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Practice as a curriculum component and inclusive education

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ABSTRACT

This text discusses aspects of initial teacher education through work developed in a Practice as a Curriculum Component (PCC) subject from an inclusive perspective. Students of a teaching degree course in mathematics were divided into groups and studied, discussed, elaborated, and, based on the pedagogical imagination process, developed geometry classes for the diversity of students they imagined. This research is qualitative, so the data was made up of group reports, questionnaires, and the researcher's field diary, which were analyzed through content analysis. The study provided opportunities for reflective, critical, and autonomous practices to enable the graduates to build their own knowledge by exploring possible situations they will experience in the profession. Thus, it became evident that when offered, the PCC influenced the formative process of prospective mathematics teachers, stimulating criticality and reflection toward inclusive education.

PALAVRAS-CHAVE: Pedagogical Imagination; Diversity; Deficiency; Initial Teacher Training.

Prática como componente curricular e educação inclusiva

RESUMO

Neste texto, discute-se aspectos relacionados à formação inicial docente por meio de um trabalho desenvolvido em uma disciplina de Prática como Componente Curricular (PCC) na perspectiva inclusiva. Os alunos de um curso de licenciatura em Matemática, divididos em grupos, estudaram, discutiram, elaboraram e, a partir do processo de Imaginação Pedagógica, desenvolveram aulas de Geometria para a diversidade de alunos que imaginaram. Trata-se de uma pesquisa qualitativa, de modo que os dados foram constituídos pelos relatórios dos grupos, questionários e pelo diário de campo da pesquisadora, e analisados por meio da análise do conteúdo. O estudo oportunizou práticas reflexivas, críticas e autônomas, de forma a proporcionar ao licenciando a construção do próprio conhecimento, a partir da exploração de possíveis situações que serão vivenciadas ao exercer a profissão. Assim, tornou-se evidente que a disciplina de PCC, ao ser ofertada, influenciou o processo formativo dos futuros professores de Matemática, estimulando a criticidade e a reflexão em relação à Educação Inclusiva.

KEYWORDS: Imaginação Pedagógica; Diversidade; Deficiência; Formação Inicial Docente.

INTRODUCTION

Mathematics education constitutes a research and action domain dedicated to investigating mathematics teaching and learning involving a critical analysis of various elements, including public policies in the educational field (Bicudo, 1999). In this context, the process that outlines mathematics teaching and learning encompasses practices, concepts, approaches, and trends that give meaning to the world through education (Bicudo; Garnica, 2002). These considerations encompass concerns about teacher education and the approach to inclusion.

This text discusses aspects related to initial teacher education through work developed in a subject called Practice as a Curriculum Component (PCC) from an inclusive perspective. To direct this investigation, we consider the following questions: What understandings can be produced with students of a mathematics teaching degree course when developing work in PCC on geometry teaching for diverse students? In what follows, we present the theoretical-methodological frameworks that guided our study, highlighting the actions developed, after which we present our analysis.

TEACHER EDUCATION AND PRACTICE AS A CURRICULUM COMPONENT

Dialogues on teacher education focused on improving basic education and initial teacher education gained prominence after the enactment of the Law of Guidelines and Bases for National Education (Lei de Diretrizes e Bases da Educação Nacional - LDB) (Brasil, 1996). According to Nóvoa (1992), this education process goes beyond accumulating knowledge or techniques; it promotes critical thinking about practices and constant (re)construction of professional identity. Tardif (2014) agrees, highlighting that the knowledge acquired in initial education is essential to teaching knowledge, encompassing personal knowledge from basic education and professional education, together with knowledge from literature, programs, and practical experiences.

The National Education Council (CNE) Opinion CNE/CP 28/2001 states that the process by which practice originates in teacher education cannot be considered a copy and reflection of theory to seek a balance in the theory-practice relationship in the subjects, but rather to develop it to produce knowledge in the scope of teaching that helps form the educator's professional identity (Brasil, 2001b). The document uses the expression "teaching practice," which began to set apart from the term PCC in Opinion CNE/CES 15/2005 (Brasil, 2005), which clarified that the PCC consists of formative activities that "[...] provide experiences of applying knowledge or developing procedures specific to the exercise of teaching. [...] can be developed as a core or as part of subjects or other formative activities" (Brasil, 2005, p. 3).

The resolutions, opinions, and guidelines indicate that reformulations were necessary, including the PCC's mandatory nature, ruled by the CNE. However, this obligation did not occur in a way that explained what the developers of the National Curriculum Guidelines (Diretrizes Curriculares Nacionais - DCN) proposed, resulting in different interpretative paths. This reflection aligns with Santos and Alves (2019), who found that legislation alone was not enough for planning and

changing the school curriculum, as it did not direct how the PCC could be inserted into the curricular matrix, generating doubts in the elaboration of pedagogical projects. In fact, in the teaching degree course at the university where the work took place, the PCC is developed jointly with the other activities in the curriculum.

Santos and Alves (2019, p. 111) highlight that the inclusion of the subject *Practice as a Curriculum Component* in teaching degree courses stimulates "discussions in the search for alternatives in the construction of teaching knowledge that portrays the teacher as someone critical, reflective, creative, questioning, and investigative of their pedagogical practice." This statement motivates the present research since, although the success of inclusion in schools depends largely on teachers, this topic has been neglected in initial education courses. Therefore, we consider that the PCC emerges as an opportunity to address issues related to inclusive education.

INCLUSIVE EDUCATION AND PEDAGOGICAL IMAGINATION

The movements in favor of social rights, represented by events such as the World Conference on Education for All (1990), the World Conference on Special Educational Needs: Access and Quality (1994) and the Report to UNESCO of the International Commission on Education for the 21st Century (1996), guided the discussions on the inclusion process, aiming to "share the process of humanization, in an experience of collective construction that places everyone in the condition of subjects" (Araújo et al., 2010, p. 406). These initiatives reflect Paulo Freire's conception of education, which sees the individual as the architect of their own history, endowed with the ability to question and understand his relationships with the world (Freire, 2009). In this way, recognizing the uniqueness of each being, including the understanding of the self, improves connections and learning in all processes, promoting a humanized approach to education.

Through the reflections proposed in these meetings and in documents related to educational practices, the social inequality of various groups in the educational process is noticeable. Thus, the need for transformation becomes evident to enhance learning equity where the school environment has the potential to mitigate discriminatory actions, welcoming all students with any physical, intellectual, social, emotional, or linguistic conditions, that is, with any and all singularities. Thus, we can see the inclusion of people with disabilities, gifted people, people who live on the streets, people who work, people from distant populations, people from linguistic, ethnic, or cultural minorities, and people from disadvantaged or marginalized areas. This analysis allows the emergence of an understanding of what inclusion for diversity encompasses.

Regarding education for people with special educational needs, in 1994, a United Nations resolution dealing with principles, policy, and practice in special education, the Salamanca Declaration, was published. This document proclaims that "children and young people with special educational needs must have access to regular schools, which must be adapted to them through a child-centred pedagogy capable of meeting these needs" (Unesco, 1994, p. 2). This declaration promotes education for all, with a perspective that moves towards inclusive education. It seeks to respect the differences and uniqueness of individuals,

encourages pedagogical adaptation according to each student's abilities to provide opportunities without discrimination, and aims to build an encompassing society.

The National Guidelines for Special Education (Diretrizes Nacionais para Educação Especial - DNEE) in basic education, published in 2001, proposed adapting the system to serve the entire plurality of students (Brasil, 2001b). In line with the ideas proposed in the DNEE, the General National Curriculum Guidelines for Basic Education highlight the relevance of teacher education that addresses the needs of students with disabilities and the implementation of inclusive educational practices in schools (Brasil, 2013).

The DCN for initial and continuing teacher education also references the importance of qualifying professionals who enhance awareness of diversity, gender differences, generational groups, social classes, religions, ethnic-racial differences, and educational needs (Brasil, 2019).

From this perspective, Cintra and Penteado (2018) explain that including students with disabilities in schools implies demands, one of which is the teacher as one of the important elements for this inclusion process to be of quality, and they highlight that initial education plays a crucial role in the construction of knowledge that can facilitate the teaching and learning process for diversity, in addition to promoting a critical stance towards inclusive education.

Thus, in the initial teacher education environment, we seek to investigate how PCC can enhance reflective transformations in prospective teachers who are in the process of professional education, to assist the skills in associating theory with practice, considering and respecting diversity.

Several approaches to structuring initial formative work are aligned with the PCC. In this study, we decided to adopt the pedagogical imagination (PI) approach, proposed by Ole Skovsmose, which emerged in doctoral works in South Africa, post-Apartheid regime, given the need to research something not yet present. Thus, he proposed investigating possibilities and imagining what could happen, exploring dialogues and actions related to these possibilities in the context of critical mathematics education (Skovsmose; Borba, 2004; Skovsmose, 2007, 2011, 2015; Lima, 2021, 2022).

PI requires fuel and resources. It is based on concepts such as social justice, equity, and democracy, which provide fertile ground for pedagogical imagination. These contested concepts allow the imagination to be explored in different ways. Pedagogical imagination is a process that seeks to develop and relate different current, experimental, arranged, or imaginary situations, going beyond a descriptive paradigm (Skovsmose, 2011).

Based on Ole Skovsmose's critical reflection, Milani (2017) conducted research aimed at proposing actions to enhance mathematics prospective teachers' understanding during their professional performance in a supervised practicum, in addition to theorizing about the role of dialogue. Kleemann and Petry (2020) presented a methodological proposal for interdisciplinary teaching between mathematics and physics using virtual learning objects, which triggered an exercise of pedagogical imagination to identify possibilities related to content and concepts for solving problems in high school. Lima (2022) discusses the process of pedagogical imagination, in which prospective mathematics teachers imagine

classes in the subject from an inclusive perspective. The practice of pedagogically imagining allowed undergraduates to reflect on different ways to make mathematics classes more inclusive and plural.

From an inclusive perspective, Skovsmose (2019) highlights that investigating PI in inclusive scenarios facilitates understanding and the development of proposals that meet students' diversity and singularities. Nevertheless, it represents a critical process that explores alternative possibilities, especially related to mathematics education and inclusion. This method encourages reflection, imagination, and the search for innovative solutions, promoting a richer and more meaningful approach to mathematics teaching and learning.

METHODOLOGICAL ASPECTS AND THE RESEARCH ENVIRONMENT

The qualitative research approach is a field study that investigates the formative process of prospective mathematics teachers. The qualitative nature of the research implies the natural environment as a direct data source, using the researcher as the main instrument and focusing more on the process than the product, according to Lüdke and André (1986).

This research was conducted in a PCC subject of a mathematics teaching degree course, with 60 class hours distributed over 15 weeks and the participation of 11 students. The proposal for the subject was supported mainly by the works by Skovsmose (2004) and Lima (2022) and involved reading texts on geometry and discussions from an inclusive perspective, the process of pedagogical imagination, and the preparation of a final report, describing the entire process of pedagogical imagination and a didactic sequence for teaching geometry.

The planning of the subject was divided into two moments. In the first, students participated in readings, summaries, presentations, and dynamics that promoted discussions about geometry teaching. Topics such as the importance of continuing education, concrete materials, respect for diversity, and the concept of universal design were addressed. The texts studied were by Marcone (2018), Sales, Penteado, and Moura (2015), Domingues, Filho, and Sturion (2020), Fernandes and Healy (2010), and Skovsmose (2019).

Marcone (2018) uses the term "deficiencyism" to describe the concept that relates the construction of disability to standards of normality. The study reinforces the idea that disability is a construction based on normative standards, highlighting it as an invention compared to an ideal of normality. Its approach examines disability as an experience, something people are subject to experiencing, rather than considering it a predefined condition.

Sales, Penteado, and Moura (2015) discussed the inclusion of people with disabilities in school environments, focusing on a process of negotiating signs in LIBRAS during mathematics classes for deaf elementary school students. The observation highlighted the importance of interaction between all students in the implementation of exploratory activities, especially in defining signs for geometric figures not present in dictionaries. The authors realized that ensuring equitable learning for students with disabilities in regular schools requires additional actions, such as using alternative methodologies.

Fernandes and Healy (2010), in turn, developed teaching materials with tactile exploration so that visually impaired students could understand concepts of area, perimeter, and volume of various geometric figures. Thus, they observed the implementation process of the proposal, including the students' interaction with the material, the other students in the class, and the teacher.

Domingues, Filho, and Sturion (2020) proposed a methodology for studying the relationship of triangles, based on the condition of existence and the sum of the measurements of their internal angles, for the 7th grade of middle school. They showed that practical activities using manipulative materials as a learning tool encouraged students to understand mathematical concepts and motivated their participation in classes, promoting knowledge.

Finally, Skovsmose (2019) explores the notion of inclusion, highlighting that, although it appears to be a well-defined idea, it is a contested concept with controversies of a political and cultural nature. He highlights the need to question in what context inclusion occurs and who is included, as it may involve debatable patterns and structures. By questioning the notion of normality, the author proposes a reinterpretation of inclusive education as a process that seeks to establish encounters between differences. It highlights how important it is that inclusive mathematics education creates inclusive research scenarios, recognizing that this construction is a debatable activity.

The second moment was dedicated to pedagogical imagination, where students, supported by the works of Skovsmose (2015) and Lima (2022), were invited to imagine geometry classes from an inclusive perspective. They imagined the school environment, the physical space, the available resources, the relationships between teachers and students, and accessibility, among other aspects. This process was shared through presentations and collective discussions in the last four classes of the subject, resulting in the final reports presented below.

Report 1, prepared by three students, describes how they imagined the classes: a public school with eight classrooms, emphasizing diversity and collaboration between teachers, coordinators, and students. The school is accessible, with ramps, adapted restrooms, and flexible teaching materials. It is an eighth-grade group of 30 students, and the content covered is triangles and inscribed and circumscribed circles. The desks are organized in pairs to promote dialogue. Special educational needs include autism, attention deficit, hyperactivity, introversion, foreign origin, shyness, and motor disability.

The teaching proposal involves a practical activity followed by theoretical development in the last two months. Each student receives drawn triangles and a script to guide the practical activity, encouraging questioning and interest. The planning considers the diversity of the class, especially students with attention deficit, including large drawings and figures, and the possibility of consulting dictionaries. The concern with positioning students with special needs close to the teacher's desk for constant support stands out.

Report 2, written by three students, describes how they imagined the classes: a single-story, accessible public school with nine classrooms where teachers seek to understand and improve students' processes. The sixth-grade class of elementary school, made up of 25 students, addresses the topic of triangles. The content is explored through varied activities, such as the correlation of the

geometric figure with everyday situations, the construction of triangles, and the use of GeoGebra software and geoplanes. The proposal considers students' special needs, such as physical disabilities, low vision, autism, and intellectual development deficits, including pedagogical and accessibility resources. The planning highlights attention to the particularities of each student, respecting rhythms and overcoming difficulties, with the continuous support of teachers and the involvement of family members.

Developed by two students on how they imagine the classes, Report 3 describes a public school with 18 classrooms on three floors, highlighting accessibility elements such as ramps, tactile flooring, enlarged doors, and Braille signs. The educational approach is based on interactionism, seeking meaningful interactions in the school community. The second-grade high school class, with 19 students, works on the intuitive concept of areas on different surfaces. Students' special needs include deafness, blindness, ADHD, and wheelchair mobility. The activity on areas, planned for five class hours, uses Tangram as a resource, promoting an inclusive and attractive approach. Adaptations are made for students with deafness, blindness, and visual impairment, aiming to explore the visual field, touch, and the Braille system. Tangram is presented actively, arousing curiosity and engagement and allowing all students to participate in the teaching-learning process.

Report 4, developed by three students, describes a public school that follows traditional approaches, using textbooks provided by the government and offering materials such as rulers, compasses, protractors, and squared notebooks. The sixth-grade class of elementary school, with 30 students, has several special needs, including foreign origin, giftedness, deafness, ADHD, and low vision. The mathematical content covered is quadrilaterals. The teaching proposal suggests two classes for the topic. The first class aims to present the characteristics of quadrilaterals, using questions written on slides and adapting the size of the letters to facilitate reading for students with low vision. For international students, providing a sheet in their native language is considered. The practical activity involves making polygons with popsicle sticks, followed by collective reflections. In the second class, the focus is to explore the presence of quadrilaterals in everyday life, proposing the creation of posters in groups using different materials to represent these geometric shapes.

Once the presentation is complete, we move on to the next section to analyze the impacts of working on inclusive education in a PCC subject on the initial education of prospective mathematics teachers. To this end, we analyzed the final reports prepared by the groups, the questionnaire applied at the end of the course, and the researcher's field diary, seeking to identify significant aspects related to students' initial education.

The approach adopted for the analysis was based on the content analysis methodology outlined by Bardin (1997). This methodology comprises a set of systematic and objective procedures to describe the content of messages, using indicators that enable inferences about knowledge related to the conditions of production and reception of these messages. In this way, we go through the different phases of content analysis, which include pre-analysis, exploration of the material, and processing of the results, culminating in the inference and interpretation of the information obtained.

Regarding the categories of analysis, after all this detailed work, we consider the category "Influences on initial teacher education," based on three axes: (i) Reflections on coexistence and knowledge about people with disabilities; (ii) New learning provided by reading scientific articles; and (iii) The process of pedagogical imagination. Below, we discuss these axes, presenting considerations on contributions to initial education on the theme of inclusive education.

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REFLECTIONS ON INITIAL PERCEPTIONS AND COEXISTENCE WITH PEOPLE WITH DISABILITIES

Initially, based on the questionnaire, we sought to analyze whether the students had had contact with people with disabilities. Six reported having had contact with people with disabilities during basic or higher education, or within the family. These contacts awakened perceptions in students, whether due to the individualized service provided to students with disabilities, the material used by students with disabilities, or the difficulty in communicating or establishing links.

Some of those students who had had contact with people with disabilities said they found it hard to establish links and proximity with them, as we can see in Paulo's report: "*When I was in basic education, I studied with a female and a male student, both blind. We didn't have very close contact, and they sat next to two other students who helped them in class*." According to Gabriel: "*In high school, I had contact with a classmate who had low vision, who sat close to the teachers. I remember they always provided printed activities for all subjects with a larger font size.*"

However, other participants sought closeness, like Kamyla, who commented that she had a closer relationship in elementary school when she had just moved to the city: "*It was a new experience, I had no friends or acquaintances. I started making friends, and soon, there was an opportunity to help a classmate with a disability. It was a very different and enriching experience for me*." Like her, João reflects that helping a classmate with a disability "*was interesting, and it added a lot [to him], as he really made a point of helping her at school*."

These reports underscore how the reported reality approaches the recommendations from UNESCO (1994), as documented in the Salamanca Declaration, since access by students with disabilities to regular schools is taking place with respect for each person's differences and singularities. Furthermore, there is an attempt at pedagogical adaptation, such as the integrative action of a student serving as a mediating support for those with disabilities, as well as printing with magnification for students with low vision, thus considering individual skills and aptitudes, to provide the learning process for everyone without discrimination, through adaptations of the subjects.

Furthermore, we note that having contact with a person with a disability is not necessarily linked to the development of an emotional relationship, as some participants described this coexistence with a certain distance, which may be associated with a fear or a barrier, as that was the first contact. Thus, we highlight the importance of continuous dialogue and promoting interaction between all

individuals, as these may favor connections and develop an open and supportive community.

Regarding higher education, some participants had classes taught by a Brazilian Sign Language (LIBRAS) teacher, who is completely deaf. Maicon reports that, despite the teacher being a deaf person with oral ability, since she verbalized some expressions and used written language for communication, she sometimes wrote on the board to communicate with students who did not understand the signs. Even after weeks of classes, such action bothered him, as he felt "*unable to communicate with her through LIBRAS, even though he [had] not learned it before and was learning with her, [he] felt lost and insecure about how to talk*." In such a report, a feeling of frustration and insecurity about how to communicate with a person with a disability is evident. This feeling of hesitation also sometimes gives rise to a feeling of sympathy when not knowing how to act before a person with a disability, which can manifest feelings of assistance or the desire to acquire skills to communicate and coexist with those who are different.

Once again, the importance of coexistence and immediate interaction between individuals becomes evident, so blockages and fears regarding the way of relating are minimized. This reflection is in line with the thinking of Cintra and Penteado (2018), who understand that the uniqueness of the human being and their potential for transformation are constituted through social relationships, which, once initiated, accelerate the perception that the relationship between individuals, disability, and education is something natural.

The importance of Law N. 10.436 (Brasil, 2002) is also evident, as it included LIBRAS in the curriculum of teaching degree courses, which favored the reflective process and the approach to inclusive educational practices for students, as evidenced in Maicon's report.

Furthermore, one student explained how her family lived with a cousin with hyperactivity and attention deficit and highlighted the difficulty some family members had understanding the importance of his being enrolled in an inclusive school: "*His father did not accept seeking professionals and placed him for a while in a traditional school that did not offer the necessary support to students with disabilities, and this made his learning difficult*" (Fernanda).

Through this report, the ongoing need for dialogue about differences is evident, both in schools and in society as a whole, to foster an understanding of how to deal with differences respectfully, enhancing the development of each one's singularity.

Participants' statements show that their interaction with people with disabilities was not enough to encourage them to reflect on inclusive education, since they only emphasized the interventions carried out exclusively for those in need and reinforced what bothered them or made them feel fulfilled. However, an approximation, understanding, and sensitivity toward this term were noted during the course. This reflective process will be discussed in the following sections.

NEW LEARNING PROVIDED BY READING SCIENTIFIC ARTICLES

We investigated the knowledge acquired and modified during the reading process and reflections with an inclusive bias of scientific articles regarding pedagogical practices of geometry and inclusion. At the first moment of the invitation to study the teaching of geometry in an inclusive way, the undergraduates seemed uncomfortable. This discomfort was only alleviated after we read the texts, discussed, and during the process of imagining a math teacher in an inclusive classroom, as we can see: "*Previously, I had a vision that teaching students with disabilities was something extremely difficult, even though I already had an inner desire to work in this area in the future. Today, I realized that inclusive education happens through small details, adjustments made through teachers' sensitivity and attention, without the need for huge revolutions, but rather initiative and goodwill*" (Priscila).

The article by Sales, Moura, and Penteado (2015) discussed the difficulties teachers face in developing alternative methodologies that consider all the diversities of a classroom or in adapting activities for students with specific needs. This dialogue aligns with Fernandes and Healy (2010), who found that education professionals do not feel capable and confident in preparing classes and receiving students with disabilities in their classroom environment. They also corroborate Cintra and Penteado's (2018) perspective when discussing most teachers' lack of preparation to teach students with disabilities, which prevents them from developing pedagogical practices that help these students' learning.

Thus, the importance of this reflective dialogue in initial education is evident to develop knowledge capable of assisting the teaching and learning for diversity with criticality regarding inclusive education.

Regarding the term 'negotiation process in Libras,' there was a discussion about how important it is for the teacher and student to agree on the signs so that those developed for specific mathematical elements, for which a representation in LIBRAS has not yet been established, make sense to the deaf individual. Since the inclusion of LIBRAS in the curriculum of teacher education courses through Law N. 10.436 (Brasil, 2002), these debates can occur in an integrated manner with both disciplines – PCC and LIBRAS.

Other terms discussed were: 'multifunctional resource rooms' and 'visual communication and the issue of the senses.' Regarding multifunctional resource rooms, participants reported that they learned about this environment after reading the text and considered this space with accessibility resources necessary for specialized educational assistance (Atendimento Educacional Especializado - AEE).

The reports demonstrate that even students who had contact with classmates with disabilities in basic education were not familiar with these spaces, which may indicate that the schools they studied at did not provide the necessary support to assist in the possibilities of educational inclusion with equity, or that the institutions had these resource rooms. However, they were not publicized and shared with all students, perhaps because they were used outside school hours, which may indicate a gap between the forms of teaching for each singularity.

Visual communication and the issue of the senses were addressed by participants as a need for education to explore all the senses in the teaching sequences developed for classes, given that verbal language usually predominates, which does not help the learning process for deaf students. Thus, by establishing visual and tactile communication, the understanding of students with disabilities is enhanced, and possibilities are created for all students to develop the significance of mathematical concepts.

The discussions proposed by Domingues, Filho, and Sturion (2020) brought reflections on possibilities for teaching geometry to blind, deaf, and gifted students, for example, through the use of manipulable materials for blind students; they listed the use of resources with non-rough textures, so as not to hurt students who use touch in the learning process. Furthermore, they thought about using relief glue and string to establish the limits of certain mathematical elements, such as geometric figures.

Regarding the deaf students, they reflected on the non-predominance of verbal language, prioritizing visual communication and the establishment of sign negotiation, identifying the influence of the discussion about the article read and discussed the week before. Furthermore, they addressed the different degrees of deafness so that, for each classification, one sense can take priority over the other; each singularity must be understood to develop the activity planning inclusively.

For gifted students with skills and mental abilities considered above average, they thought of manipulative materials that would challenge them, allowing them to utilize this resource in problem solving. Furthermore, they debated the possibility of electing these students as monitors or assistants in implementing the activity, in which they would, together with the teacher, mediate the execution; that is, they would help the other colleagues carry out what was proposed.

With this reflection, it was possible to perceive that the formative process encourages critical thinking about practices and helps construct a lesson plan characteristic of the class individuals, which aligns with what Nóvoa (1992) proposed.

Through Fernandes and Healy's (2011) text, students talked about not feeling prepared to work in classrooms with students with disabilities because of a lack of confidence and fear of not developing their learning satisfactorily. At the same time, they stated that, despite still being frightened, they could reflect on methodological adaptations after reading. Student Alex asked about the number of students with disabilities in a classroom since, in his perception, with just one student, a single teacher can pay attention to their uniqueness; but, when this number increases, how will a single teacher be able to divide the attention? This question generates reflection on this participant's understanding of whether teaching people with disabilities is more difficult or whether they are afraid of what is different. Furthermore, the speech in question brings to the dialogue the importance of a support network to assist the teacher in teaching. This network can be linked to mediators capable of transmitting information from the teacher to the student with a disability, such as LIBRAS interpreters or an assistant teacher to talk to students with attention deficit.

With Marcone's text (2018), they brought about deficiencyism, understanding that it refers to how disability has been constructed through standards of

normality. They highlighted that thinking about disability as an experience, as the author proposes, is challenging and sometimes not understood.

Based on Skovsmose's article (2019), they began to understand inclusive education as an encounter between differences, where differences define one of the main characteristics of the human condition, to practice dialogue and tolerance through the recognition and appreciation of each person's differences.

At this first moment, we noticed that some students' understanding of inclusion was superficial, possibly related to little contact with people with disabilities or the low frequency of readings on the subject. However, from the texts read at the beginning of the course, they began to understand and become interested in the topic, as Gabriel stated: "*I know that I need to continually improve on this issue to become an increasingly prepared teacher. Now I'm not so afraid*."

It is also worth noting that, little by little, through the discussions, the idea that people with disabilities are incapable was deconstructed. In this sense, Cintra and Penteado (2018) argue that developing work during initial education that involves inclusion contributes to prospective teachers' education, allowing them to see disability as something natural.

Sometimes, we observed that participants consider the concepts of education for people with special educational needs and inclusive education synonymous, as seen in Priscila's speech, when stating: "*Education for students with disabilities has the basic notions to generate adaptations that encompass teaching for diversity in general. Therefore, it is necessary to know the existing needs and differences and the strategies to solve them*."

Before the course, most students thought that teaching mathematics to diverse students required developing different activities, as stated by student Fernanda: "*Before, I thought that the activities had to be adapted individually*," which shows that the student did not understand the idea of inclusion. Student Maicon's speech also supports this perspective: "*In my opinion, when it comes to special educational needs, I believed it was not possible to have several people with different special needs in the same class and provide the same teaching and ensure that everyone gets the most out of it*."

The student's explanation shows that, in addition to inclusive education, from the dialogue in class, he grasped the notion of universal design to learning, which shows that these ideas were being transformed. Below, other statements corroborate students' change in perspective:

> *At the beginning of the course, I had a very closed view of teaching for diversity, I didn't have the knowledge, especially for students with disabilities, and it was by reading the articles that I began to change my view* (Gabriel).

> *At first I thought that something extremely out of the ordinary was needed, that it required very big, unreal things. By reading the texts, I could see that they are actually simple adaptations, but that make all the difference, such as, for example, printing in a larger font, or an object with high relief. Today I feel more capable of dealing with a situation like this in real life* (Paulo).

Gabriel's speech shows that he has acquired the knowledge that adapting teaching methodologies can benefit all students in the classroom, which is corroborated by Kamyla and Paulo's statements when they explain that teaching

for diversity requires preparation and dedication so that they can deal with everyday actions.

This first moment was outlined as per Lima, Silva, and Souza's (2020) studies highlighting the transformation of thoughts due to critical and reflective communication between teacher educators and prospective teachers. We highlight the continuous need for dialogues about practices or, in this case, to think about possibilities to provide broad and dynamic initial education capable of understanding today's society.

THE PROCESS OF PEDAGOGICAL IMAGINATION

During the initial process of PI, which involved detailing the school, we realized that the experiences as students in basic education influenced their imagination of the school where they would work. The detailed description of the school, including the library, computer room, and accessibility, highlights the attention given to physical and structural aspects, as shown in the following excerpt.

> The school is a municipal middle school located in a neighborhood of popular housing with a community of mostly low-income people. [...] The physical space also has a library, a computer room, a canteen, and two uncovered multi-sports courts, in addition to the courtyard. The library has no large bibliographic collection, providing only the basics for students' research. The computer room has 15 not very up-to-date computers and medium-speed internet access (Group 1 report).

The typification of students, which includes individual details about each student, highlighting specific characteristics and challenges, such as motor disabilities, autism, ADHD, foreign origin, and shyness, among others, reveals the sensitivity in recognizing diversity in the classroom and the importance of adapting pedagogical practice to meet individual needs.

Concerns about the strategies proposed for teaching geometry range from the use of games, software, and manipulative materials to the teacher's availability for mediation.

> The game will consist of rounds, and in each round, a student makes a triangle. After the colleague has created the triangle, everyone must record the classification of that triangle on their registration sheets based on its sides and angles. A registration form adapted to her vision was created for student Allana, using Arial font and size 24. For Eliana, the fact that it is collective can minimize any difficulty concerning motor limitations (Group 3 report).

The preparation of the activities involved adaptations to meet students' needs, and we understand that the undergraduate students exercised reflection within critical mathematics when seeking alternatives to solve a possible problem. With this, they demonstrated a concern with the relationship between mathematics education and democratic teaching, as Skovsmose (2007) discussed.

They hoped to spark the interest of all students, encouraging learning. Group 1 suggested "holding a plenary session to share the resolutions and, if necessary, for the teacher to develop possible reasoning on the board," and this initiative, a moment of socializing the solutions found, promoted students' interaction and

dialogue, thus contributing to the inclusion process, as highlighted by Skovsmose (2019) and Lima (2022).

According to Group 2's report, they proposed group activities: "A group activity in which posters should be made to correlate the content of quadrilaterals with everyday situations to be displayed on the school wall." The suggestion of collective work aligns with the idea of recognizing and leveraging differences between students to enhance learning, as suggested by Skovsmose (2019). This approach involves understanding the variability of differences between students through cooperation, which fosters learning by highlighting singularities that lead to encounters in differences.

Assessment methods are traditional, indicating resistance to paradigm change. Despite being open to adapting pedagogical practices, the groups maintained some traditional concepts regarding assessment. The assessments followed a traditional format and were adjusted to meet students' needs, revealing an inclusive approach, despite still being linked to conventional practices.

FINAL CONSIDERATIONS

This text aimed to discuss what understandings can be produced from work carried out in the Practice as a Curriculum Component (PCC) subject from an inclusive perspective with students from a mathematics teaching degree course. During the practice, the prospective teachers developed studies on geometry teaching focused on students' diversity. Such studies are part of the pedagogical imagination developed by the group.

We understand that the work developed allowed prospective teachers to overcome fears and blockages and feel motivated towards teaching that focuses on diversity. It provided undergraduates with greater aptitude to deal with diverse situations in the classroom, promoting reflection on inclusion and improving their pedagogical skills. This result aligns with Lima (2022), who emphasizes the importance of research from an inclusive perspective by prioritizing teacher education and mathematics classes, thereby contributing to creating a more inclusive society with social justice.

We believe that the PCC subject helped foster the understanding of inclusive education and motivated prospective teachers to reflect on, research, and plan inclusive activities. The pedagogical imagination process is free, and although guidance is provided during this process, the form of construction was established by the groups, demonstrating autonomy in executing the proposal.

Finally, we understand that the work developed will help prospective teachers adopt inclusive practices in mathematics classes, favoring critical reflection on pedagogical practice, contributing to the (re)construction of personal identity, and strengthening teaching knowledge. Hence, we hope that this work will contribute to teacher education, providing new perspectives to look carefully at diversity and with respect for everyone.

NOTES

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REFERENCES

Araújo, M. V. de; Rusche, R. J.; & Molina, R., Carreiro, L. R. R. Formação de professores e inclusão escolar de pessoas com deficiência: análise de resumos de artigos na base SciELO. *Rev. Psicopedagogia*, v. 27(84), p. 405-416, nov. 2010. https://www.revistapsicopedagogia.com.br/detalhes/195/formacao-de-professores-e-inclusao-escolar-de-pessoas-com-deficiencia--analise-de-resumos-de-artigos-na-base-scielo

Bardin, L. (1997). *Análise de conteúdo*. Lisboa: Edições 70.

Bicudo, M.A. V. (1999) Ensino de Matemática e Educação Matemática: algumas considerações sobre seus significados. *Bolema*, Rio Claro, SP, v. 12, n. 13. https://www.periodicos.rc.biblioteca.unesp.br/index.php/bolema/article/view/10638

Bicudo, M. A. V. & Garnica, A. V. M. (2002). *Filosofia da Educação Matemática*. Belo Horizonte: Autêntica. (Tendências em Educação Matemática).

Brasil. Lei nº 9.394. (1996). Das diretrizes e bases da Educação Nacional. *Diário Oficial da União*. Brasília. http://www.planalto.gov.br/ccivil_03/leis/l9394.htm

Brasil. (1994). Conferência Mundial sobre Necessidades Educativas Especiais: Acesso e Qualidade. In: UNESCO. *Declaração de Salamanca e linhas de ação sobre necessidades educativas especiais*. 2. ed. Brasília: Corde.

Brasil. (2001a). Ministério da Educação. Secretaria de Educação Especial. *Diretrizes nacionais para a educação especial na educação básica.* Brasília: MEC; SEESP, 79 p. http://portal.mec.gov.br/seesp/arquivos/pdf/diretrizes.pdf

Brasil. (2001b). *Parecer CNE/CP28/2001.* Dá nova redação ao Parecer CNE/CP 21/2001, que estabelece a duração e a carga horária dos cursos de Formação de Professores da Educação Básica, em nível superior, curso de licenciatura, de graduação plena. Brasília: MEC. http://portal.mec.gov.br/cne/arquivos/pdf/028.pdf

Brasil. (2002). Lei nº 10.436, de 24 de abril de 2002. Dispõe sobre a Língua Brasileira de Sinais e dá outras providências. *Diário Oficial da União*, Brasília. http://www.planalto.gov.br/ccivil_03/leis/2002/l10436.htm

Brasil. (2005). *Parecer 15 CNE/CES*. Solicitação de esclarecimento sobre as Resoluções CNE/CP nos 1/2002, que institui Diretrizes Curriculares Nacionais para a Formação de Professores da Educação Básica, em nível superior, curso de licenciatura, de graduação plena, e 2/2002, que institui a duração e a carga horária dos cursos de licenciatura, de graduação plena, de Formação de Professores da Educação Básica, em nível superior. Brasília: MEC.

Brasil. (2013). Ministério da Educação. Secretaria de Educação Básica. Diretoria de Currículos e Educação Integral. *Diretrizes Curriculares Nacionais Gerais da Educação Básica.* Brasília: MEC, SEB, DICEI. http://portal.mec.gov.br/index.php?option=com_docman&view=download&alias=13448-diretrizes-curiculares-nacionais-2013-pdf&Itemid=30192

Brasil. (2019). *Resolução nº 2, de 20 de dezembro de 2019*. Diretrizes Curriculares Nacionais para a Formação Inicial de Professores para a Educação Básica e institui a Base Nacional Comum para a Formação Inicial de Professores da Educação Básica. Brasília: MEC/CNE, 2019. https://www.in.gov.br/en/web/dou/-/resolucao-n-2-de-20-de-dezembro-de-2019-*-242332819

Cintra, V. P. & Penteado, M. G. (2018). Educação Matemática e Inclusão em cursos de licenciatura: o caso de uma abordagem via trabalho com projetos. In: Rosa, F. M. y C. da; Baraldi, I. M. (org.). *Educação matemática inclusiva*: estudos e percepções. 1. ed. Campinas, SP: Mercado de Letras, p. 63-80.

Domingues, M. A. F. G.; Filho, P. J. D.; & Sturion, L. (2020). Materiais manipuláveis como mediadores do processo de ensino e aprendizagem de geometria. *Brazilian Journal of Development*, v. 6, n. 7, p. 54148-54160. DOI: http://dx.doi.org/10.34117/bjdv6n7-894

Fernandes, S. H. A. A.; & Healy, L. (2010). A inclusão de alunos cegos nas aulas de Matemática: explorando Área, Perímetro e Volume através do Tato. *Bolema*, Rio Claro, SP, v. 23, n. 37. p. 1111-1135. https://www.periodicos.rc.biblioteca.unesp.br/index.php/bolema/article/view/4306

Freire P. (2009). *Pedagogia da autonomia*. 40. ed. Rio de Janeiro: Paz e Terra.

Kleemann, R. & Petry, V.J. (2020). Desenvolvimento de um exercício de imaginação pedagógica a partir de uma proposta metodológica interdisciplinar. *Investigações em Ensino de Ciências*, v. 25, n. 3, p. 232. Disponível em: http://dx.doi.org/10.22600/1518-8795.ienci2020v25n3p232 . Acesso em: 11 out. 2021.

Lima, R. F.; Silva, N. L. da; & Souza, I. dos S. de. (2020). Contribuições de produções acadêmicas nacionais sobre educação matemática inclusiva. *Revista Exitus*, Universidade Federal do Oeste do Pará, v. 10, p. 1-31. http://www.ufopa.edu.br/portaldeperiodicos/index.php/revistaexitus/article/view/938

Lima, P. C. (2021). Imaginação Pedagógica, Educação Matemática e Inclusão: em busca de possibilidades para aulas de Matemática. *Intermaths*, v. 2, n. 1, p. 121-137. https://periodicos2.uesb.br/index.php/intermaths/article/view/8595/5927

Lima, P. C. (2022). *Imaginação Pedagógica e Educação Inclusiva: possibilidades para a formação de professores de matemática*. 242 f. Tese (Doutorado em

Educação Matemática) – Instituto de Geociências e Ciências Exatas, Universidade Estadual Paulista, Rio Claro, SP, 2022. https://repositorio.unesp.br/handle/11449/234464

Lüdke, M.; André, M. E. D. A. (1986). *Pesquisa em educação*: abordagens qualitativas. São Paulo: EPU.

Marcone, R. Desconstruindo narrativas normalizadoras. In: ROSA, Fernanda M. C.; Baraldi, I. M. (org.). (2018). *Educação matemática inclusiva*: estudos e percepções. 1. ed. Campinas, SP: Mercado de Letras, p. 17-36.

Milani, R. (2017). "Sim, eu ouvi o que eles disseram": o diálogo como movimento de ir até onde o outro está. *Bolema*, v. 31, n. 57, p. 35-52, 2017. https://doi.org/10.1590/1980-4415v31n57a02

Nóvoa, A. (1992). Formação de professores e profissão docente. In: Nóvoa, António. *Os professores e sua formação*. Lisboa, Portugal: Dom Quixote.

Sales, E. R. de; Penteado, M. G.; & Moura, A. Q. (2015). A negociação de sinais em Libras como possibilidade de ensino e de aprendizagem de Geometria. *Bolema*: Boletim de Educação Matemática, v. 29, n. 53, p. 1268-1286. DOI: http://dx.doi.org/10.1590/1980-4415v29n53a23.

Santos, L. M. M. dos & Alves, M. A. (2019). Formação inicial de professores de matemática: mapeamento teórico. *Revista de Ensino de Ciências e Matemática,* v. 10, n. 6, p. 110-130. https://revistapos.cruzeirodosul.edu.br/index.php/rencima/article/view/2262/1221

Skovsmose, O. & Borba, M. (2004). Research methodology and critical mathematics education. In: Valero, P.; Zevenbergen, R. (ed.). *Researching the socio-political dimensions of mathematics education*: issues of power in theory and methodology. Dordrecht, Holanda: Kluwer Academic Publishers, v. 35, p. 207-226.

Skovsmose, O. (2007). *Educação Crítica*: Incerteza, Matemática, Responsabilidade. São Paulo: Cortez.

Skovsmose, O. (2011). Critique, generativity, and imagination. *For the Learning of Mathema*tics, New Brunswick, Canada. v. 31, n. 3, p. 19-23.

Skovsmose, O. Pesquisando o que não é, mas poderia ser. In: D'ambrosio, B. S.; Lopes, C. E. (org.). (2015). *Vertentes da subversão na produção científica em educação matemática*. Campinas, SP: Mercado de Letras, 2015. p. 63-90.

Skovsmose, O. Inclusions, meetings and landscapes. In: Kollosche, David; Marcone, R.; Knigge, M.; Penteado, M. G.; Skovsmose, O. (ed.). (2019). *Inclusive mathematics education*: state of the art research from Brazil and Germany Cham. Switzerland: Springer, p. 71-84.

Tardif, M. (2014). *Saberes docentes e formação profissional*. 16. ed. Petrópolis, RJ: Vozes.

Unesco. (1994). Declaração de Salamanca: sobre princípios, políticas e práticas, na área das necessidades educativas especiais. https://unesdoc.unesco.org/ark:/48223/pf0000139394

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