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Geography for Children: Drawing and Spatial Thinking

Geographie für Kinder: Zeichnen und Räumliches Denken

Geografía para niños: Dibujo y pensamiento espacial

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Zusammenfassung Räumliche Repräsentationen sind Teil des kartographischen und geographischen Alphabetisierungsprozesses. Dieser Aufsatz zielt darauf ab, die Zeichnungen als Repräsentationssystem zu analysieren. Sie gelten dabei als eine Sprache zur Kommunikation räumlichen Denkens, basierend auf der Beziehung zwischen Denken und Sprache im Rahmen der kulturhistorischen Theorie. Es werden drei Schwerpunkte angesprochen: räumliches Denken und Geographie in der Grundschule; die Beziehung zwischen Erfahrungen, Alltag und räumlichem Denken sowie räumliche Darstellungen durch Zeichnungen. Zeichnungen von Vorschulkindern werden als Möglichkeit zur Erweiterung des räumlichen Denkens und als Teil des kartographischen Alphabetisierungsprozesses vorgestellt. Die Idee, dass geographische Bildung Bedingungen schafft, um vorgefertigte Ansichten des Alltagslebens zu durchbrechen, ist die zentrale Achse dieser Forschung.

Schlüsselwörter Räumliches Denken, Kindheit, geographische Bildung

Abstract Spatial representations are part of the cartographic and geographic literacy process. This paper aims to analyze drawing as a representation system, a language to communicate spatial thinking based on the relationship between thought and language under the historical-cultural theory. Three main points are addressed herein: spatial thinking and Geography in primary school; the relation between experience, everyday life, and spatial thinking; and spatial representation through drawing. Drawings by preschool students are presented as a way of broadening spatial thinking and part of the cartographic literacy process. The idea that geographic education creates conditions to disrupt pre-established views of everyday life is the central axis of this research.

Keywords spatial thinking, childhood, geographic education

Resumen Las representaciones espaciales forman parte del proceso de alfabetización cartográfica y geográfica. Este trabajo pretende analizar el dibujo como un sistema de representación, un lenguaje para comunicar el pensamiento espacial a partir de la relación entre pensamiento y lenguaje bajo la teoría histórico-cultural. Se abordan tres puntos principales: el pensamiento espacial y la Geografía en la escuela primaria; la relación entre la experiencia, la vida cotidiana y el pensamiento espacial; y la representación espacial a través del dibujo. Los dibujos de los alumnos de preescolar se presentan como una forma de ampliar el pensamiento espacial y parte del proceso de alfabetización cartográfica. La idea de que la educación geográfica crea condiciones para analizar las visiones preestablecidas de la vida cotidiana que es el eje central de esta investigación.

Palabras clave pensamiento espacial, infancia, educación geográfica

1. Introduction

The dimensions involving both space and time are not spontaneously developed by children since these factors are coordinated in the environment they are inserted in, characterized by several cultural and social relations. One learns about the succession of activities since childhood. At school, while sharing a daily routine with other children and adults, children learn that there is a sequence of activities in particular spaces, for example. These mediations involving the space-time relation occur through and in the core of social and intergenerational relations, which are endowed with culture and produce culture as well, providing grounds for the human cognitive activity to be developed and broadened through the activities developed at school. In this sense, what symbolic languages contribute for the development of space and time notions in children's education?

This question comprises the historical and cultural conception that the development of a person results from the development of learning, and pedagogical interventions can create learning conditions and, consequently, development conditions, based on the relationship between thinking and language (Wiegand 2006). In this sense, we emphasize the importance of the formation of conscious people from an ontological perspective–not only epistemologically–that is, the formation of social individuals and their relation with the construction of the knowledge accumulated by humanity.

The present study, based on the theory developed by Heller (2016) and on the category of experience (Vygotski 2018), addresses the role of school education in broadening spatial thinking. Spatial thinking is a human cognitive activity developed throughout life and broadened through school activities; thus, it needs to be thought of as a factor that relates the basic education segments, i.e., preschool education and primary school. In previous studies investigating 4 to 6-year-old children in the school Cartography field (Juliasz 2012, 2017), I emphasized the importance of theoretical and methodological foundations to mobilize spatial thinking through contextualized activities and to promote and evaluate concrete conditions to broaden the human cognitive capacity of perceiving the space through concepts and spatial representations.

Considering the critical theory of subject formation, school education provides children with experience regarding non-everyday themes in a way that historically accumulated knowledge can dialogue with internal mediations, and geographic knowledge can broaden the spatial thinking developed by children from birth. Firstly, the main points to be considered for the development of Geography in primary school are presented, and, subsequently, preschool education is discussed to understand why this segment can provide a sound basis for more complex concepts and languages regarding geographic knowledge.

2. Geography in Primary School

The Brazilian school Cartography is aligned with Geography teaching and comprises different research segments, such as teacher formation curriculum, teaching materials, methodology, space representation and technologies (Almeida & Almeida 2012). In this scenario, there is a constant dialogue between the teachers' practice and the basic education curriculum. In Brazil, school is mandatory for children aged over four, who must be enrolled at pre-school education, periods that precedes primary and secondary education, in which Geography is included. To teach in primary education, a major in Pedagogy is required, while secondary education requires a major in Geography.

The cartographic literacy process precedes learning map codes, since it entails graphic language acquisition and the view of drawing as spatial representation. Despite them being aimed at different readers and having different purposes, drawing and Cartography have the same essence, namely the graphic representation, the first act of writing space.

Thus, investigations on drawing as a representation system and spatial notions in preschool education are of the utmost importance, as well as the understanding that human development throughout basic education entails the integration of different segments that include geographic themes developed in preschool.

The study of reality through Geography allows us to analyze, compare, create analogies and associate space variables, regarding space as a shared reality and a collective construction, rather than an individual experience. This reality requires understanding, since understanding how we live, the problems we have and what we desire enable us to become aware of the existing challenges and be committed to overcoming them. This is what the school's contribution should be.

At school, the child interacts with different types of knowledge produced from reality, in a constant dialogue between the subjects' knowledge and scientific knowledge, which is also historical, social, and cultural. To reflect upon Geography teaching in primary school, three factors must be considered: the specific Geography contents (representations and procedures), the conception of development (Educational Psychology), and the pedagogical approach (Didactics). This triad constitutes the teaching action, since it is based on the questions: Who is taught? What is taught? How is it taught? Why is it taught? The first step to understand the role this discipline plays in primary school, is to consider that its development involves a social and spatial practice.

Geography contributes to the analysis of the territory and of the use of natural elements, since it systematizes the reading of the world, the understanding of spatial formation, the production processes, and the relations between the social dimensions of people's lives. The analysis of a spatial problem requires answering the question *where?* using the geographic principles (location, distance, extension, distribution, and scale), since while analyzing a particular element of reality through Geography, we locate spatial objects, their distribution and distance, and limit their extension according to a possible scale, relating the spatial objects in their totality (Gersmehl 2008; Helfenbein 2010).

Through its principles, geographic education contributes to the recognition of cultural dimensions of different places and of the interaction between the different societies and the environment (Catling & Willy 2018). Therefore, we work with temporal and spatial scales to recognize, understand, and analyze the space generated by social relations. The geographic principles appear as an operational part, providing children with basic spatial notions for further complex analyses, since learning occurs through the construction of a concept net, in which each learned concept serves as a basis for another one. For instance, the location principle creates the relation between elements, in a situation of distribution and distance, allowing the understanding of the position of the spatial object beyond the intersection of two points on a plan, thus understanding the object in its spatial-temporal relation. The acts of observing, describing, and interpreting through geographic principles and concepts, allied to the cartographic representations, foster critical thinking.

In primary school, Geography teaching introduces the systematization of cartographic contents along with the recognition of elementary spatial and geographic notions. The learning process involving elements and principles that constitute the map, such as viewpoint and legend, is developed, and this process will subsequently allow the user to read, understand, and relate the information represented by the codes used in the map.

For the cartographic signs to have meaning, it is necessary that the subject can use the maps to reframe the spatiality of the observed phenomena, which requires complex factors from a cognitive point of view, since it allows the codification and the translation of the tridimensional space to the bidimensional vertical view, and this process demands the understanding, of both code and cartographic syntax.

Reading maps mobilizes and broadens the child's spatial thinking, articulating the reality with objects and phenomena represented by cartographic language. As cartographic language aims at allowing the child to read and write about the territory and get to know other places through maps to read the world, this process can be called cartographic literacy (Freire 1967), a process that allows the individual to access cultural literacy.

The assimilation of cartographic elements by the child will allow the observation and a thorough analysis of geographic aspects at different scales. In this sense, the child can get

to know the position of places and the connections of such places with others throughout time, allowing the comprehension of space as a product of the relational work of science, society, technology, and environment.

Cartographic analysis goes beyond looking at an image, it entails decomposing it and relating it to other representations and data, providing the child with the knowledge that rural space, rather than being homogeneous, is not the same as in the Brazilian space. To reach this type of analysis, the child begins the interpretative process by observing to describe, for example, the location, extension, and the distance of the studied phenomenon. To go beyond observation, it is necessary to analyze where, how, and why the things are where they are, their connections with human life, and their reflections on society.

Thus, it is necessary to understand the importance of studying a place in its totality, in a multi-scalar approach associated with a critical methodological conception of teaching and geographic science. The human condition itself presupposes its identification in space and time, cognitively surpassing the idea of *here and now* (Azanha 2011). Geography provides the prerequisites to carry out analysis at different scales and can broaden spatial thinking, involving ways of thinking and constructing knowledge beyond the immediate space. A geographic study through scales aims at addressing a dialectic relation, where some knowledge of a municipality can result in knowledge about the world and vice-versa. The Brazilian National Curriculum Parameters (Brazil 1998) mentions a problem regarding Geography, stating that, many times, the discipline is not clear, since it does not explain how local themes are present in a universal scope (and vice-versa), or how the geographic space materializes different times of society and nature.

Geography learning involves thinking about the location, the condition, and the connections between phenomena, understanding the social, cultural, and historical relations underlying the production of space. In this context, spatial thinking is the basis to analyze the phenomena from a geographical point of view, since the critical development of Geography enhances one's capacity to reflect upon space. Parellada and Castorina (2019) emphasize the need to deepen studies regarding spatial thinking in Cognitive Psychology, making them more complex to dialogue with critical Cartography.

Regarding the concept of scale, Lacoste (1988) emphasizes the importance of considering geographic objects with dimensions that differ from reality, as the global action is articulated with local actions. Thus, analyzing spatial dimensions requires a way of thinking that is inherent to Geography, since several factors are considered in the action of thinking about concrete or abstract spatial sets, revealing the epistemological and ontological importance of geographic knowledge while we are treating scientific knowledge and the formation of the person, a social being.

To create conditions for this type of thinking in primary school, the pedagogic actions have to consider geographic and pedagogical dimensions, aspects of cognition and human development, aiming at the development of children who are aware of their historical and social role. Preceding this educational stage, preschool education must provide opportunities for the development of elementary notions of space based on the experience and on the relations children establish with their knowledge.

3. Experience, Everyday Life, and Spatial Thinking

The ways to reflect upon space and time are part of everyday life, the activities that correspond to cultural everyday or non-everyday actions, and that can be also scientific, philosophical and artistic. The development of such notions by the child involves a particular way of thinking–spatial thinking–and requires investigations about teaching methodologies that, in turn, must consider the importance of the environment in the child's development (Catling & Martin 2011; Juliasz 2018). It is important to emphasize that, while not called *Geography* in the preschool curriculum, Geography is present in the development of the notions of space and time.

Preschool education is the first approximation to systematized knowledge, which does not mean accumulating information or deepening scientific content. The preschool education envi-

ronment is expected to develop systematized activities, since the child in this educational stage has to be provided with knowledge that will support the subsequent years, dialoguing with what has already been learned and progressively adding new readings and ideas. It is of the utmost importance to understand the meaning of preschool education and the concrete conditions that need to be created to meet the child's needs, thinking about the articulation of this stage with primary and lower secondary education, since such articulation lies on the pedagogical structuring of this educational segment. Regarded from a scientific view, the institutions (daycare centers and preschools) provide fertile and suitable contexts for learning and development, sustained by planned contents and procedures (Arce 2010).

In discussions with fellow researchers about the importance of studying spatial representations and geographic knowledge in preschool, some points were recurrent: learning occurs through the organization of chained concepts that are open, stabilized, and destabilized, in an ongoing process of construction to produce knowledge. To move into the systematized world of sciences is to encourage 4-year-olds, for example, to observe, describe, question, classify, and discuss the environment and spaces of their immediate world. The question is: Are not these some of the procedures we want to develop as Geography teachers? Mobilizing children to think about space and its relation in a systematized way is to contribute to the formation of a social individual, since an individual, other than as a member of society, would never develop qualities and characteristics that are the result of a methodical development of humanity (Vygotsky 2018).

While understanding and determining what to teach, we need to analyze the ways through which subjects are learned, and their teaching methodological foundations. Thus, the education process has to take into consideration the following child development aspects: (1) the organization of concepts; (2) awareness about the intellectual activity; (3) the relationship between the child and the knowledge. Bearing in mind the aspects regarding how to teach and how to learn, the environment should be considered, since it is a source for child development and is related to the subjects' experience, not merely an environment that, for containing certain qualities and characteristics, defines purely and objectively the child's development (Vygotsky 2018).

Children experience the environment, observe and perceive their surroundings in a way that their development is influenced by these external situations, which can be analyzed by their level of comprehension, that is, their awareness and ability to attribute meaning to what is perceived. The situations of the environment constitute the person, in a relation of externalities and interiorities, objectivities and subjectivities; therefore, it is not unusual to observe the same situation promoting different meanings in different children.

> When the child begins to walk, the world is expanded, and more and more relations between the child and the surrounding people are possible. Subsequently, the environment is modified through education and becomes specific for the child in each stage: in early childhood, the daycare center; at preschool age, the kindergarten; at school age, the school. Each age is related to a specific environment, organized for the child in a way that, when regarded as something purely external, it is modified in the landscape in the transition from one age to another (Vygotsky 2018, p. 75).

The relation between the child and the environment as a unit corresponds to the notion of experience, which reflects how the child becomes aware, assigns meanings, and effectively relates to a particular event. "Experience is the unit in which the environment is represented in an indivisible way, what is experienced. Experience is always related to something that is outside the person, and, at the same time, how the person experiences it" (Vygotsky 2018, p. 78). The same event can have a different meaning for the same subject at different ages.

Age is an important factor to be considered in the teaching and learning process, not considering a linear human development from a determinist and biological perspective, but for understanding that preschool children dialogue with and relate to other people, constructing meanings and senses, mainly through speech, which are also modified throughout the child's development. Children do not construct the same meanings as adults, since the word represents a generalization, a process that relies on complex cognitive activities for the formation of concepts. At preschool age, children's generalizations are more concrete, visual, and factual.

In the early years of life, the social environment is the important factor in helping children begin to use generalization. In babies, consciousness about the world around them is developed and modified through social interaction. Until the third year of age, perception is a central and differentiated function, with memory and thinking as subordinate but active functions. For pre-school children, memory becomes dominant and supports the development of thinking as a significant function. In effect, during this period perception, memory and thinking begin to interplay through cross-functional activity, socially stimulated and engaged.

But why is it important to know about cognitive functions? The answer is that when we plan a pedagogic action, we must know which is the dominant function at a particular age and understand the cross-functional relations. Therefore, in the preschool stage, the memory is fundamentally important; however, it is not independent, since it interacts with perception and imagination. The cognitive activities and their relations with teaching activities must provide children with conditions to assign meaning to the relations established in pedagogic action. It is necessary to observe who learns and how he/she learns.

The environment plays the role of a source for children's development, since "[…] for [the child] to develop, the ideal form, which interacts with the initial and conducts the child to development, needs to be present in the environment" (Vygotsky 2018, p. 87). School education contributes to this development based on the ideal form of humanization, considering the capacity of children to admire the world (Freire 1987).

The school is one of the environments where the child can be in contact with ideal forms, since it is an environment where knowledge is systematized and the child's experience can be broadened and the ideas about everyday life and spatial thinking are transformed. Spatial thinking is a human cognitive capacity present in everyday activities, as a walk in the city or inside the house without bumping into the furniture or even organizing a room or a closet. Young children think about the space they are in from an action and perception view, and from their experience, and as other cognitive functions are developed, such thoughts become more elaborated. Thus, the systematization of geographic knowledge broadens thoughts that are in the everyday action scope, in a dialogue between everyday and non-everyday aspects.

If the school has the objective of promoting scientific, philosophic, and artistic knowledge, it is expected to offer the ideal way to access and develop such systematized knowledge, bringing non-everyday life to the child's context. According to Heller (2014), the structure of everyday life is characterized by the mutual coexistence of the particular (individual) and the generic (human-generic). Arts and Science are considered ways to raise the individual to the human-generic dimension, since they are lasting objectivations materialized in history and culture; "[…] the artistic and scientific reflections disrupt the spontaneous tendency of the everyday thought, which is oriented to the individual-particular self" (Heller 2014, p. 43).

Arts and science demand reflections about their origins and meanings for humanity, and this goes beyond an individualized and subjective conception, since these subjects are associated with the development of humankind, and not with for-itself objectivizing, which raise thought from the everyday and become mediations for consciousness. "Individuals are not fully developed if their lives are limited to the everyday scope. When this happens, it is because the relationship between the individual and the everyday life is an alienated one" (Duarte 1999, p. 38).

Preschool education is the environment for the formation of the social being and for the development of the humanization process, where we can structure an ontological conception of spatial thinking within human cognitive activity, considering the conscious formation of human cognitive functions through school experiences.

If we consider the children's development from a longitudinal view, considering continuous learning between preschool education and primary school, spatial thinking is a common point throughout the process.

4. Investigation Path

The lack of methodology and theoretical support for preschool education with regards to spatial thinking can cause a dislocation of contents and practices developed for primary school to younger children. Spatial thinking develops gradually. It starts very early in life, begin-

ning with observation and the manipulation of objects by babies. As a baby begins to move through crawling, and into early walking, they become aware of the space they are in and what is in it, enabling them to begin to establish the spatial relationships of *in front* and *behind*, from one side to the other side, and *on* and *under*.

Children operate these spatial notions at home, in the mediation with adults and other children; however, such notions can be contextualized by the school and related to different themes regarding space. We conducted research based on the understanding of how children establish spatial relations in a teaching activity regarding Geography to investigate spatial representation considering experience and non-everyday aspects.

To establish some theoretical and methodological guidelines for pre-school education, I developed the research *Drawing as Representation System and Spatial Thinking: A Historical and Cultural Approach in School Cartography*. The study was developed through the analysis of graphic productions, speech, and gestures of children aged between 4 and 5 years and 11 months old performing Geography activities in three different schools. Three groups were analyzed, a total of 90 children, 30 in each group.

The methodology involved the presence of the researcher in the study field to allow a thorough understanding of the subjects' actions while developing their tasks in their habitual environment. The research techniques were previously published (Juliasz 2012, 2018).

This is a qualitative research study in which the activities and drawings were analyzed in accordance with theories of children's drawing development. The following aspects were considered: (1) creation of graphic equivalents–relation between graphic signs and real objects; (2) volume translation–the knowledge regarding the real tridimensional object is transferred to the graphic bidimensional space; (3) perspective–the possibility of creating objects from a vertical or frontal view, for example. These elements are part of cartographic literacy and are important to be considered when children map their everyday life.

The concepts of experience, everyday life, and the school context were taken as referential, and the drawing, as part of cartographic literacy, regarded as fundamental language to communicate spatial thinking. Drawings, just like spoken language, even in their early forms, are an important *language* children use to express their perceptions and images. Our main objective was to listen to the children, allowing them to interact, and understand how the school can provide conditions for the development of human cognitive functions through teaching activities. In this context the focus is on the spatial aspects of their development.

5. Spatial Thinking and the Drawing of Space

The representation of urban spaces is the result of the child's experience, frequently characterized by the movement of cars, streets and retail stores, as reported in the literature (Juliasz 2012). In dialogues with the children about the places they enjoyed visiting in the city, it was possible to find the most varied elements, since the children's perception is subjective and the images they have about the city are the result of their relationship with the environment and their memories, i.e., these images result from life experience. In this activity, children from one of the investigated groups (30 children) were asked to draw maps based on our conversation in the *yarning circle*. In that moment, they could talk about their experience and express their view of the city through the maps. "A child's play is not simply a reproduction of what he has experienced, but a creative reworking of the impressions he has acquired. He combines them and uses them to construct a new reality, one that conforms to his own needs and desires" (Vygotski 2011, p. 11). A sequence of actions in the space can be observed in Barbara's (5 years old) account:

> I drew my house. I went to the garden and picked this flower and gave it to my mom. I drew the building where my aunt used to live. I drew the river where I dive.

This was the account of a 5-year-old about her drawing (Fig. 1). The represented elements were classified into two groups: (1) personal (the alphabet learned at school, the teddy bear, the ball, the wardrobe the toy train railroad) and (2) general (the building, the house, the river, the garden). The city represented by the children in their maps brings aspects from their lives, such as their insertion in the world of letters, their toys and household elements, that coexist with elements present in the city and are

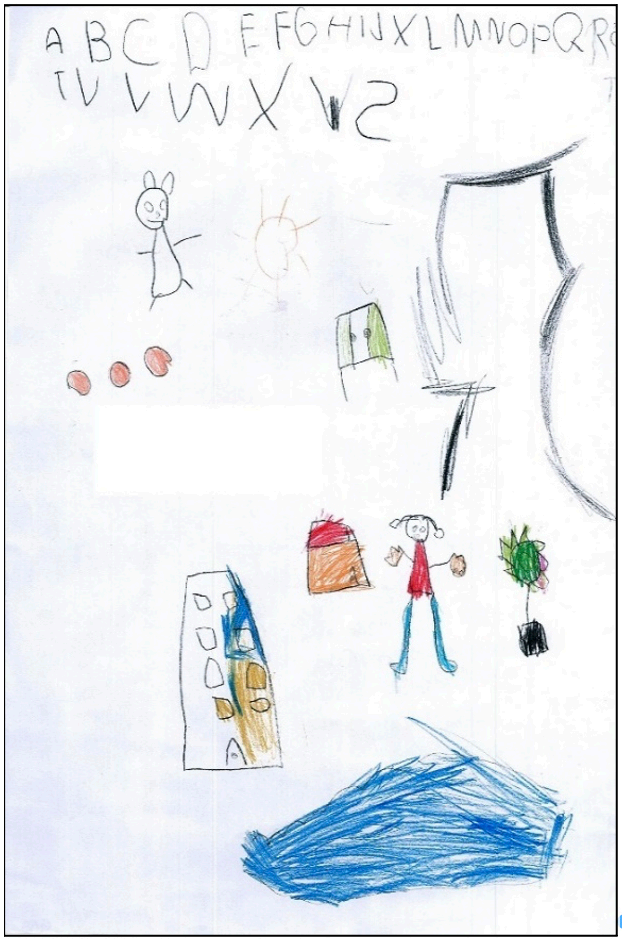

Fig. 1. The city by Barbara (five years old) (Source: Juliasz 2012, p. 152)

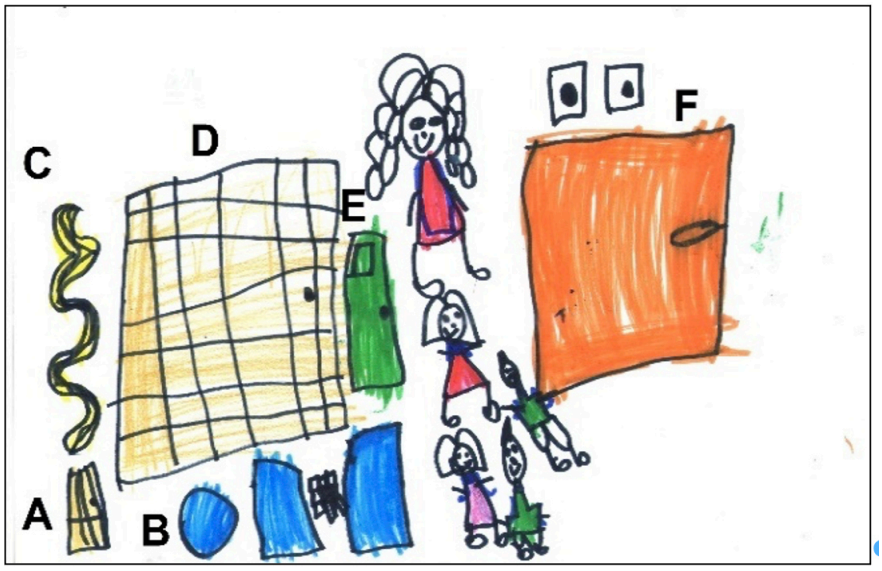

Fig. 2. The city by Nicole (five years and eight month old; source: Juliasz 2017, p. 107)

common to all the individuals who share the same urban everyday life.

Spatial representation occurs in a fragmented way, without visual connection between the elements, as a groundline or skyline, which serve as referential to organize the drawing as a whole. The drawings of *The City* and *The School* are collections of children's memories and mobilize the creation of graphic equivalents for real objects. The child deals with the problem of translating the volume of the real object into the graphic bidimensional space. Such problem is part of spatial representation and the process of cartographic literacy process. On the other hand, the speech–another representation of thoughts–reveals the sequence of actions described by the child while combining memory and imagination.

The child's map shown in Fig. 2 illustrates the occurrence of fragmented representation by preschool children (Juliasz 2017). The drawing entails different elements that compose the way to the school: a gate (A) followed by three swimming pools, in the foreground, at the bottom of the page (B), and, above, the way the children walk every day: a yellow ramp (C), a gate with bars (D), a door (E), and the classroom's orange door (F). The author of this drawing, Nicole (five years and eight months old) described the way to the classroom as follows: she passes through the gate, goes past the swimming pools, goes up the ramp, passes through the gate with bars and through the door, and finally finds the classroom, which has an orange door. Her narrative presents a spatial sequence that is not evident in the graphic space.

The space and time relation is fragmented at this age. When children start to establish a ground line in their drawings, we can assume a space-time sequence, since they are probably trying to present an organization of places and objects. In Fig. 1, the child drew different places in the city and, in Fig. 2, the proposal was to draw the way from the school gate to the classroom. Such activity was proposed because the school facilities are large (21,400 sqm) and many children did not know some of the spaces discussed, such as the administration building. Two different proposals along with the drawings show that representing their own space allows children to get to know it better. Furthermore, this type of activity creates experience situations, since children undertake a dialogue through languages of expression, such as drawing and speech. Listening to the children is fundamental to understand their actions and potentialities. The authors of the analyzed drawings showed the space-time relations in the verbal narratives about the drawings, which is not expressed in the graphic space expected from an adult's point of view.

I developed a teaching activity for 5 to 6-year-old children based on a story about what existed under the ground and observed different spatial representation, regarding both their form and content. The activity revealed the presence of cultural factors, such as the representation of dead people buried, elements of children's stories as ghosts, religious beliefs, and knowledge acquired at school. All the groups mentioned these factors, showing that this imagery was repeated in different contexts. This demonstrates that children's drawings are influenced by their culture and portray children's imagination.

In Fig. 3, the drawing by a 5-year-old brings meanings and symbols of the culture and the society in which the child lives, since it portrays someone weeping after someone else's death and a funeral ritual. In Fig. 4 and Fig. 5 we can see the representation of a devil and ghosts, demonstrating that the memory–predominant cognitive function at this age–is associated with another function: the imagination. In other words, what the child imagines is constructed by memory elements and new combinations in the creating activity are established.

Fig. 3. Cultural elements in space drawing by five-years-old Elisabeth (Source: Juliasz 2017, p. 68)

Fig. 4. Religious beliefs by five-years-old Laura (Source: Juliasz 2017, p. 118)

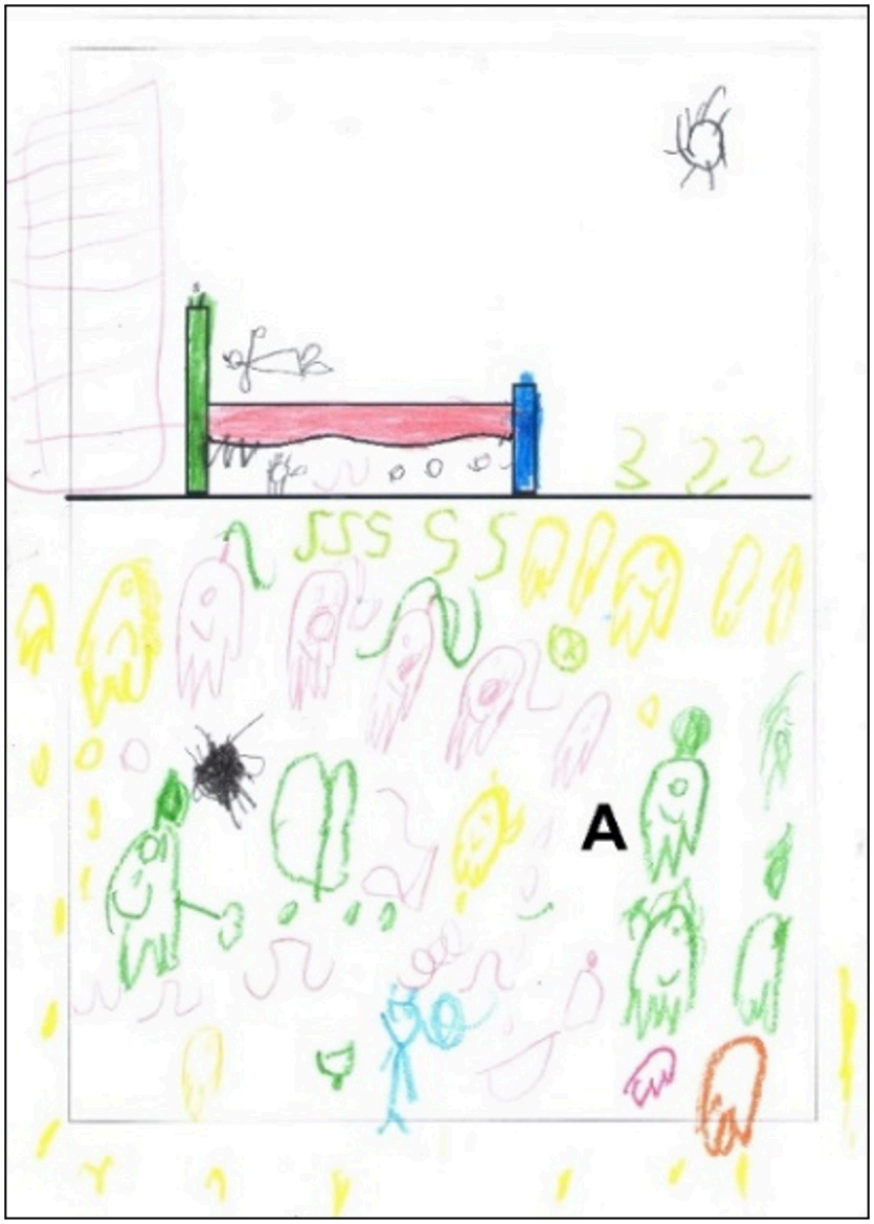

Fig. 5. Fantasy in the drawing of space by Hugo (5 years and two monts old; source: Juliasz 2017, p. 118)

6. Discussion

According to Vygotsky (2018), human development is the result of the mediated relationship between the subject and the environment, that is, the subject experiences the environment internalizing and externalizing signs that are gradually arranged into a symbolic system and formulates meanings from social and collective constructions. The activities that mobilize spatial thinking can create conditions for the child to access and explore different places beyond the immediate space which is their everyday space. The way a child represents a particular space demonstrates his/her own way of imagining and thinking about the organization and the use of such space.

Spatial thinking can be broadened and systematized through geographic knowledge, since analyzing the relations between the social and physical/natural aspects demands understanding, for example, location, extension, and distance. The concept of location is fundamental for understanding simple or complex space notions. According to Pérez Esteves et al. (1998), two conceptions of space must be considered, especially regarding cartographic representations, namely an external view and an internal one.

The external view coincides with absolute space and consists of a geometrical view whose expression is centered on the map, which in turn presents a reference point for a particular location according to latitude and longitude. As external figurative representations, maps differ from other types of representations, such as photographs, in that the former include a series of arbitrary signs, as circles, dots, dotted lines, and so forth.

The internal view corresponds to the subjective dimension, not only in relation to the subject itself, but also in the symbolic mediation with the others. From birth, the child experiences the space and forms objective and subjective images, since children perceive the situations according to their own mediations. The school provides children with a framework to understand spatial information, allowing them to think about space and its relations and enabling them to create new maps and new external and internal views, and, in this process, a relation between language, representation, and a new way of thinking–the spatial–is created.

The spatial representation (a drawing, for example) is a way to concretize spatial thinking and provides us with information about the children's reading of reality, allowing them to express imagination and memory (the predominant cognitive functions in preschool age) about an object or a place. The drawing of space, while part of cartographic literacy, consists of a representation system that precedes the act of reading and drawing a map and fosters the creative activity of the children through the relationship between imagination and memory. This type of spatial representation allows embryonic relations between the geographic principles, such as location, and those associated with Cartography while creating codes and equivalent graphs.

From a child's drawing, we can investigate the spatial organization in the graphic space, understand which element of the scene establishes a set relation, and then understand the child's point of view. The drawing expresses spatial thinking, which consists of the human cognitive capacity to think about referentials, movements, orientation, and information in and about the space. When a child draws a place, a creative activity is developed through the cognitive mechanisms of memory and imagination, resulting in a graphic and mental representation. The drawing opens the doors for us to understand the children's perception and conception of the space, since it is the projection of the spatial perception experienced by the child on a piece of paper.

The children's drawings represent spatial knowledge developed through the child-environment-relation, that is, the experience, and favors reflections about the possible relations between the geographic principles, such as location involving notions of graphic representation, and the creation of graphic equivalents, and the problem of volume projection on the bidimensional plan. Space is a fundamental category in human thinking and is mediated by cultural signs of social relations. Moreover, it is expressed in children's draw-

ings, which allows us to regard the environment as a source for spatial thinking development. Spatial representation is modified throughout life by one's experience (subject-environment unity) and by the possibilities of developing objectivations for itself, in a dialogue between everyday and non-everyday aspects. According to Heller (2014), there is no *Chinese Wall* between the everyday and the non-everyday praxis or the non-everyday thinking; however, there are infinite types of transition.

Drawing is a language and represents the child's first written expression, a graphic representation which comprises elements of cognition, culture, motor development, and affectivity. Thus, in the school Cartography context, as the first graphic expression, the drawing is the onset of spatial representation, preceding cartographic knowledge and its symbols. The drawing consists of a language and of a symbolic activity that creates experience conditions and objectivations for itself when the pedagogic proposal is embedded in intentionality.

Thinking about environmental space involves perceptions and memories, higher cognitive functions that, together with inferences, generalizations, and descriptions, problematize the organization of space. Children's drawings express the relation between how spatial thinking and graphic language, representation and mind, are inserted in the culture.

The development of graphic representation by children is based mainly on the relation between memory and imagination and on the connections between speech and thinking. Drawing is a way to concretize spatial thinking and the creative activity can be the basis to construct knowledge about space. Drawings of environmental space by children demand intentionality and awareness, i.e., they introduce notions of drawing as representation.

In the context of geographic knowledge and school Cartography, the activities developed at school contribute to spatial thinking, broadening it based on notions of location and other spatial representation aspects–the creation of graphic equivalents, volume translation, and perspective. In this sense, as a human cognitive activity, spatial thinking is developed and broadened throughout school education–from the preschool period–as the subjects observe, perceive, describe, and establish relations from the teaching activities proposed by their educators.

7. Final Considerations

Spatial thinking development has its onset prior to the primary school years, i.e., before Geography starts being formally studied, since the child interacts with people thorough speech, names, places and objects, manipulates objects, and deals with spatial organization.

In the case of school activities developed by the teacher, spatial thinking can be broadened and systematized.

At preschool age, the child understands a problem and develops functional equivalents to the adults' concepts; however, children are not capable of operating at a more complex conceptual level, since the ways of thinking are different. In this sense, the school can develop the non-everyday aspects and provide conditions for the child to be in contact with knowledge, interact with the environment and develop the cognitive functions. It is important to note that in this stage their development occurs through expressive languages that mobilize memory and imagination, fostering a creative dialogue with adults and other children. This leads us to reflect about the problem of using manuals and textbooks in preschool education.

The spatial experiences that the child brings to school must be considered to create systematic teaching activities aimed at mobilizing spatial thinking through geographic themes, such as city, subsoil, and soil. Thus, in the present investigation of the non-everyday aspects, I considered the epistemological (theoretical and methodological construct of science) and ontological (theoretical-practical construct of the child and the social context) importance of school geographic content in addressing the scientific knowledge and the formation of a social individual, the geographic dimensions, the development of higher cognitive functions, and the human capacity of thinking about space.

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