disability-related topics. Simultaneously, participants are encouraged to reflect on their own circumstances, strategize for the integration of LBB within their educational contexts, and document all procedures within the VLE. This enables both the tutor and peers to engage in collaborative problem-solving (Vygotsky, 1998; 1993), fostering learner autonomy within their professional domains and, consequently, for their respective students (Freire, 1997). In this way, the tutor can assist each participant in appropriating the new concepts addressed in the training and applying them in their pedagogical practice based on their prior knowledge, which is defined by Ausubel as the foundation of meaningful learning (Ausubel, 1963).

The data selected to assess the effectiveness of the CCM approach in this training were collected from the final activity, in which participants conduct a self-assessment of their involvement and evaluate the training program. Since this excerpt is part of a doctoral research and a research productivity survey PQ, only data from the most recent edition, held in the second semester of 2023, will be analyzed. This edition received 1,113 responses, representing 90% of the total number of participants who completed the program.

The research is characterized as applied and of qualitative-quantitative nature, as data analysis was conducted by compiling the responses obtained from the evaluation form. The average percentages of "very satisfied" and "satisfied" participants were calculated for each assessed item. Table 1 summarizes the responses obtained.

*Table 1. Responses obtained in the training program evaluation form carried out in the second semester of 2023.*

Participant's opinion on:	Very satisfied		Satisfied		Indifferent		Dissatisfied		Very dissatisfied	
	freq.	%	freq.	%	freq.	%	freq.	%	freq.	%
Virtual learning environment	551	49.5	501	45.0	21	1.9	32	2.9	8	0.7
Available materials	721	64.8	368	33.1	11	1.0	9	0.8	4	0.4
LBB and its use in inclusive education	845	75.9	247	22.2	9	0.8	6	0.5	6	0.5
Web conferences	668	60.0	419	37.6	7	0.6	13	1.2	6	0.5
Support received from their tutor	818	73.5	256	23.0	24	2.2	9	0.8	6	0.5
Average	720.6	64.7	358.2	32.2	14.4	1.3	13.8	1.2	6	0.5

Source: Elaboration based on the responses obtained in the training program evaluation form carried out in the second semester of 2023.

The averages of the percentages corresponding to the "very satisfied" and "satisfied" options sum up to an average of 97%, indicating a high level of satisfaction among the participants regarding the analyzed aspects.

The participants reported a 99.4% rate of positive responses regarding the program's contributions to their professional growth within school environments aimed at fostering inclusion. The justifications for this response include: Enrichment of the Learning Process and Pedagogical Practice; Inclusion and Sensitization to Diversity and Special Needs; Professional Development and Preparation for Various Situations.

The findings demonstrate that, participants perceive the ETPLBB, underpinned by the CCM approach, contributes to creating a dynamic and constructive educational environment where participants can develop and reflect on their teaching methods, and their students can autonomously and actively engage in their learning process (Schlünzen, 2000; 2015).

This comprehensive approach to education is integral for the development of literacy skills in children with VD, promoting an inclusive and supportive learning environment that meets the needs of all students.

### 3. Final considerations

The professional development of educators, focused on enhancing the learning process and pedagogical practice, is a fundamental pillar for the enhancement of inclusive and effective education. The feedback from participants of the PFELBB reveals a significant impact in three main areas. Firstly, many participants highlighted the enrichment of their learning process through the acquisition of new knowledge and strategies. This aspect was crucial for revitalizing their pedagogical practices, making them more playful, creative, and inclusive. The incorporation of these new approaches not only renewed the dynamics in the classroom but also substantially improved the quality of teaching, highlighting the value of continuous education for educators.

Secondly, the training program proved to be crucial in promoting inclusion, with special attention to students with blindness and low vision. Participants reported significant development in their perceptions and approaches to inclusion. The learning acquired enabled them to overcome previous challenges and underscored the importance of careful attention to vision. This transformation in educators' beliefs and attitudes towards inclusion reflects the need for sensitive and adapted teaching to the diversity present in contemporary classrooms.

Lastly, the training program provided a significant advancement in the professional development of the participants. They expressed a sense of greater preparation and confidence to tackle various educational situations, including supporting students with VD. Furthermore, the willingness to continue learning and to share acquired knowledge with their peers demonstrates a commitment to continuous improvement in pedagogical practice. The training program, therefore, emerged as a valuable complement to educators' curricula, reinforcing their role in building a more inclusive and student-centered educational environment.

In conclusion, this training program has revealed its profound impact not only on the professional development of educators but also on the improvement of their pedagogical practices and the promotion of a more inclusive educational environment sensitive to diversity and special needs. These results underline the importance of continuous training programs that address emerging needs in dynamic and diverse educational settings.

The next phases of the research involve a broader quantitative and qualitative analysis that encompasses all the issues addressed in the forms completed by participants across the five editions of the PFELBB. The aim is to improve aspects identified as less positive, such as participants' opinions about the VLE, which, in the sample used for this article, received a response rate of 3.6%.

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