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Scientific Literacy in Childhood Education: experience in a countryside school in times of pandemic

Lia Heberlê de Almeida[1], Elenize Rangel Nicoletti[2], José Vicente Lima Robaína[3],
[1, 3] Universidade Federal do Rio Grande do Sul - UFRGS. Programa de Pós-Graduação em Educação em Ciências. Rua Ramiro Barcelos, n. 2600, bairro Floresta. Porto Alegre, Brasil. [2] Universidade Federal do Pampa - UNIPAMPA.

Author for correspondence: lia_ha@hotmail.com

ABSTRACT. The present study analyzed the implementation of a set of activities in Early Childhood Education, based on the methodology of the Islands of Rationality (Fourez, 1997). The qualitative research was carried out remotely in two Pre-School classes in a rural school in the city of São Gabriel/RS, during the year 2020. Different methodological strategies were used, such as drawings, observation of the surroundings of their homes, the local landscape, interviews with family members, listening to the radio, writing poems, and producing models. Data are presented according to three categories: i) Reflections on remote work at Escola do Campo; ii) The IIR methodology in Early Childhood Education and iii) Scientific Literacy in Preschool. Remote work brought some challenges, especially in Early Childhood Education, considering the need for interaction between subjects and teacher mediation. It was found that learning took place in other spaces and times, mainly in the interaction with family members and in the observation of the social and natural environments of their surroundings, being important for the construction of the identity of the subject of the countryside and the appreciation of cultures and knowledge. locations. The use of the IIR methodology in Early Childhood Education is in line with the Experience Fields signaled by the National Curricular Common Base (Brasil, 2017). It is concluded that some skills related to Scientific Literacy, such as autonomy, mastery, and communication can be achieved with the development of an IIR in Preschool, even if remotely.

Keywords: preschool, interdisciplinary project, remote learning.

Alfabetização Científica na Educação Infantil: experiência em uma escola do campo em tempos de pandemia

RESUMO. O presente estudo analisou a implementação de um conjunto de atividades na Educação Infantil, baseadas na metodologia das Ilhas de Racionalidade (Fourez, 1997). A pesquisa, de caráter qualitativo, realizou-se de forma remota em duas turmas de Pré-Escola em uma escola do campo no município de São Gabriel/RS, durante o ano de 2020. Foram utilizadas diferentes estratégias metodológicas, tais como: desenhos, observação do entorno de suas casas, da paisagem local, entrevistas com familiares, escuta de rádio, elaboração de poemas e produção de maquetes. Os dados são apresentados segundo três categorias: i) Reflexões acerca do trabalho remoto na Escola do Campo; ii) A metodologia IIR na Educação Infantil e iii) Alfabetização Científica na Pré-escola. O trabalho remoto trouxe alguns desafios, em especial na Educação Infantil, considerando a necessidade de interação entre os sujeitos e mediação do professor. Verificou-se que a aprendizagem ocorreu em outros espaços e tempos, principalmente na interação com os familiares e na observação dos ambientes sociais e naturais do seu entorno, sendo importantes para a construção da identidade do sujeito do campo e a valorização das culturas e dos saberes locais. A utilização da metodologia das IIR desde a Educação Infantil vai ao encontro dos Campos de Experiência sinalizados pela Base Nacional Comum Curricular (Brasil, 2017). Conclui-se que algumas habilidades relacionadas à Alfabetização Científica, como a autonomia, o domínio e a comunicação, podem ser alcançadas com o desenvolvimento de uma IIR na Pré-escola, mesmo que de forma remota.

Palavras-chave: pré-escola, projeto interdisciplinar, ensino remoto.

Alfabetización Científica en Educación Infantil: experiencia en una escuela rural en tiempos de pandemia

RESUMEN. El presente estudio analizó la implementación de un conjunto de actividades en Educación Infantil, a partir de la metodología de las Islas de la Racionalidad (Fourez, 1997). La investigación cualitativa se realizó de forma remota en dos clases de preescolar en una escuela rural en la ciudad de São Gabriel/RS, durante el año 2020. Se utilizaron diferentes estrategias metodológicas, tales como: dibujos, observación de los alrededores de sus casas, el paisaje local, entrevistas con familiares, escuchar la radio, escribir poemas y producir maquetas. Los datos se presentan según tres categorías: i) Reflexiones sobre el trabajo a distancia en la Escola do Campo; ii) La metodología IIR en Educación Infantil y iii) Alfabetización Científica en Preescolar. El trabajo a distancia trajo algunos desafíos, especialmente en Educación Infantil, considerando la necesidad de interacción entre sujetos y mediación docente. Se encontró que el aprendizaje se dio en otros espacios y tiempos, principalmente en la interacción con los miembros de la familia y en la observación de los ambientes sociales y naturales de su entorno, siendo importante para la construcción de la identidad del sujeto del campo y la apreciación de las culturas y los conocimientos. El uso de la metodología IIR desde la Educación Infantil está en línea con los Campos de Experiencia señalados por la Base Común Curricular Nacional (Brasil, 2017). Se concluye que algunas habilidades relacionadas con la Alfabetización Científica, como la autonomía, el dominio y la comunicación, se pueden lograr con el desarrollo de un IIR en Preescolar, aunque sea a distancia.

Palabras clave: preescolar, proyecto interdisciplinario, enseñanza a distancia.

Introduction

In Early Childhood Education, learning should be based on processes of enculturation and emancipation of the subjects, building support networks with school partners and members of the local community. Thus, it is necessary to invest in methodologies that stimulate children's autonomy and protagonism, and that promote this approach with the school community. The methodologies that articulate the acts of playing and socializing in playful, pleasurable situations that involve toys and games are the most appropriate for children.

Among several existing methodological possibilities for the classroom, this study reflects on the limits and possibilities of using the methodology of Interdisciplinary Islands of Rationality (IIR) for the development of practices in Early Childhood Education that promote Scientific Literacy from an early age. The case study presented here investigated the implementation of an IIR that occurred illy a remote way in a Rural School in the countryside of Rio Grande do Sul (RS). The research occurred in a pandemic context, in which schools adapted their pedagogical practices, seeking different ways to contact their students and socialize knowledge.

In this scenario, we invested in activities that the children could do independently, without needing constant adult guidance for long periods. During the planning process for Early Childhood Education, the routine of the children's families was taken into consideration, especially that of working parents who had two or three children of school age to attend to. The impacts of not maintaining the school bond, if the activities were not sent, were also evaluated. Once it was decided that the activities would be kept in a remote format, subsidies were sought to structure proposals that would involve the students and could be guided, even if remotely by the teacher. Then, a proposal arose from the Municipal Department of Education (SEME) of the city of São Gabriel, RS, for the entire network to address the issue of 'Housing'. In 2020, the municipality joined the International Association of Educating Cities (AICE), becoming an Educating City. The first action of the movement was the project entitled "São Gabriel - my educating city", with the objective of "developing the concept of Educating City for the school community of the Municipal Schools of São Gabriel/RS" (São Gabriel, 2020). Among the initial purposes, it aimed to bring the students closer to their local context.

The Field School analyzed in this work creates, then, the subproject 'Housing in the Field' to value and investigate the local context of the children, analyzing the surroundings of the residences as a power for citizen formation, using the knowledge of the place and their

family habits. The proposal developed as an interdisciplinary project, is based on the analysis of the Fields of Experience of the Common National Curricular Base (BNCC, and is structured in eight stages that involve the participation of students enrolled in pre-preschool their families. It seeks to analyze how a set of activities developed remotely with a kindergarten class can contribute to the Scientific Literacy of the participants.

Interdisciplinary Islands of Rationality: a possibility in Early Childhood Education

Preschool-age are naturally curious and observant, they make their discoveries based on many questions to adults and formulate hypotheses about the situations experienced in their context and the stimuli offered to them. In these relationships, through social, cultural, and environmental interactions, they build their identity.

To meet the specificities of Early Childhood Education, it is necessary to think of a pedagogical practice that contemplates the exercise of citizenship, with the child understood as a subject capable of transforming his or her reality.

Lorenzetti and Delizoicov (2001) defend the importance of the debate about the role of citizenship in the formation of children. Contextualization is a determining factor for the construction of meanings by students so that they can build their knowledge from a new look at Everyday elements since scientificity is related to the most basic human needs such as food, health, and housing (Shen, 1975, cited by Lorenzetti & Delizoicov, 2001).

The emphasis on working with different approaches in Early Childhood Education raises "print educational intentionality to pedagogical practices" (Brasil, 2017, p. 38). Project-based methodologies, among them the IIR, can subsidize these practices, with a work proposal from the perspective of Scientific Literacy (Fourez, 1997).

This methodology aims at participative teamwork and relations between the different areas of knowledge, as well as the active participation of students since it values their previous knowledge, investigation, and research on the object of study. The construction of an IIR aims to relate the knowledge from the areas of knowledge to everyday knowledge and organized a theorization, that is, to provide a proper understanding of a given subject.

The proposal advocated by Fourez (2005) involves concepts from different disciplines, which form a network of knowledge that provides teachers and students an overview of the object of study in several aspects. Nehring et al. (2000, p. 95) explain that "the definition of what will be done in the activity is not determined by the various disciplines linked to the

theme, but by the project, its purpose, and its context". Although structured in eight steps, the author states that during the course of the Project, there is no need to fulfill all of them linearly, because "they are flexible and open, in some cases being able to be suppressed and/or revisited, as many times as the team judges necessary" (Nehring et al., 2000, p. 96).

Methodology

For organizational purposes, the methodology will be presented in two parts. The first seeks to detail the format of the research as to its nature and form of data analysis. The second presents what was developed with the students emphasizing how the activities were structured and detailing which materials were analyzed.

Methodological design

The research is configured as a Case Study, which according to Gil (2002, p. 54) aims to "preserve the unitary character of the object studied; and describe the situation of the context in which a given investigation is being conducted. To this end, qualitative research was conducted, using Pope and Mays' (1995 cited by Neves, 1996) explanation that qualitative methods contribute to the researcher with a mixture of rational and intuitive procedures capable of contributing to a better understanding of phenomena.

The implementation of the project occurred for two weeks between the months of July and August 2020 in a rural school, 76 km away from the urban area of the municipality of São Gabriel, RS. The activities occurred entirely remotely due to the emergency of the Covid-19 Pandemic. The researcher is also the teacher of the classes participating in the research.

We analyzed materials produced by 12 students enrolled in Early Childhood Education, six from Pre-A (4 years old) and the other six from Pre-B (5 years old). The productions analyzed were: printed activities; interviews recorded in videos and written; production of drawings; collages; paintings; construction of models, and elaboration of poems. To organize and analyze the research data, we used the principles of content analysis (Bardin, 2004), defining the analysis categories as a *posteriori*.

Pedagogical design

To structure the project, the off regulations were sought, being supported by the learning and development objectives brought by the BNCC (Brazil, 2017) for Early Childhood

Education. Chart 1 systematizes the Fields of Experience provided for Preschool (Young Children, 4 years to 5 years and 11 months) in the document.

Chart 1 - BNCC Fields of Experience considered when structuring the Early Childhood Education Housing Project.

Understanding Learning	**Alphanumeric code**	**Learning and development objective Young children (4 years to 5 years and 11 months)**
The self, the other, and the we	EI03EO03	Expand interpersonal relationships, developing attitudes of participation and cooperation.
	EI03EO04	Communicate your ideas and feelings to different people and groups.
	EI03EO06	Express interest in and respect for different cultures and ways of life.
Strokes, sounds, colors, and shapes	EI03TS02	Express themselves freely through drawing, painting, collage, folding, and sculpture, creating two- and three-dimensional productions.
Listening, speaking, thinking and imagination	EI03EF01	Express ideas, wishes, and feelings about their experiences through oral and written language (spontaneous writing), photos, drawings, and other forms of expression.
	EI03EF02	Invent singing games, poems, and songs, creating rhymes, alliterations, and rhythms.
	EI03EF04	Recount stories heard and collectively plan scripts for videos and performances, defining the contexts, the characters, and the structure of the story.
	EI03EF09	To raise hypotheses about written language, making records of words and texts, through spontaneous writing.
Spaces, times, quantities, relationships and transformations	EI03ET01	Establish comparison relationships between objects by observing their properties.
	EI03ET02	Observe and describe changes in different materials, resulting from actions on them, in experiments involving natural and artificial phenomena.
	EI03ET03	Identify and select sources of information, to answer questions about nature, its phenomena, and its conservation.
	EI03ET04	Record observations, manipulations, and measurements, using multiple languages (drawing, recording by numbers, or spontaneous writing), in different media.
	EI03ET05	Classify objects and figures according to their similarities and differences.

Source: Adapted from Brazil (2017).

Table 2 summarizes the IIR implemented in Early Childhood Education. In addition to the eight stages foreseen by the author, there is the stage of organizing the teaching work (stage zero).

Chart 2 - Description of the stages of the Housing Project implemented remotely in a Field School in Early Childhood Education (continued).

Steps	**Description**	**Objectives for the research**
STAGE 0: Island Organization	Planning the actions of the project remotely. Sending the following materials to the students:	Prepare and organize the project
	- Timeline; Iinstructional material for parents; - Activities for students.	
STEP 1: Cliché	Answer and draw activity to the question, "What kinds of houses do you know?"	Understand children's prior knowledge.
STAGE 2: Spontaneous overview	Choose an expert. It can be someone from the community, a grandparent, an uncle, or a neighbor, among others. Then answer: "Who did you choose? Why?", "What is your affinity with this person?"	Understand children's prior knowledge.
STEP 3: Consultation with the experts	The radio program aired on July 31 with the guest expert, Geography teacher, and mediator of the class teacher (1st author of this work). Soon after listening to the program, the students registered with drawings in the material sent to them the types of dwellings they got to know through the radio program.	Deepen and socialize the knowledge about different dwellings
STEP 4: Going into the field	Interview the chosen specialist, using the questionnaire structured by the teacher and with the guidelines for recording the answers (it can be through video, audio, or with the help of a family member in written form).	Develop an investigation. Raise hypotheses from the dialogue with the expert. Understand changes in nature over time.
STEP 5: Opening Black Boxes with Expert Help	With the help of their parents, the students talked about the different "animal dwellings", a representative way of providing an insight into the animals' habitat. And with reusable materials, they built a birdhouse. They answered some questions sent by the teacher.	Understand lea ing. Produce a material, using autonomy.
STEP 6: Global Schema	Through printed activities (cutting, pasting, and painting) the students learned about the rooms of a house. The task was to build a small model of their favorite room in their house.	Understanding Learning
STEP 7: Opening Black Boxes Without Expert Help	Through printed activities, the students were instigated to observe the dwellings, living beings, plantations, and vegetation near their homes.	Developing an investigation

Source: own elaboration (2022).

Chart 2 - Description of the stages of the Housing Project implemented in a Field School remotely in the Early Childhood Education (conclusion).

Steps	Description	Objectives for the research
STEP 8: IIR Synthesis	The students had contact with the poem "The best place in the world" by Noele Berger, after which they were challenged along with their parents to compose a poem or verse about Azevedo Sodré (the place where the school and most of the students are located).	Understanding Learning

Source: own elaboration (2022).

During the pandemic period, the pedagogical activities were prepared and organized by the teacher and sent to the directive team, which organized and separated the activities according to the bus lines. Soon after, the activities were sent by school transportation to be taken to the students' homes every two weeks. At each biweekly visit to the student's home, there was an exchange of materials, that is, the student delivered the activities for correction and received new activities to be performed. In the case of this project, only a fortnight was used.

Results and Discussion

Organizing remote work for young children in a rural school was a challenge at the same time as those several reflections. Thus, three categories emerged from the results: i) Reflections about remote work in a rural school; ii) The IIR methodology in Early Childhood Education, and iii) Scientific Literacy in Preschool.

Remote work in the Rural School

The writing of this text took place in early 2021 when the pandemic of COVID-19 lasted about a year. The social distance provided countless feelings: joys, learning, overcoming, uncertainties, and anguish. In this tangle of feelings, the place to be and to do teaching was taken away: the school ground. Each day the desire to create ways to be present increased, to express and reaffirm that teachers were present in the search to welcome the other. Thinking about the reality of Preschool Education in rural schools, it was necessary to consider the difficulties of continuous access to the *internet*. Of the six students in Pre-school (Pre-A), one had access to the *Internet* every day (because he had Internet via radio and lived near a signal tower); one had *Internet* via satellite, and the others only had Internet via pre-paid cell phones owned by parents or guardians. The latter usually had no access to the *Internet*, either because

of a lack of credit or because of the lack of signal in their homes in the countryside. Among the six preschool students (Pre B), two had *internet* via radio, and the others only with access via prepaid plan.

It is worth noting that two students had more siblings and only one cell phone at home, without *internet* access, with a signal only for phone calls. One of them, when contacted, was usually the father who answered during his work on the farm. A message was then left for the student, asking him to call back if possible, or the call was returned at night because that was the time the child's father was home. Even so, a *WhatsApp* group was created for communication and sending general messages, photos, and videos. Most parents reported that they could only see the messages when they came to the city.

Before thinking about the pedagogical part, it was necessary to conceive the children in their totality, considering the local context and its relations, with ethical, gender, religious, cultural, racial, and ethnic issues and their respective economic and social relations. Listening to the children and their families was the first strategy. It was necessary to reinvent the practices aligning the possibilities of the moment, the conceptions and legal frameworks in force, the needs of the children and their families, in addition to the technological possibilities. We sought equity in the educational process and universal access by sending printed activities and a timetable with guidelines, as well as calls and messages to complement the information sent. In this way, nonpresidential pedagogical activities were sent in printed form using school transportation, arriving fortnightly at the students' homes. At this moment, the students also sent the previous activities to be corrected by the teacher, thus also complying with the municipal administration's propositions.

During the pandemic, it was observed that virtual media entered the homes of families with school-age children. Thus, it was decided not to abandon some principles, such as the choice of media to be used. The curriculum states that children should not use screens, especially until they are 2 years old (WHO, 2019). After that, a few hours of contact with screens is recommended, which requires caution when guiding excessive use in school tasks. Based on these perspectives, the non-use of media is justified, favoring the "care" and "education" provided for in the BNCC. Caring in the sense of caring for the health of children and educating in the sense of educating for social differences and inequalities, favoring a proposal that would reach all students, in which everyone could participate and receive the activities.

It is noteworthy that some stages received feedback from all the children, however, some activities came up blank. Teacher Rute Neves, in an interview for *Nova Escola* magazine about rural schools in quarantine, states: "Many parents do not have completed high school, so it is difficult for them to help their children. That is why I started to give more detail in the activities, for example" (Bimbati, 2020). This account resembles the reality of the families of the classes in this research since culturally the rural people start working in the field very early, which is more valued than education.

The idea of educating children through non-face-to-face pedagogical activities is challenging because early childhood education is constituted in collective spaces. The pandemic required the reinvention of pedagogical practices from a context with little access to the *internet*, with the use of radio media and, as the main source of communication, activities accompanied by instructions and schedules.

However, we sought to build a process of experiences in this differentiated context, considering the importance and responsibility of education, especially for these children, sons, and daughters of workers, family farmers, rural workers, and landless people, among others who, based on their knowledge and practices experienced and shared, build their own and collective identities. Thus, childhood, family, and the school can be considered social constructs of this historical time.

IIR on the topic of housing in Early Childhood Education

In the returns from the first week of sending the activities, the mothers reported that the children were happy to receive the activities, and some were doing a greater number than the suggestions sent. The families in the classes analyzed, for the most part, consist of two to three school-aged children in the family group. As some were receiving the activities in elementary school, the children in kindergarten were also expecting to receive activities.

Initially, the children were challenged to illustrate the types of houses they knew. This activity was planned to involve four Fields of Experience and explore learning and developmental objectives. In this way, they were expected to be able to: "communicate their ideas" (EI03EO04); "express themselves freely through drawing, painting, collage" (EI03TS02); "raise hypotheses regarding the written language" (EI03EF09); and "classify objects and figures according to their similarities and differences" (EI03ET05), (Brazil, 2017). In the step called Cliché, children illustrated the types of houses they knew through drawings

that represented houses [BNCC objectives - EI03ET04; EI03ET01 (Brazil, 2017)]: (1) "wooden and cement"; (3) "brick and wood"; "board and brick"; (1) "house, hut, building and apartment". Three students sent audio: "board and brick"; "house and shack"; "I know this house". In all activities, there were instructions for parents or guardians, and parents were asked to transcribe the answers, using exactly the words of the child, with apace to parents' records and children's drawings.

Step 2 was the time for the children to choose the experts. The activity was designed to allow them to obtain information about the houses from different sources [BNCC objective - EI03ET03 (Brazil 2017)]. The choices included: dad (1), grandma (5), and grandpa (1).

Step 3 was thought of using the Radio Program with the invited expert, a Geography teacher, to deepen information about the theme under study. Immediately after listening to the program, the students recorded the information using drawings. Of the total of 12, only three students did not answer and informed that they did not own a radio.

Step 4 was planned to provide an investigation, where the student should select an expert (defined in step 2), and that, the dialogue, they could raise hypotheses. It was a moment when they had contact with different cultures and ways of life of their ancestors [BNCC objective - EI03EO06 (Brazil, 2017)].

During the interviews, the students or their parents or guardians could record audio or videos. They could also transcribe it into the printed material sent to them. At this stage, three students sent videos, two sent audio and the other three interviews were transcribed in the printed activity. Chart 3 presents the interview questions forwarded by the teacher in advance and the answers of the selected experts.

Chart 3 - Interview questionnaire with the experts (continued).

Interview Questions	**Answers from the experts chosen by the students**
What kinds houses do y know?	"Grandma knows houses made of planks, of materials, Grandma has seen and lived in a house of clod, and I've also seen a house of wattle and daub. A casa de torrão is made of a clay slab, and a pau a pique house is built with a frame, and the walls are made of bamboo squares, all the ends are tied, and then the whole wall is covered with clay, the clay is beaten well and stuck, hit hard on the wall, and it sticks there, It is a very good house for the winter, very warm, and very cool in the summer. Some are covered with zinc, with tiles, and others with Santa fé grass, Santah hardly exists today" (Expert 1)
	"I know the brick house, board house, I know various kinds of houses" (Expert 2)
	"I know houses made of material, of wood, and I've seen mud houses too" (Specialist 3)

	"I know the house with a clay wall, and the roof is made of grass, and the floor is made of dirt. And the house that I live in here, is my house, very old, more than 200 years, is the house of my husband's grandfather, and it is a clay wall with stone, and the wall is 40 cm wide, and the roof is made of grass" (Specialist 4)
	"Of brick and wood" (Specialists 5, 6, 7, and 8)
And the animal house, which ones do you know?	"The only houses I know, the rabbit's house, which is a hole in the ground, and João Barreiro's, which he builds in a tree out of clay with his beak" (Specialist 1)
	I know, I know a dog's house, a bird's house, and a layman's house" (Expert 2)
	"Porongo, cardboard and dog" (Expert 3)
	"I know the little house that we have here, which is for our dog, for the pig, and for the chickens, which is the chicken coop, and for the kitten, little house for the kitten too" (Specialist 4)
	"João de Barro's house, and the dog's house" (Expert 5)
	"Did not answer" (Expert 6)
	"Wood" (Expert 7)
	"Bird and dog" (Expert 8)
Here where your home is, has life changed much over the years? What have you noticed that has changed?	"Not much, but there were some changes, in the farm itself here, that had some reforms, simple ones, but there were, and more was the change of planting fruit trees, shadows that were born from nature" (Specialist 1)
	Ah it has changed a lot, the way people build houses, in the old days there were many old houses, today people have changed the way they build houses, it has changed a lot" (Specialist 2)
	"It has changed quite a bit" (Expert 3)
	"Yes, it changed my house, because my house was made of grass, then we changed it, put brasilite, and reformed it all, so it changed our house" (Specialist 4)
	"Yes, enough we have telephone, *internet*, light, Br and cars" (Specialist 5)
	"Did not answer" (Expert 6)
	"People are leaving for the city and abandoning the campaign" (Expert 7)
	"Did not answer" (Expert 8)

Chart 3 - Expert interview questionnaire (conclusion).

Interview Questions	**Answers from the experts chosen by the students**
What was it like before?	"Before it was more difficult because there was no light, now there is. And before we had buses closer to home and now we only have them in the lane, but it's still normal" (Specialist 1)
	"Before the houses were built of clay, of pau a pique, with a grass roof, the people also produced their tricks in the field, many times, and so on, it has changed a lot, we hardly see tile houses anymore, we see more houses of brasilite and zinc, it has changed a lot nowadays" (Specialist 2)
	"Before there were more wooden houses, then more houses made of materials" (Specialist 3)
	"Answered in the previous question" (Expert 4)
	"It had a railway station and water from a cacimba" (Specialist 5)
	"Did not answer" (Specialists 6 and 8)
	"The people were more united" (Expert 7)

How many animals did you have here? Do any animals no longer live here?	"Do any animals no longer live here? I don't think any of them are leaving, because the ones we have in the field here, some leave, others come back, and they keep going. Only the kittens sometimes go out for a walk and sometimes they end up not coming back, and there are others that you took to your house and then they don't come back, they live with you" (Specialist 1)
	"As today we only cultivate citrus, we no longer work with animals, today we can say that cattle no longer live here, but we still have birds, cats, dogs and also wild animals that we see almost every day, like the broom, armadillo, we still see many animals. But the ones that don't live with us today are the bovines, like the cattle" (Specialist 2)
	"It has, but most of them are gone or have died" (Specialist 3) "Look here we have some, but many have died, they don't exist anymore" (Specialist 4)
	"They had 7 and 1 is missing" (Expert 5)
	"Did not answer" (Specialists6 and 8)
	"20 cows and 4 dogs" (Expert 7)
How does the water get to your house?	"The water in the countryside is usually from a cacimba, here it's well, we used to pull with a rope with a rondana, and that's how it was. Then, after the electricity came, it became easier because then the plumbing was done, and then the water tank, and now we have water in the tap inside the house" (Specialist 1)
	"The water here today comes through an artesian well, where the soil is drilled, and where the water is extracted for our consumption, it doesn't go through any treatment, just straight from the water tank, and from the water tank to the tap where we drink" (Specialist 2)
	"Pipe and sleeve" (Expert 3)
	"Here the water arrives pulled with the pump from the cacimba" (Specialist 4)
	"Artesian well" (Expert 5, 6, and 7)
	"Cano" (Expert 8)

Source: own elaboration (2022).

The wooden house was mentioned by most of the specialists in the context of residences, and this can be associated with the availability of this material in the countryside, which is easy and low-cost. The most curious thing was the mention of the adobe house, also known as the clod house, where Specialist 1 describes the whole elaboration process and also mentions "it is a very good house for the winter, very warm, and cool in the summer", broadening our knowledge about this local culture.

Regarding the animals' homes, the predominant citation was dog and cat homes. But the specialists mentioned other animals, common to the countryside context, but distant from urban communities, such as rabbits, birds (in particular João de Barro), pigs, and chickens. When asked about the changes that have occurred, although the transformations in the countryside occur more slowly, the specialists highlighted that many characteristics have changed in the countryside in recent years and cited: changes in agriculture; changes in the ways houses are built; the presence of telephone, *internet*, electricity, highway, and cars. Another point that

draws attention, perhaps considered one of the biggest challenges, is the migration of people from the countryside to the city.

The specialists highlighted situations from the past, such as the non-existence of electricity; the materials used in the construction of the houses; the buses that passed closer to the houses; the existence of passenger trains, and more unity among neighbors. Also mentioned were situations related to the change in the number of animals, especially the production of cattle that was replaced by crops.

In the last question of the interview, about how the water comes to their homes, they mentioned the existence of a waterhole or artesian well; and pumps for water withdrawal. They also mentioned the presence of objects used in the current hydraulic installations in their homes, such as pipes, sleeves, water tanks, and faucets, presenting a simplistic view of how water reaches their homes.

Although important lines were extracted from the interviews, this stage of the IIR presented a greater degree of difficulty, considering that the students were not literate. Thus, they required more help from parents to read the questions (for them to ask the experts) and to transcribe them on paper. Also, those who chose to record the interviews on audio or video required parents to film or send audio to the teacher.

Sasseron and Carvalho (2008, p. 138) reiterate that "science teaching should occur through open and investigative activities in which students play the role of researchers". At this stage, however, it is not possible to identify the level of student involvement or to propose further discussions among them. In Kindergarten, the conversation circles are an opportunity for students to build relationships between scientific knowledge, the technologies associated with this knowledge, and the consequences for society and the environment. The teacher is fundamental in this mediation, in the use of appropriate language, and in the identification of the elements raised by the child. Therefore, we highlight the teacher's essential role in mediating learning, especially in Early Childhood Education.

Stage 5 sought to promote dialogue between parents and children about the different animal habitats, and to build a birdhouse with recyclable materials. When planning this step, it was thought to explore the learning objectives (Brazil, 2017): "Expand interpersonal relationships, developing attitudes of participation and cooperation" (EI03EO03), and express themselves freely through drawing, painting, collage, folding, and sculpture, creating two- and three-dimensional productions (EI03TS02). This case strengthened the relationships among the

family members who started to participate more actively the school activities. We received feedback from all the children, who used milk cartons and pet bottles as materials. Some sent audio reports on how the construction had been; also, the parents of others recorded in the printed task the place of choice to put the little house once it was ready.

In the same perspective, the printed activities of step 6 allowed students to take a closer look at the rooms of the house and identify the objects in each one of them. Then, using their autonomy, they created a model of their favorite room, expressing their experiences [objective BNCC - EI03EF01 (Brazil, 2017)].

Although simple for an adult, building a birdhouse and a model for children aged 4 to 5 requires complex efforts. From the return of 100% of the activities in stages 5 and 6, it can be inferred that, in addition to the learning objectives, a family get-together moment was provided, where parents and children sat together to do the school task playfully. School is complementary to family life, something very positive amid so many challenges (Brasil, 2017). According to a report in Nova Escola magazine (Bernardo, 2020):

> ... despite the regrets, the relationship between family and school improved during the pandemic. It became closer, more intense, and more collaborative. "The family was forced to participate more in the school life of their children. This is excellent for the formation of the child," says the teacher from Lucas do Rio Verde (MT). Today, they are more interested, they run after it.

It is possible that the difference in the percentage pointed out by the subject about the activities (steps 5 and 6) portrays the differences between urban and rural schools, where the rural communities still have the school as a reference and that participation has always been something common identified in their culture. This approach becomes relevant in the relationship between family and school and in the participation of students and the monitoring of their learning.

In step 7, students were provoked to look carefully at the surroundings of their home, observing living things, plants, and vegetation. They sought to relate the learning objectives (Brazil, 2017): "observe and describe changes ... involving natural phenomena" (EI03ET02), "record observations ... using multiple languages (drawing, recording by numbers or spontaneous writing)", exploring the field of experience "Spaces, times, quantities, relations and transformations". This field has an intrinsic relationship with the dialogue of place and daily life, being a strong aspect of the chosen theme, encouraging students to reflect on their

surroundings. Relating the activities to the student's context becomes a facilitating agent in the learning process, encouraging them to reflect on their surroundings.

In step 8, aimed at the synthesis of the IIR, students with their guardians were challenged to compose a poem about Azevedo Sodré (the place where the school and most of the students are located). The activity is in line with the skill 'EI03EF02' (Brasil, 2017) which seeks to stimulate the creation of rhymes by students in Early Childhood Education.

Box 4 - Poem produced by the students and parents of the Campo Kindergarten as a product of an IIR about housing.

I was born there in the city. *I grew up here on this ground* *Wherever you go...* *I carry Azevedo Sodré in my heart.*	*Azevedo Sodré has good neighbors* *It has adults and seniors* *And there are also young people* *and children It has crops and* *cattle A place of great hope.*	*Sodré is my ground.* *Sodré of my heart.* *Sodré is my corner,* *Where I live with passion!*

Source: survey data (2020).

The poems were short, with at most five or six stanzas (Table 4). The absence of argumentation was noticeable, and the texts were limited to phrases of very simple construction. Only three families sent this activity, possibly due to the absence of the habit of reading, which may have been a difficulty for the elaboration of the poem. It is noteworthy that the activity favored the protagonism of the students and their families, using their creativity, a remarkable factor in this task.

Working with the theme of dwellings in early childhood education, using the IIR methodology, allows us to explore the diversity found in the internal environment and the surroundings of a dwelling. From an interdisciplinary perspective, the inside can be analyzed in the visual and relational context of the rooms, furniture and objects, the organization, dimensions, and colors. Externally, it is part of the house's structure, the arrangement of things on the ground, as well as its relation to the street/road, neighborhood/locality, and city/countryside. As well as the types of houses that exist both in your locality and around the world.

Boff (2000a, 2000b, 2000c), Morin (2002, 2003), and Morin, Ciurana, and Motta (2003) reflect on the relationship of human beings to themselves and their surroundings, showing how human beings have despised the Earth and its natural resources, resulting in the degradation and threat to the planet. The study of the surroundings suggests an education for the awareness of "Learning to Care" and the strengthening of the feeling of belonging.

This context may be a way to enhance the relationship with the surroundings, contemplation, and preservation of nature, raising a universe of meanings, motivations, aspirations, values, and attitudes for the construction of a deeper space of relationships. Just as Louv (2016, p. 89) reiterates that "any natural space contains an infinite store of information, therefore, a potential for inexhaustible discoveries."

Evidence of Scientific Literacy in IIR activities

Scientific Literacy (CA) happens in formal and non-formal educational spaces, and being a continuous and permanent process (Marques & Marandino, 2018). The aforementioned authors state that the individual can relate to CA even before having attended school, arguing that the earlier this contact and the earlier his relationship occurs, "the more significant and richer will be the scientific knowledge of this individual". However, discussions about CA in Early Childhood Education are still few and recent.

The development of an RTI seeks to promote CA in the subjects. Bettanin and Alves Filho (2003) propose an observation form to analyze whether the attributes related to CA were achieved during the development of the RTI. In relation to **autoAbout**g for information about the situation; having one's ideas, not being influenced by others; having creativity; making decisions safely when facing situations. And about **communication: knowing how to** express their opinions; knowing how to dialogue within the team and with specialists; elaborating theoretical models; having good arguments in their placements.

The authors point out that autonomy, mastery of content, and communication are hardly separate (Bettanin & Alves Filho, 2003). It is noteworthy that, most of the time, when the student demonstrates understanding about a certain subject he needs to express himself and, therefore, use some form of communication. Table 5 presents the materials analyzed and which attributes were achieved in each of the stages of the IIR.

Table 5 - Attributes related to Scientific Literacy found in the activities with students in Early Childhood Education.

Material analyzed	Autonomy	Domain	Communication
1 - Drawings	X		
2 - Sheet with the choice of the specialist	X		

3 - Drawing from the listening in the radio program		X	X
4 - Form filled out by interviewees			X
5 - Free-form birdhouse			X
6- Model of the favorite room in the house	X	X	
7 - Sheet recording individual observations of the school surroundings	X	X	
8 Poem about the school location	X	X	X

Source: own elaboration (2022).

Due to the length of the paper, we chose to describe the activities related to the students' drawing productions (steps 1 and 3).

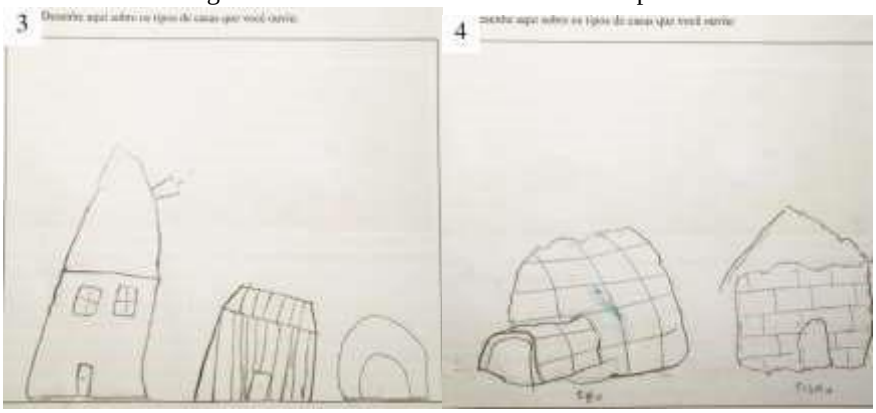
The children got involved with the activities and tried to illustrate the types of houses according to their experiences (Figures 1 and 2). Thus, it was possible to identify their previous knowledge about the theme, where the child specifies the house, the hut, and the building, illustrating the differences between these dwellings.

Figures 1 and 2 - Schoolchildren's records obtained during stage 1 of the IIR Children's dwellings in stage 1.

Source: survey data (2020).

It is noteworthy that the students were attentive to the Radio Program and made associations, according to listening to the details of the houses, relating them to their experiences and previous knowledge. The abstraction capacity is evident in Figure 4, in which the igloo (ice house that protects from cold) is illustrated. In Figure 3, it is inferred that the house in the center of the drawing is a wooden house, by the vertical line.

Figures 3 and 4 - Children's answers in step 3.



Source: survey data (2020).

In this sense, bringing the pedagogical practice of the preschool closer to the assumptions of CA presupposes the discussion of everyday problems and situations experienced in the school community, such as the appreciation of biodiversity through care for the surroundings, the preservation of forests, the habitats of animals present in them, and natural resources.

It refers to experiences that promote the construction of knowledge about the correct destination of the waste produced, recycling, reducing consumption, reusing materials, the need for a balanced diet, and the possibility of producing food without pesticides in home gardens, as well as saving water and energy. In the practice presented in this paper, CA was approached through the exploration of the surroundings of the student's residence, seeking to value and care for biodiversity. The perspectives of CA are diverse, the exploration of the natural environment involves and mobilizes children in their curiosity to unveil the world.

The theoretical contributions of CA and the IIR methodology contribute to the construction of pedagogical practices for preschool, as they help in the construction of a critical reading of the reality of the surroundings in which they live and, through these interactions and experimentations, expand the understanding of the world in an interdisciplinary perspective.

Final considerations

Early Childhood Education, unlike the other stages and modes of education, covers important and inseparable concepts, which are: caring, Playing, and educating. These actions, in the pedagogical context, promote the development of the completeness of the subject child, which also involves issues of citizenship training, becoming something inherent to early childhood education. Therefore, it is necessary to think of the child as a subject that must be heard, that must be considered socially competent, that can create and recreate, redefine its

knowledge, see the world with its own eyes, and create its own cultures. The early childhood education environment must support children in all their rights, including their learning rights. Many questions took over the daily teaching routine: how to ensure that these routines are permeated with interaction and play? How to guarantee pedagogical intentionality in the planned activities? What does it mean to attend to rural children respecting their spaces, times, knowledge, and the organization of social life? What pedagogical proposals will be able to welcome rural children? These questions cannot be answered from the perspective of "manuals" or "recipes", but through the reflective interaction of the teacher with these children, in the teacher's understanding of the individual and collective scenario of insertion of these students. However, a basic point is to recognize education as a right, of access and permanence, ensuring the principles of fundamental rights, welcoming differences and specificities, and, at the same time, building processes to overcome inequalities.

The pedagogical practices analyzed showed the weaknesses of education in times of pandemic. Due to the suspension of classroom classes, it was necessary to adopt non-contact pedagogical activities, which caused difficulties in the teacher's mediation in the development of the teaching and learning process. However, the proposed activities provided opportunities for other learning spaces and times, especially when interacting with family members and observing the social and natural environments of their surroundings, which were important for building the identity of the rural population and valuing local cultures and knowledge. Due to the distance between the urban headquarters and the school, the interactions did not take place in the school environment, due to the social distance, but in the child's social context, with adults, family members, neighbors, and friends, because it is in them that knowledge is constituted.

We cannot say that this pandemic time was underused or that it needs to be recovered On the contrary, it serves as collective learning, to be looked at, reflected upon, analyze, and, appropriated, which provided situations of discomfort and discovery. We need to reflect on the context in which we are inserted and consolidate learning from these experiences so that there is no mechanized return to routines, schedules, and previous problems. We need to work on another construction, on the sum of experiences lived before, during, and after the pandemic, building a school that thinks about the collective of the school community.

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