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Development of set operations in children aged 4 to 5 at the Private Early Childhood Centre in Uíge

O desenvolvimento das operações de conjuntos em crianças de 4 a 5 anos de idade do Centro Infantil Privado do Uíge

El desarrollo de las operaciones con conjuntos en niños de 4 a 5 años del Centro Infantil Privado de Uíge

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Abstract:
The present research emerged from the educational context of Preschool Education, with special attention to Mathematical Representation, with the aim of developing educational activities for the formation, decomposition, union and comparison of sets for children aged 4 to 5 years old. It is a research carried out in one of the private children's centers in Uíge, justified by the understanding that the teaching of Mathematics must begin very early, from the moment the child begins to perceive the world that surrounds them, also by realizing that the Working with sets covers a good part of the Mathematical Representation program in pre- school education. This is a qualitative research with a descriptive focus, where participatory observation, the grid of direct observation of activities and the semi-structured interview aimed at educators, were decisive instruments for data collection, the main concern was how to achieve a better development of formation, decomposition, union and comparison of sets by children aged 4 to 5 years old. The results obtained demonstrated that set operations activities are the main activities to support mathematics in children aged 4 to 5 years old. This research will provide a contribution to the development of pedagogical practice with regard to Mathematical Representation, especially in work with sets.

Keywords:
Child. Operations with sets. Mathematics.

Resumo:
A presente pesquisa emergiu do contexto educativo da Educação Pré-escolar, com uma especial atenção na Representação Matemática, com o objectivo de elaborar actividades educativas de formação, decomposição, união e comparação de conjuntos por crianças de 4 a 5 anos de idade. É uma pesquisa realizada em um do centro infantil privado do Uíge, justifica-se por compreender que o ensino da Matemática deve começar muito cedo, a partir do momento em que a criança começa a perceber o mundo que a rodeia, ainda, por perceber que o trabalho com conjuntos abarca uma boa parte do programa de Representação Matemática do ensino pré-escolar.Trata-se de uma pesquisa qualitativa com enfoque descritivo, onde a observação participativa, a grelha de observação directa as actividades e a entrevista semi- estruturada dirigida às educadoras, foram instrumentos determinantes para a recolha de dados, a principal inquietação residia em como alcançar um melhor desenvolvimento de formação, decomposição, união e comparação de conjuntos por crianças dos 4 a 5 anos de idade. Os resultados obtidos demonstraram que as actividades de operações de conjuntos são as principais actividades para alicerçar a matemática em crianças de 4 a 5 anos de idade, a presente pesquisa proporcionará um contributo ao desenvolvimento da prática pedagógica no que se refere a Representação Matemática sobretudo no trabalho com conjunto.

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Palavras-chave:
Criança. Operações com conjuntos. Matemática.

Resumen:
Esta investigación surgió del contexto educativo de la educación preescolar, con especial atención a la representación matemática y el objetivo de elaborar actividades educativas de formación, descomposición, unión y comparación de conjuntos para niños de 4 a 5 años. Se realizó en un centro infantil privado de Uíge y se justifica porque la enseñanza de las Matemáticas debe comenzar desde que el niño empieza a percibir el mundo que lo rodea, y porque el trabajo con conjuntos abarca buena parte del programa de representación matemática preescolar. Se trata de una investigación cualitativa de enfoque descriptivo. La observación participante, la guía de observación directa de actividades y las entrevistas semiestructuradas a las educadoras fueron instrumentos fundamentales para recopilar datos. La principal inquietud fue cómo mejorar el desarrollo de la formación, descomposición, unión y comparación de conjuntos en niños de 4 a 5 años. Los resultados demostraron que las actividades de operaciones con conjuntos son fundamentales para sentar las bases de las Matemáticas a esa edad. La investigación contribuirá al desarrollo de la práctica pedagógica de la representación matemática, especialmente al trabajo con conjuntos.

Palabras clave:
Niño. Operaciones con conjuntos. Matemáticas.

Introduction

At preschool age, children begin to discover their surroundings and relate to the world, becoming familiar with objects and their qualities, natural phenomena and social life. Accordingly, Framework Law 17/16 of 7 October on the Education and Teaching System, amended by Law 32/20 of 12 August, defines the following preschool objectives: stimulate children's intellectual, physical, moral, aesthetic and emotional development, ensuring a healthy environment that facilitates entry into general education; develop expression, communication and creative imagination; and stimulate curiosity and play.

To achieve these objectives, the Preschool Education Subsystem Curriculum defines the following fields: Linguistic Communication; Mathematical Representation; Physical and Social Environment; and Artistic and Motor Expression.

Mathematical content is present in everyday life: going to work or the market, or children sharing snacks. It also contributes to individuals' comprehensive development and provides foundations for social inclusion, social justice and democracy. Mathematical Representation is therefore this study's object.

According to Skovsmose (2001, in Pinto & Pires, 2019, p. 121), "It is impossible to imagine the development of a society like ours without technology playing a prominent role,

with Mathematics playing a dominant role in shaping technology." Given Mathematics' importance, children should encounter this field early to understand its mechanisms. Working with sets allows children to form, unite, decompose and compare objects by colour, size and shape, introducing quantities and, consequently, natural numbers.

The question is therefore: how can the formation, decomposition, union and comparison of sets be better developed among children aged 4 to 5, specifically at one early childhood centre in the city and province of Uíge?

This study aims to develop educational activities involving formation, decomposition, union and comparison of sets for children aged 4 to 5 at an early childhood centre in Uíge.

The following specific objectives were established to guide the research towards its general objective:

Analyse the theoretical and methodological foundations supporting Mathematics for children aged 4 to 5;

Diagnose educators' knowledge concerning children aged 4 to 5 at an early childhood centre in Uíge;

Propose and implement educational activities involving formation, decomposition, union and comparison of sets for children aged 4 to 5 at an early childhood centre in Uíge;

Evaluate the results of applying the proposed educational activities to children aged 4 to 5 at that centre.

The study is justified by the understanding that Mathematics teaching should begin as soon as children start perceiving their surroundings, and that work with sets covers a substantial part of the preschool Mathematical Representation programme.

The study intends to provide educators with tools to improve skill development through Mathematical Representation activities using playful procedures, contributing to pedagogical practice, especially work with sets.

Addressing the problem will help minimise difficulties related to early childhood Mathematics by compiling playful tasks and activities to improve qualitative and quantitative learning among children aged 4 to 5.

Although optional, preschool education is considered Angola's first educational level and plays a decisive role in young people's educational and social success. Children should be given dedicated time for structured learning crucial to their development. Mathematical Representation is consistently addressed in preschool to develop logical reasoning through manipulating objects.

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Theoretical framework

1. The preschool child

In my understanding, discussing teaching and learning in early childhood education for children aged 4 to 5 means discussing preschool children, specifically kindergarten. Article 21 of the Framework Law on the Education and Teaching System (No. 17/16 of 7 October, amended by Law 32/20 of 12 August) states: “The Preschool Education Subsystem is the foundation of education, caring for early childhood at a stage when conditioning and psychomotor development activities should take place.”

The Ministry of Education (MED, 2013) analyses development at this stage in three major dimensions: psychological, sociological and motor/physical.

Psychologically, children’s memory, perception, attention, will, imagination, intelligence and language are developing. Quantitative and temporal concepts are not fully developed, and orientation remains limited. Sociologically, children are social actors participating in exchanges, interactions and continuing adjustments that shape and transform society. In the motor/physical dimension, children develop control over their bodies, depending also on physical and mental health. All activities take place through the body, providing resources for sociability and a positive self-concept.

Interpreting MED (2013), this developmental stage is characterised by curiosity and exploration: children already observe, ask questions and play. Learning relies on playful activities and games, and children readily acquire and appropriate knowledge owing to the flexibility of their nervous systems. It is, therefore,

In these dimensions, Mathematics contributes activities promoting citizenship and developing autonomy, confidence, thought and memory. It equips children with analytical and synthetic abilities to select the many pieces of information received daily. Through social interaction in games and play, they develop further, acquiring new attitudes through hearing, touch, smell and other senses.

Mathematics and its skills in preschool education

Authors including Ruiz (2001), Ruiz and Greciet (2003), MED (2013), and Pinto and Peres (2019) confirm that Mathematics and its aims contribute to educational development

worldwide. It plays an indispensable role in inventing techniques and technology, major drivers in solving global problems.

According to Santos, Oliveira and Malusá (2017), Mathematics stands out among school knowledge because it develops basic logical reasoning processes and learning that permeate pupils' entire lives. They likewise state that "several studies have demonstrated the relevance of working with this subject", in which:

> Mathematical knowledge does not develop by memorising facts, and learning numbers involves much more than counting, although counting is important to understanding their concept. Scholars argue that mathematical ideas developed early will be useful in everyday and school life (Smole; Diniz; Cândido, 2000, in Santos et al., 2017, p. 3).

Leonardo, Menestrina and Miarka (2014) recognise Mathematics as important and necessary for global development, major technological advances, professional work, everyday situations and many other applications meeting human needs. Piscareta likewise considers mathematical knowledge essential for critical participation in contemporary society, supporting decisions in different circumstances and understanding the surrounding world (Piscareta, 2001, in Leonardo, Menestrina & Miarka, 2014).

Mathematical exploration can support children's intellectual, social and emotional development. In terms of content, it is their first intentional, directed encounter with the world of shapes and quantities (Lorenzato, 2008).

Mathematics is indispensable because it develops logical reasoning and problem-solving ability and stimulates creativity. It is useful through continual contact with shapes, magnitudes, numbers, measurements and counting (Bertoso & Mota, 2000).

Mathematical skills develop when adults recognise and question Mathematics in children's play; encourage problem solving and persistence; provide books and stories containing numbers and patterns; propose investigative tasks; organise rule-based games; combine formal and informal experiences; and use mathematical language such as "the same number as…", "the same shape as…" and "this tower is taller than…" (Rodrigues, 2008, in Mata, 2012).

Moreira and Oliveira (2003) identify three strands defining mathematical competence in contemporary societies that should develop from preschool: knowing how to:

Communicate mathematically, meaning interpret, express oneself and decide using Mathematics; solve problems, drawing on Mathematics to address mathematical situations; and use Mathematics to question, reflect, represent and relate facts and ideas in understanding the physical and social world. Considering these strands in preschool means "developing number

and operation sense, attending to patterns, symbols and models, considering geometry and spatial sense, and organising and analysing data". It also means valuing mathematical processes: "solving problems and investigating, communicating, representing and relating" (Moreira & Oliveira, 2003, p. 57).

Thinking mathematically about an event or problem includes forming, uniting, separating, subtracting and matching, encountering objects' properties such as colour, size and shape. Children also frequently narrate everyday events involving mathematical operations. Narration allows simultaneous inclusion of these operations because it requires children to use the first mathematical operations: "set formation, set union, set decomposition and set comparison", even without realising it.

Developing work with sets at preschool age

Work with sets is among the most important content for forming preschool children's first mathematical concepts and effectively develops kindergarten children's intellect. Its school-based practice develops mental abilities, including analysis, synthesis, comparison and abstraction, and helps establish elementary mathematical concepts and relationships addressed in subsequent grades (Ruiz, 2001).

Ruiz and Greciet (2003) identify two fundamental aspects of work with sets to develop with children: qualitative and quantitative relationships.

The qualitative aspect rests on objects' qualities, emphasising their nature and characteristics, including colour, size and shape, to familiarise children with the operations. Formation, decomposition and union are most commonly used, enabling children to gather and separate objects according to characteristics without excluding other set operations.

Learning objects' characteristics teaches children that materials have different qualities. They discover that objects fall or move, vary in weight and size, and can draw conclusions and plan actions from immediate physical perceptions. Their growing capacity to form mental images supports recognition of similarities and differences between objects and materials, and develops language to describe relationships they find interesting (Hohmann & Weikart, 2011).

Independent activities for developing set operations

Independent activities concerning our object of study require structured manipulatives. According to Damas, Oliveira and Silva (2010), these learning supports involve children in

solid, gradual construction of mathematical foundations. When materials are available, children act, communicate and acquire key vocabulary by associating real actions with verbal expressions.

Educators' selection of materials, questions and interactions is important. Equally important are respect for children's individuality and the constructive dynamism of their thinking, promoting communication through continuous dialogue and reflection and deeper recognition of first mathematical notions. Activities should be organised, selected and sequenced to provide increasing complexity (Damas, Oliveira & Silva, 2010).

Drawing on authors discussing early childhood Mathematics (Smole, 1996; Duhalde; Cuberes, 1998; Chamorro, 2005; Vecino, 2005; Lorenzato, 2006; Canals, 2009), Moreira, Gusmão and Moll (2018) highlight considerations when designing tasks:

Begin with children's interests and curiosity; privilege play; encompass oral, gestural, pictorial, musical, artistic, dramatic, bodily and other forms of expression; promote communication supporting exchange and exploration of ideas, advancing language and representation; provide challenging experiences encouraging exploration, observation, comparison, hypothesis generation and testing, decision-making and problem posing and solving; include different mathematical fields without privileging one, connecting them whenever possible and necessary (Moreira, Gusmão & Moll, 2018). The essential aim of mathematical activities is to stimulate intellectual activity and thought. As thinking develops, the desire for knowledge and cognitive interests increase, and thought increasingly acquires knowledge of the surrounding world beyond tasks arising directly from practical activity.

Methodology

This is qualitative research, which Bogdan and Biklen (1994) describe as "a science of cultural description involving specific assumptions for its construction". Data take the form of words and images rather than numbers, including "(...) quotations, interview transcripts, field notes, photographs, videos and other official records".

Accordingly, this study follows a qualitative, descriptive methodology: a "group case study". To achieve its objective, data were collected at a private early childhood centre in Uíge. Several visits established the centre's actual operating conditions. The environment, daily routine and all Mathematical Representation teaching moments were observed through participation to understand, explore, describe and analyse educational contexts, finally presenting results in a report.

Participants comprised a graduating class at the centre: 36 children, 21 girls and 15 boys, aged four to six, including four aged four and two aged six; and three educators aged 31 to 33, one university graduate and two attending university. Instruments included participant observation, a scheduled-activity observation grid and a semi-structured interview guide, supported by a telephone for recording audio, video and photographs.

A field diary combined with participant observation was among the first research instruments. It recorded dates, locations and children's experiences at the centre, contributing to the research corpus. Although consulted only by the researcher, it supported the investigation by cross-referencing recorded perceptions with observations and interviews, often revealing facts that complemented deeper perspectives.

The observation grid for scheduled activities resembles systematic observation. According to Prodanov and Freitas (20013), this occurs under controlled conditions to meet predetermined purposes. Researchers know which community or group characteristics are significant for the objectives. Before fieldwork, therefore, the researcher defined indicators and a specific plan for organising and recording information, establishing analysis categories in advance.

For Alves (1991), "Qualitative interviews are generally very loosely structured, resembling conversation more than formal interviewing." This model is common in participant observation studies, where researchers usually already know participants, allowing interviews to resemble conversations between friends (Bogdan & Biklen, 1994).

Interviews with three educators sought to assess preparation for developing formation, decomposition, union and comparison of sets with four- to five-year-olds. They also complemented observation data and helped the researcher understand educators' approaches to these operations.

The work comprised three stages. First, the object was clarified, research questions and location specified, children and educators in a five-year-old classroom identified as participants, and data sources selected. Second, data were collected systematically using instruments developed from initial observations. Finally, collected data were analysed and results presented in a written report.

Analysis and discussion of results

For approximately eleven months, from September 2021 to August 2022, mathematical events at the centre were observed through participation. Initially, we counted children,

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educators and educational assistants present. Subsequently, we followed children's reactions to daily tasks, educators' guidance in Mathematics and how children successfully or unsuccessfully demonstrated learning.

At first contact, three adults wore the same uniform colour. Asked who was the educator and who the assistant, one replied: "We are all educators." To preserve confidentiality, they were named Educator 1, Educator 2 and Educator 3; the 36 children were designated C plus a number. Educators generally worked with all children, attentive and distracted alike. To manage the class, they arranged groups of four or five at each table, usually for introductory worksheets or handwriting books. Blackboard activities and children's stories used rows or circles.







Figure 2: Children's arrangement during storytelling. Figure 1: Children's arrangement during blackboard activities.
Figure 3: Children's arrangement for introductory worksheet activities.
Source: Author's own material.

Although conducting mathematical activities at the centre was not easy, several observations showed how they occurred. Most were not planned: educators generally did not bring an activity plan.

Despite three educators, 36 children appeared too many for one classroom because educators could not promptly assist everyone. They worked with all children simultaneously, using introductory worksheets 1, 2 and 3. These predominated, contradicting the principle that

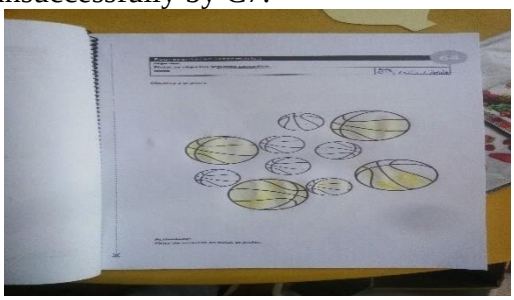
four- and five-year-olds should work with manipulatives. Tasks also lacked uniformity: some used worksheet 1 and others worksheets 2 and 3, meaning some children were further ahead.

Play was almost always a starting point rather than a technique for directly transmitting knowledge, since activities usually used worksheets. Before beginning on some days, educators sang and organised guided or free play in the classroom.

Many activities showed that children understood size, shapes, colour and some natural numbers. On 9 May, for example, they were instructed to colour the large balls yellow in a picture.

C2, C3, C16 and C18 completed this successfully without help. C7 coloured a small ball as well as the large ones. In another task asking children to mark the triangle among other shapes, C14, C23 and C1 did so unaided.

Figure 4: Task completed unsuccessfully by C7.



Source: Author’s own material.

The absence of other manipulatives for Mathematics particularly drew my attention. During approximately five months of observations, only two activities involved educators making tangible materials: cardboard bananas and apples of different sizes, and oranges, for set formation. No set decomposition tasks helping children separate objects were observed.

Some activities placed children in a circle. When educators planned to use the blackboard, children sat in rows, one behind another. For example, E2 used this arrangement for number sequences. This methodology recalls traditional education, an approach considered contradictory to current educational thinking.

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Source: Author's own material.

Semi-structured interviews

Educators' experience in preschool ranged from three to eight years, but this time had limited significance for their practical expertise owing to institutional difficulties.

Although interview responses were not very clear, they suggested that approaches to Mathematics depended strongly on the topic. Educators used drawings and toys to support understanding, addressing counting, object characteristics, larger and smaller, direction and orientation.

Educational activities involving formation, decomposition, union and comparison of sets

The proposed activities help children discover their first mathematical notions from early childhood. Their content, rules and contingencies provide operational situations such as comparing, numbering, classifying and ordering.

Activity 1: Set formation

Theme: Buttons
Objectives: Identify common characteristics of objects.
Logical and mathematical skills: Classify and recognise shapes, colour and size.
Materials: Buttons of different sizes, colours and shapes; dolls.
Criteria: Two or three shared characteristics.

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Procedures

When we entered the classroom, educators arranged seated children in a circle and reviewed the previous activity about plants, discussing the papaya tree and its parts. Afterwards, Educator 1 said: “Children, today we will work with educator Vicente, so please do not make too much noise.”

The researcher then took charge, arranging children in a semicircle to facilitate the planned activity, greeted them, asked educators to help with materials and presented those materials.

Researcher: “Children, this bowl contains square, round, square, red and yellow, large and small buttons. We also have the doll Anália.”

It was explained that the educator would select children to carry out tasks and that they should remove only the buttons indicated. This information was repeated twice.

Activity 2: Set decomposition

Theme: A party

Objectives: Identify common characteristics of objects.

Logical and mathematical skills: Classify and recognise shapes, colour and size.

Materials: Balloons of different sizes and colours; two small tables.

Criteria: One shared characteristic.

Procedures

In the meeting room, educators and I arranged children in a semicircle. I asked for help selecting eight children, four girls and four boys. First, I presented materials to the educators and asked that we select only balloons.



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Figure 6: Materials used in Activity 2. Figure 5: Children's arrangement in Activity 2.

Educator 2: "Children, we will play a game and form girls' and boys' teams. Girls will be Team A and boys Team B."

C26, C31, C1, C19, C27, C8, C30 and C6 were selected.

I showed the materials to all children and explained the activity.

Researcher: "Children, here are balloons of different colours, blue and white. There are also large and small ones; some are round and others oval."

I explained that, with all colours, sizes and shapes mixed together, the educators said they looked untidy. We would organise them into two boxes, but I did not know how to distribute them to make them look nicer, so the children would help arrange them in different ways. I suggested organising by colour, size and shape.

This activity involved three tasks: the first concerned colour, the second size and the third shapes.

Activity 3: Set comparison

Theme: Pens

Objectives: Match pens to caps within the picture.

Logical and mathematical skills: Learn first notions of quantity.

Materials: Introductory worksheets.

Criteria: One and two shared characteristics.

Procedures

All children present participated, seated in groups of two to four at each table. I distributed introductory worksheets and asked educators to help children find page 44, then reviewed the elements shown.

Researcher: "Children, inside the circle there are pens and caps."

I asked children to determine whether each pen had a corresponding cap.

Together with the educators, I visited each table to evaluate each child's activity, asking whether there were fewer pens than caps or fewer caps than pens.

In image 8, C28 uses one-to-one correspondence to determine whether there are more pens than caps or vice versa.

I asked C10: "Why are there more caps than pens?" She replied: "Because one cap is left over."

I ended by saying there were more caps than pens, that the educators greatly appreciated the children's work, and wishing them a good lunch.

Overall evaluation of the proposed activities after their first application

After implementation, children showed no fear of carrying out the activities, demonstrating that the researcher's methodological process for adapting to the instruments was appropriate for this age group.

Activities designed to develop logical and mathematical knowledge used varied procedures, activities, tasks, structured and unstructured materials, among other resources. Children found tasks challenging under the criteria established or agreed at the start, since they did not usually work collectively. Group tasks encouraged mutual help and strategies to achieve each final objective.

Set formation using balls and buttons naturally increased children's knowledge of different characteristics found in objects and enabled classification by colour, size and shape.

Set decomposition activities also included union tasks. Children separated and united objects according to the researcher's criteria. Some needed educators' or peers' help to finish successfully, but their performance demonstrated strong interest.

In set comparison, children interestingly determined quantities in the pictures presented for each task. This allowed the researcher to help them understand the first natural numbers. They identified the number of elements in each set and verbalised some natural numbers.

Children expressed themselves orally throughout. This did not occur at a predetermined time, but often when asked about tasks: "What did you do? How did you do it? What did you use?"

Human values and confidence were present in formation, decomposition and comparison activities: children helped and cooperated without disagreement, joyfully and with satisfaction. Formation, decomposition, union and comparison are therefore educational

processes in several dimensions. Work with sets creates conditions for acquiring basic mathematical notions and, especially, learning colours, shapes, sizes and objects' possibilities through play, alongside counting the first natural numbers.

Conclusion

Theoretical and methodological analysis established the need and importance of qualitative and quantitative formation, decomposition, union and comparison of sets for intellectual development at ages four to five. Participant observations and semi-structured interviews showed that educators possessed minimal theoretical and methodological knowledge of elementary Mathematics, particularly these set operations.

A proposal addressing qualitative and quantitative aspects was designed and applied through varied activities with simple and complex patterns, developing reasoning and problem solving while stimulating curiosity, imagination and commitment.

Results indicate a strong visual component, both in representations and in the use of concrete materials to model problem situations, involving exploration of shapes, colour, size and initial notions of natural numbers.

References

Alves, A. J. (Maio de 1991). O planejamento de pesquisas qualitativas. pp. 53-61.

Bertoso, E. B., & Mota, E. A. (2000). A ludicidade no ensino da matemática na educação infantil. Porto Alegre.

Bogdan, R. C., & Biklen, S. k. (1994). Investigação Qualitativa em Educação. Portugal: Porto Editora.

Hohmann, M., & Weikart, D. P. (2011). Educar a Criança. Lisboa: Fundação Calouste Gulbenkia.

Leonardo, P. P., Menestrina, T. C., & Miarka, R. (2014). A importância do ensino da matemática na educação infantil. I simpósio Educação Matemática em debate. Brazil: Jonville/sc.

Mata, S. S. (2012). O Ensino da Matemática na Educação Pré-Escolar e no Ensino do 1º Ciclo do Ensino Básico. Ponta Delgada .

MED. (2013). Programa Classe de Iniciação (Pré-Escolar). 2013: Editora Moderna, S.A.

Moreira, D., & Oliveira, I. (2003). iniciação à Matemática no jardim de Infância. Lisboa-portugal.

Oliveira, C. L. (Sd). Um apanhado teórico-conceitual sobre a pesquisa qualitativa: Tipos, técnicas e características. revistatravessia.

Pinto, D. M., & Pires, M. A. (2019). O ensino da matemática e a sua função na formação formação do indivíduo e de sua cidadania na eduducação. Scielo.

Prodanov, C. C., & Freitas, E. C. (2013). Metodologia do trabalho científico: Métodos e técnicas do trabalho científico e acadêmico (2ª edição ed.). Rio grande do Sul , Brasil: Universidade Feevale.

Ruiz, E. C., & Greciet, L. C. (2003). El porqué de las nociones elementares de matemática en la edad preescolar. Habana: Editorial Pueblo y Educación.

Ruiz, E. M. (2001). El mundo de las cantidades en la edades preescoalres. La Habana: Editorial Pueblo y Educación.

Santos, J. A., Oliveira, G. S., & Malusá, S. (2021). Conceitos matemáticos na educação infântil: Contribuições dos estudos de Jean Piaget.Scielo.