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Canteiro Kit: Ecological Thinking With Science

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Abstract: The challenge established was the questioning of how Environmental Education could contribute to the development of learning triggers in the face of the Anthropocene. The current scenario that made face-to-face meetings between teachers and students impossible, due to the social isolation measures caused by the SARS COV 2 virus, boosted asynchronous teaching and paved the way for Education 4.0. Through the Constructivist Spiral methodology, this work proposes to reflect on the contributions of Environmental Education in asynchronous teaching for Early Childhood Education through the production of a pedagogical kit. As a result, it was identified that the promotion of an open environment for the participation of all those involved in the teaching-learning process favored an attitude committed to the collective construction of knowledge, showing that environmental "awareness" is a habit that needs to be built in together and serve as a guide for action, enhancing the transforming role of education.

Key words: constructivist spiral, active methodologies, asynchronous teaching, environmental education, learning triggers

1. Introduction

The impossibility of holding face-to-face meetings between teachers and students, due to the social isolation measures caused by the SARS COV 2 virus, boosted asynchronous teaching which, despite not using simultaneous interactions, opened the way for Education 4.0, which has as its main characteristic the role of students in the learning process.

The challenge established was the questioning of how Environmental Education (EE) as a transversal theme can contribute to the development of learning triggers in the face of the Anthropocene. The Anthropocene is understood as the Age of Humans and its influence of planetary magnitude in its relationship with the use of natural resources and its transformative actions [1].

It is not only uncertainties and risks that mark the Anthropocene, there are also opportunities. The human being has an undeniable acumen to face unprecedented realities and problems. MORIN [2] speaks of the reform of thought, a thought that links and faces the uncertainties replacing linear and unidirectional causality for a causality in a circle and multireferential. In this way, the author adds, a well-made mind is a mind capable of organizing knowledge and, thus, preventing its sterile accumulation.

Following this premise, the title of the work "Canteiro Kit: Ecological Thinking with Science" brought some metaphorical elements to contextualize and globalize knowledge. The meaning of "canteiro" in portuguese is flowerbed. In addition to being a plot of land for planting, it also means a plastic artist who sculpt stones. To sculpt an "ecological" thought, according to MORIN [3] is to place every event, information or knowledge in an inseparable relationship with its environment — cultural, social, economic, political and, of course, natural. Therefore, it is to generate environmental "awareness", "with science" of the environment.

As a basis and development of the project, the Constructivist Spiral methodology was chosen,

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following the parameters referring to Quality Education of the Sustainable Development Goals (SDGs). In item 4.7 it says: By 2030, ensure that all students acquire the knowledge and skills necessary to promote sustainable development, including, but not limited to, education for sustainable development and sustainable lifestyles, human rights, equality of gender, promotion of a culture of peace and non-violence, citizenship and appreciation of cultural diversity and the contribution of culture to sustainable development. [4]

The Constructivist Spiral is based on the synthesis of the genetic theory of Jean Piaget (1896-1980), the significant learning of David Ausubel (1918-2008), the integral formation of Henri Wallon (1879-1980) and the sociocultural approach of Lev Vygotsky (1896-1934) [5].

In this way, this project proposes to reflect on the contributions of Environmental Education in asynchronous teaching for Early Childhood Education in a constructivist perspective.

2. Constructivist Spiral

The present project was carried out in the 2nd semester of 2020 with students enrolled in the Children's Living Center "Ermelinda Ottoni de Souza Queiróz" (CCIn) of the City Hall of the University of São Paulo (USP) campus "Luiz de Queiroz", in the city of Piracicaba, SP, Brazil. These are students aged between 2 and 5 years old, children of teachers, civil servants and students at the Escola Superior de Agricultura "Luiz de Queiróz" (ESALQ, USP, BRAZIL).

To meet the objectives, the methodology chosen was the Constructivist Spiral proposed by LIMA [6]. The author explains that the educational intentionality in the use of the constructivist spiral is explained by the nature of the learning triggers used and by the transforming sense of reality derived from the critical and reflective posture in the interaction between "subject" and "object". Thus, the Constructivist Spiral is a problematizing methodology, conceived from the reflections of the teaching staff, in the formulation of curriculum that uses active educational technologies. It is also considered an active methodology, as active methodologies are teaching strategies focused on the effective participation of students in the construction of the learning process, in a flexible, interconnected, hybrid way [7]. Exploration of the constructivist spiral must follow the movements shown in Fig. 1.

2.1 Identifying Problems

In early 2020, due to social isolation measures caused by the SARS COV 2 virus, face-to-face meetings between teachers and students were interrupted, generating a need to reformulate the tools used in teaching. Remote meetings of the pedagogical team were scheduled and using the *brainstorming technique*, ideas were proposed for new educational interventions.

2.2 Formulating Explanations

One of the suggested hypotheses was to test hybrid teaching in early childhood education and the triggering theme for learning was environmental education. It is important to note that the daycare center is located on the Campus "Luiz de Queiroz" (USP) and its main training is in Agricultural, Environmental, Biological and Social Sciences, in this way, several extension programs involve the activities of the day care center, generating strong partnerships in the search for creative solutions.

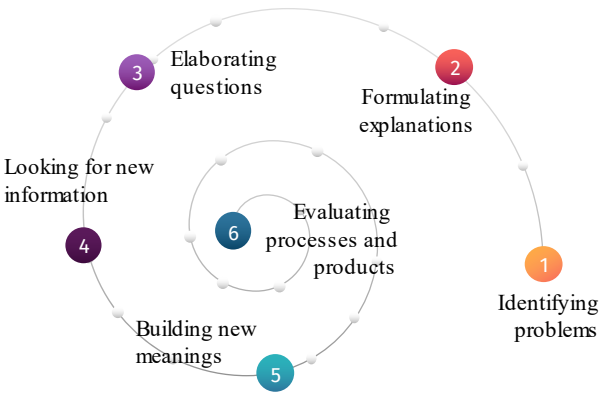

Fig. 1 Schematic representation of the constructivist spiral.

2.3 Elaboration of Questions

In order to maintain the quality of education offered by the day care center, asynchronous teaching was chosen to ensure that students maintained a leadership role in the learning process. At this moment, the idea arose of integrating the "Project Composting in daycare center"[1] and the Brazilian guidelines for early childhood education (Base Nacional Comum Curricular — BNCC) to meet the learning needs of students.

2.4 Looking for New Information

The search for new resources and online tools began and, after several training sessions, a didactic sequence was set up including the steps: 1) Production of an explanatory playful video made available to daycare students through the online platform (*Google Classroom*). 2) Assembly of the "Canteiro Kit" with reused boxes from the fair, basil seedlings produced by the environmental education intern, pet bottle and the compost produced by the "Project Composting in daycare center", always imbued with coherence and environmental commitment and also in conscious use of materials. 3) Delivery of the kit and activities to students (plant and send a photo or video on the online platform). 4) Photo and video panel mounted on the *Padlet resource* and made available for all involved to make comments and discuss the topic.

2.5 Building New Meanings

The new meanings of both the educational process and the environmental reflections were collectively constructed. The communication path between professors-students and family formed an interactive tripod and this movement of advances and setbacks fed the Constructivist Spiral.

2.6 Evaluation of Processes and Products

Asynchronous teaching, despite not using simultaneous interactions, opened the way for Education 4.0, whose main characteristic is the active role of students in the learning process. The return of activities was satisfactory and instigated the teaching staff in the search for new tools to streamline teaching. The final product, the collective reflection on the importance of Environmental Education in the Anthropocene, was exposed in an interactive panel (*padlet*).

3. Results and Findings

The first aspect observed was about the use of the Constructivist Spiral methodology. It allowed the promotion of an open environment in the construction of knowledge, both for the faculty and the students, as the problematizing positioning of the educators favored the scientific spirit, the reflection and the creativity of the students.

Learning triggers reinforced the BNCC recommendations in terms of educational intent. By intentionality is understood "the organization and proposition, by the educator, of experiences that allow children to know themselves and others and to know and understand the relationships with nature, with culture and with scientific production" [8].

It was noticed in the movement of understanding of the Constructivist Spiral that the educational intention came from both the teacher and the student through the practice of reflective dialogue and the sharing of responsibilities between the institution of Early Childhood Education and the family that actively acted in the proposed activities due to the limitations of the children's age group.

Through several records, such as photographs, videos, drawings, made at different times by both teachers and children, it was possible to evidence the progression that occurred during the observed period. If, on the one hand, the educator's job was to select and organize educational practices to favor the

[1] The "Project Composting in day care center: an experience for the whole family" is an initiative of the USP Recycle Program that aims to promote experiences in environmental education. Available online at: https://www.esalq.usp.br/usprecicla/compostagem-na-creche.

development of children, on the other hand, the process became recursive as setbacks were necessary in planning due to the current scenario due to the pandemic caused by the pandemic.

The second aspect, referring to the contributions of Environmental Education in asynchronous teaching for early childhood education, showed that the thematic richness of the environment brought playful components of extreme value to the virtual environment. Although the "Canteiro Kit" (Fig. 2) was physical and not virtual, it favored the teacher's instrumentation regarding the use of digital technologies, strengthening asynchronous teaching with dynamism.

The Fig. 3 shows feedbacks from activities performed by students with parental supervision.

Finally, it is important to highlight that the construction of new meanings, especially in matters

Fig. 2 "Canteiro Kit".

Fig. 3 Panel mounted on the Padlet tool, with activity feedback in photos and videos.

about the environment, is a continuous and permanent process as proposed by art. 2 of the Brazilian Law on Environmental Education (9.795/1999): "environmental education is an essential and permanent component of national education, and must be present, in an articulated way, at all levels and modalities of the educational process, in a formal and non-formal way" [9]. Especially in the face of the uncertainties and the many challenges that humanity is going through, it is increasingly clear that the environmental issue is a key point in facing the current crises and that environmental education is a guide for the transition and construction of more sustainable societies, supportive, engaged, committed and fair.

4. Final Considerations

The Constructivist Spiral resource offered dynamism in pedagogical relationships, both for the student body and for the teachers. The spiral movement of reflections on the contributions of Environmental Education in asynchronous teaching favored possibilities to exercise freedom of thought and autonomy in decision-making in the face of the pandemic crisis experienced worldwide using a remote teaching resource hitherto non-existent in early childhood education.

The tripod of the educational process formalized in this project, teacher-student-family, showed that environmental "awareness" is a habit that needs to be built collectively so that it becomes knowledge and serves as a guide for action. However, it is not an idealization of environmental education as a savior, much less a legislator of rules for ecologically correct individual behavior. What draws attention is the importance of Environmental Education to be thought and practiced in everyday life, within the dilemmas of the Anthropocene.

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