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EDUCATIONAL BOOKLET ELABORATION PROCESS: the environmental relationship between humans and venomous animals

PROCESSO DE ELABORAÇÃO DE CARTILHA EDUCATIVA: a relação ambiental entre os seres humanos e os animais venenosos peçonhentos

PROCESO DE ELABORACIÓN DE CARPETA EDUCATIVA: la relación ambiental entre humanos y animales venenosos

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ABSTRACT:
Educational booklets are effective teaching tools for the popularization of science and, specifically, when it comes to venomous animals. In general, the booklets address the injuries suffered by the population as a result of the increasingly frequent encounters of these animals, due to environmental changes resulting from the development model adopted. At most they address the causes of these encounters, failing to create opportunities for the reader to reflect on their interaction with these animals. Therefore, the objective was to elaborate an innovative booklet, in favor of this environmental interaction between both, from the perspective of Integral Ecology and the Sustainable Development Goals recommended by the United Nations in Brazil. Pre-writing techniques were used; the reality was delimited and, on the subject, triangulation of the underlying theoretical data was carried out; and playful techniques were used to attract children and young people. The "Coloring booklet: venomous animals, humans and the environment" was then obtained, unprecedented and innovative, whose focus was not on the disease, but on the human environmental interaction with these animals.

KEYWORDS: Venomous animals; Integral Ecology; Skills; Skills; Agenda 2030.

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Introduction

The primer is characterized as a type of educational material, of its own textual genre, that supports the development of a learning experience. It is an educational technology that brings together a set of information applied to the construction of new knowledge (Kaplún, 2003; Ramos & Araújo, 2017).

It can constitute an important mechanism for the popularization of science when it is attractive and accessible to the target audience, managing to transpose scientific knowledge to the layman (Alves et al., 2019; Bueno, 2010; Silveira et al., 2009).

The primers found on the web that deal with venomous animals generally bring important information about the aggravations, the venom, the management of the offended patients, the animal involved, and also the treatment against the offense caused by venomous animals (Azevedo & Almeida, 2017; Cunha et al., 2020). Some materials cite the causes why encounters between these animals and humans have become more frequent, but do not bring solutions to this environmental conflict (Fundação Ezequiel Dias, 2014; Leite & Filadelfi, 2015).

Scientific studies point out that, with the expansion of the cities of Tocantins, environmental problems have emerged, such as water issues, the surplus population from the countryside in the cities, the new subdivisions, and a whole movement of the economy by increasing agriculture and by agribusiness in urban areas (Barbosa & Gomes, 2012; Bessa & Corado, 2011; Feliciano & Rocha, 2019; Parente, 2015).

In this context, the area planted with soybeans, one of the fastest growing crops in the state of Tocantins was expanded by 12.5% between 2017 and 2020 (IBGE, 2022). And, the existence of two scenarios regarding the large electrical undertakings in the Araguaia-Tocantins Basin, one with eight hydroelectric plants in operation in 2018 and another with 26 plants in operation and/or planned for up to 2025 (Choueri & Azevedo, 2018).

A direct consequence of these environmental problems were the increasingly frequent encounters between humans and wild animals and, among them, venomous animals.

The comparison between records in Brazil and Tocantins indicated that, between 2017 and 2020, the ratio between the number of injuries caused by venomous animals

per 100 inhabitants in the state of Tocantins, 0.289 injuries/100 inhabitants, was almost three times higher than the national index, 0.122 injuries/100 inhabitants. The same happened in relation to the cases of snakes and 'others', which included fish, such as freshwater rays. In the same period, the rate of cases of injuries resulting from encounters with scorpions in Tocantins grew by 11.72%, a similar percentage to the snake injuries, 11.64% (Sinan, 2022).

Venomous animals have venom glands that communicate with venom inoculating structures. Non-poisonous animals, on the other hand, have no inoculating structure, but can produce venom and cause poisoning by contact, by compression or even by ingestion (Beltrame & D'Agostini, 2017; Butantan, 2007).

The evolution of venomous animals has selected species with structures inoculating their venom for feeding and defense (Bárbaro et al., 2007; Gopalakrishnakone al., 2015; Russel et al., 1971), an essential condition for their existence.

The modification of the natural habitat of venomous animals has selected species to coexist with the human population in cities. Therefore, sometimes these animals are killed or mutilated (Oliveira et al., 2015) when found. This is due to the human view, which is instrumentalist and fractionalized, linked to the usefulness of the animal for their lives (Barbosa, 2015; Kellert, 1984).

The lack of information and awareness has been pointed out as limiting factors for humans, preventing them from acting appropriately when facing these encounters (Freitas et al., 2020). Some initiatives in this direction have been described in similar studies (Corrêa & Seibert, 2016; 2019; Corrêa et al., 2021).

However, this work aimed to describe the process of developing an educational booklet with a bias towards informing and sensitizing the children and youth public about the real causes of this environmental problem, aiming to develop a more critical look at the increased frequency of encounters between them and contribute to a more respectful, more coherent and, therefore, fairer environmental coexistence.

In addition to the Brazilian Common National Curricular Base (BNCC), the chosen perspective was based on the assumptions of Integral Ecology and related

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Sustainable Development Goals (SDGs), recommended by the United Nations (UN) in Brazil.

Methodological Strategies

According to Alves, Gutjahr, and Pontes (2019), Bueno (2010), and Silveira et al. (2009), the following elements are necessary for the successful development of an educational booklet: a) knowledge of the reality and of the subject addressed; b) theoretical basis; and c) creativity (use of playfulness) when developing the paradidactic material and disseminating information.

The theoretical foundation was performed by 'triangulation of data sources', creating a cohesive justification for the objective in question (Creswell, 2007; Yin, 2010). The integral sources of triangulation were: the elaboration of competencies and skills to be developed (Bloom, 1986; BNCC, 2017; Moretto, 2010; Perrenoud, 2000), the premises of Integral Ecology (Franciscus, 2015; Tavares, 2016) and the related SDGs (UN Brazil, 2022).

In addition to the elements presented, two others were highlighted by pertinent literature for the development of educational primers and considered here. The first was 'representativeness', because it ensures the identification of the target audience with the topic presented. And the second element was the incorporation of 'playful activities', such as crosswords, word searches, drawings to color, among others; bringing to the material the possibility of the reader to develop his creativity (Alves et al.; Pontes, 2019; Regis et al., 1996).

Results and Discussion

The triangulation of the data sources generated a tripod that supported the Primer and provided the opportunity to popularize it through three groups of distinct and complementary scientific information (figure 1). There was not, necessarily, the contemplation of the three groups of the external ring of circles, at all times of the product obtained, however, in each part of the booklet, the presence of more than one of them was observed.

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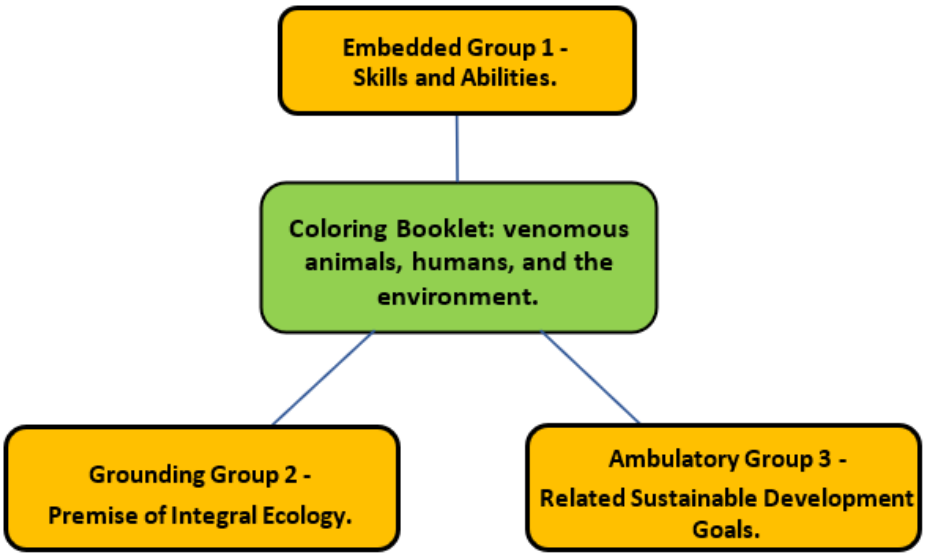
Figure 1 - Theoretical tripod of the elaborated Educational Primer



Search: From research (2022).

Thus, **Grounding Group 1**, 'Skills and Abilities' was developed based on the following macro competencies of the BNCC (2017), which have affinity with the theme addressed by the Primer:

> C2 - Exercise intellectual curiosity and use the approach typical of the sciences, including research, reflection, critical analysis, imagination and creativity, to investigate causes, develop and test hypotheses, formulate and solve problems and create solutions (including technological) based on the knowledge of different areas.
>
> C7 - Arguing on the basis of facts, data and reliable information in order to formulate, negotiate and defend ideas, points of view and common decisions that respect and promote human rights, socio-environmental awareness and responsible consumption locally, regionally and globally, taking an ethical stance towards caring for oneself, for others and for the planet.
>
> C8 - Know, appreciate and care for their physical and emotional health, understanding themselves in human diversity and recognizing their emotions and those of others, with self-criticism and the ability to deal with them.

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C10 - Act personally and collectively with autonomy, responsibility, flexibility, resilience, and determination, making decisions based on ethical, democratic, inclusive, sustainable, and solidarity-based principles (pp. 9-10).

According to Perrenoud (2000), "Competence is the ability to mobilize a set of cognitive resources... to solve a range of situations pertinently and effectively" (p. 19). Complementing, Moretto (2010) mighta that Skill is always associated "... to know how to do something specific... a physical or mental action, indicative of an acquired ability." (p. 23).

These actions (skills) should be elaborated, having as initial element a command verb in the infinitive, which indicates the classification of the desired level of cognition, preferably gradual, by its degree of complexity, during the learning process. Bloom's taxonomy (1986) contains six cognitive levels of learning, namely (from the lowest to the highest degree of complexity): knowledge, understanding, application, analysis, synthesis and judgment (Bloom, 1986).

Thus, after the approximation with the knowledge of reality and with the subject matter, the following competencies and skills to be developed by the Primer were elaborated: Competency 1 (C1) and its respective Skills 1 (H1) and 2 (H2); and Competency 2 (C2), with Skills 3 (H3) and 4 (H4).

Competence 1 (C1): Understand the main morpho-physiological aspects and prophylaxis in relation to the venomous animals in question; Skill 1 (H1): Recognize the main morpho-physiological aspects and preventive measures to be adopted when facing an encounter with snakes, scorpions and freshwater stingrays (cognitive level of knowledge); and Skill 2 (H2): Differentiate venomous animals, venomous non-venomous animals, and non-venomous animals (cognitive level of analysis).

Competency 2 (C2): Understand the interaction between environment, venomous animals and society; Skill 3 (H3): Recognize anthropic modifications occurring in natural ecosystems and their implications (cognitive level of knowledge); and Skill 4 (H4): Solve complex environmental problems facing encounters with venomous animals in diverse environments from the perspective of Integral Ecology and the UN SDGs (cognitive level of judgment).

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The Emphasis Group 2 is constituted by the set of premises of Integral Ecology. By revisiting the relevant literature, it was observed that Integral Ecology is opposed to Shallow Ecology, to human anthropocentrism and instrumentalism, approaching Deep Ecology (Capra, 1996; Goldim, 1998; Naess, 1973; Schú, 2021) and the ethical and emancipatory thought of the Ecology of Knowledges (Santos, 2010).

Considering that Integral Ecology is understood as a complex proposal, consisting of four inseparable dimensions: environmental, socioeconomic, cultural, and daily life (Paroli, 2019; Tavares, 2016), the following premises were listed (Founding Group 2, figure 1):

Socio-environmental Indissociability: there is no possibility of separate crises, one environmental and one social (Franciscus, 2015).

Interdisciplinarity: integral ecology requires transcending the language of the exact sciences or biology (Silva, 2018).

Information: there is a need to 'see' more closely what is happening in our common home, to 'see better', to 'see well' the origins of the phenomena that have caused the ecological crises, to develop analytical power and criticality (Tavares, 2016).

Proactivity: in listening to the language of nature, one must respond to it coherently (Benedict XVI, 2011). One must, in every concrete action, articulate the local with the global (Tavares, 2016).

The **Core Group 3** brought together the SDGs related to the theme developed in the Primer. In 2015, after 70 years of the creation of the United Nations (UN), three major events were held to define another post-2015 international agenda, which aimed to make decisions for sustainable development, especially regarding the issues of climate change and humanitarian crises (Alves, 2015).

The result was the launch of 17 Sustainable Development Goals (SDGs), which are presented in an interconnected and inseparable way, contemplating the obstacles faced by the world and Brazilian people for development. They constitute a global call to action by 2030 to eradicate poverty, protect the environment, and ensure peace and prosperity for people globally (UN Brazil, 2022).

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Approaching the SDGs to the theme to be developed in the Primer, the following goals and targets to be achieved by 2030 were highlighted: number 3) health and well-being; number 4) quality education; number 15) earth life; and number 17) partnerships and means of implementation. Figure 2 presents these goals and their respective targets.

Figure 2 - SDGs and their respective targets, which dialog with the produced material (Embedding Group 3, figure 1)

RELATED SDGs (UN BRAZIL, 2022)	CONTEMPLATED GOALS (UN, 2022)
Goal 3 - Health and well-being: ensure healthy living and promote well-being for all, at all ages.	**Goal 3.8 -** Achieving universal health coverage, including financial risk protection, **access to quality essential health services and access to medicines** safe, effective, quality, and affordable essential vaccines for all.
Goal 4 - Quality Education: ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.	**Goal 4.7 -** By 2030, ensure that all learners acquire the knowledge and skills necessary to promote sustainable development, including, but not limited to, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development.
Goal 15 - Earth Life: protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss.	**Goal 15.1 -** By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in accordance with obligations under international agreements. **Goal 15.5 -** Take urgent and significant action to reduce the degradation of natural

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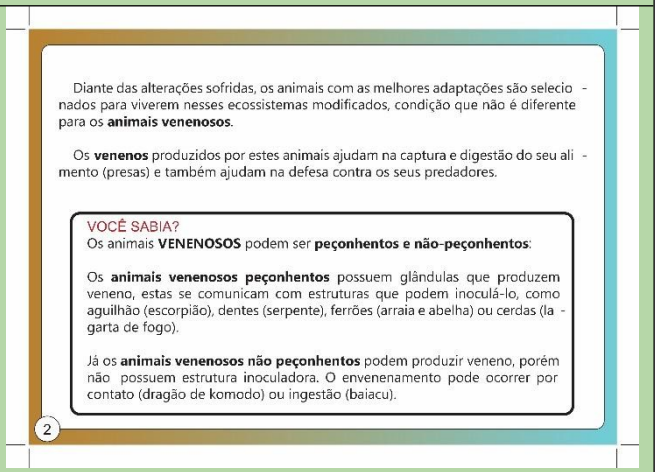
	habitats, halt the loss of biodiversity and, by 2020, protect and avoid the extinction of endangered species.
Goal 17 - Partnerships and means of implementation: strengthen the means of implementation and revitalize the global partnership for sustainable development.	**Goal 17.6 -** Improve regional and international North-South, South-South and triangular cooperation and access to science, technology and innovation, and increase knowledge sharing on mutually agreed terms, including through better coordination between existing mechanisms, particularly at the UN level, and through a global technology facilitation mechanism. **Goal 17.7 -** Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favorable terms, including on concessional and preferential terms, as mutually agreed.

Source: Adapted from UN Brazil (2022).

Figure 3 - Example of the theoretical basis of the 'Coloring Booklet: venomous animals, humans, and the environment', from the Embasuring Trio (Embasuring Group 1, figure 1)

EXAMPLE/UNDERLYING TRIO	SOURCE	CORRESPONDING FIGURE
GRUPO 1 **C1 -** Compreender os principais aspectos morfofisiológicos e profilaxia em relação aos animais venenosos peçonhentos em questão. **H2 –** Diferenciar animais venenosos peçonhentos, animais venenosos não peçonhentos e animais não venenosos (nível cognitivo da	Coloring primer: venomous animals, humans, and the environment (2019, pp. 2-3).	

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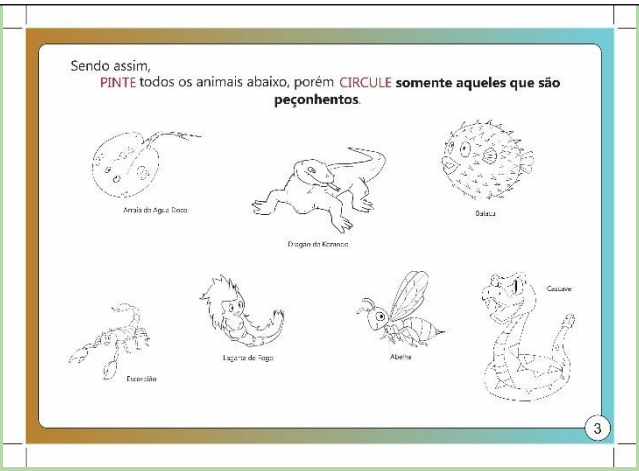
TB: análise). **GRUPO 2** **Característica nº 3 da Ecologia Integral:** Informação. **GRUPO 3** **ODS números 4 e 15:** educação de qualidade e vida terrestre.		

The **example in Figure 3 used pages 2 and 3 of the 'Coloring Booklet: Poisonous Animals, Humans, and the Environment**, to expose the background on which the Primer was based. For its foundation, it used elements from the three Groups of the Trio Embasador. It is worth pointing out that there was no obligation to necessarily use the three Groups in all parts of the material produced, and that the use of at least one of them may occur in each part of the material produced.

From **Group 1, which contains the competencies and skills** The example shown (figure 3) sought to develop in the reader Skill 2 (H2), which aimed to 'Differentiate venomous animals, venomous non-venomous animals, and non-venomous animals'. As the command verb was 'differentiate', in this case 'the types of animals in terms of venom and physiological production of venom', the level of learning, according to Bloom's taxonomy (TB), was that of 'analysis', which does not presuppose value emission or personal notes, but rather the decomposition of the whole into parts (Bloom, 1986; Bloom et al, 1956; Driscoll, 2000; Ferraz & Belhot, 2010; Krathwohl, 2002), i.e., the material brought the 'whole' and its 'parts' when it presented the types of animals in relation to venom and venom production. The exercise following the short trigger text, to color and circulate, ensured the fixation of the analysis performed, proposing the classification of animals by the reader.

Thus, the example enabled the development of Skill 2 (H2), which is part of the "know-how plan" for the achievement of part of Competence 1 (C1), which aimed to "Understand the main morpho-physiological aspects and prophylaxis in relation to the poisonous venomous animals in question. In other words, the reader's development of

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H1 and H2 was expected to promote the achievement of C1, in its entirety, as suggested by Moretto (2010). In this case, H1 can be found elsewhere in the produced material, as if the material were an integrated mosaic of skills.

This methodological strategy has been used by the National System for Evaluation of Basic Education (Saeb) of the Ministry of Education (MEC) in Brazil, whose implementation is the responsibility of the Anísio Teixeira Educational Research Institute (Inep), since the mid-1990s (Andrade et al., 2000). Therefore, connecting the routine of Brazilian teachers in the methodological preparation of their teaching practices to the material produced, aimed at greater approximation and adherence to the reality experienced.

From **Group 2, which ensured the use of the main characteristics of Integral Ecology** In the material, the example shown in figure 3 contemplated premise #3, concerning 'Information', to support this part of the Primer. This was evident in the red highlight on page 3, the 'Did You Know? Through this feature, it was possible to inform the reader about the existence of, and differences between, poisonous and non-poisonous venomous animals, and to provide examples of both.

The 'Information', characteristic No. 3 of Integral Ecology, proposes that it is necessary to 'see' more deeply what is happening to 'our common home', that it is necessary to know the causes of the phenomena that have generated the environmental crisis, being information the key to the achievement of criticality, the choice for responsibility for oneself, for others and for the environment (Tavares, 2016).

As for **Group 3, related to the Sustainable Development Goals (SDGs)**, related to the research, recommended by the UN, in the example shown in figure 3, goals number 4, 'Quality education' and number 15, 'Life on Earth' were contemplated.

The UN Brazil (2022) determined specific goals for each of the 17 proposed SDGs. In Figure 3, the goals that dialogue with the objectives that have affinity with the material elaborated are listed.

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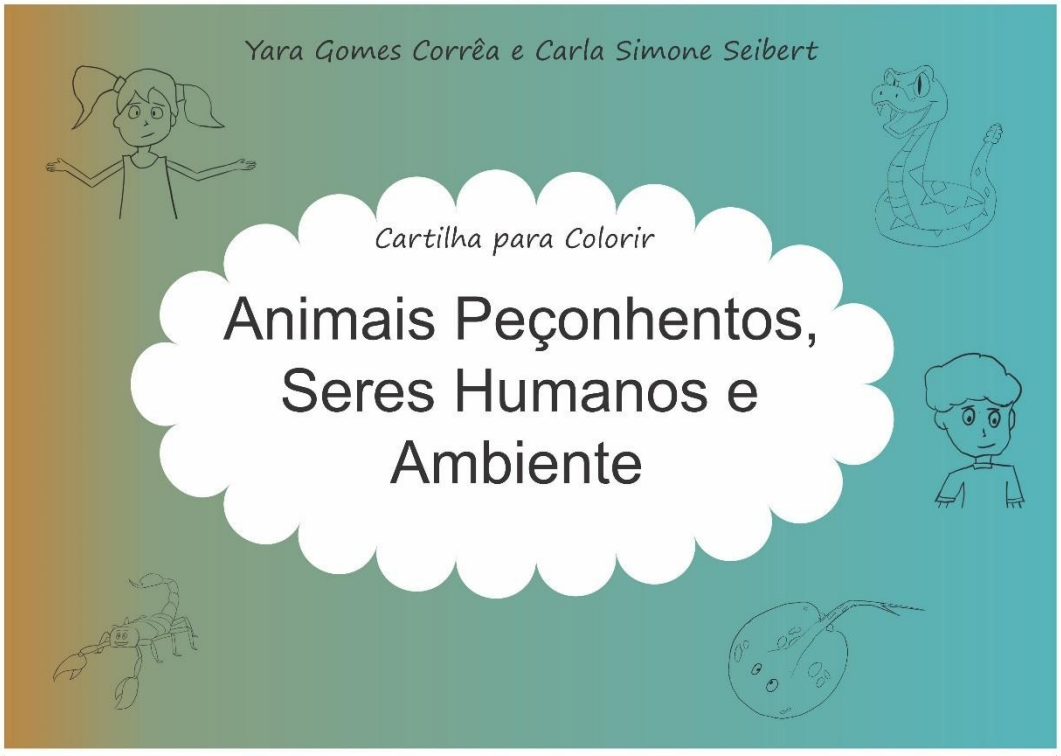
Thus, in the case of the example, goal 4.7 of SDG No. 4, 'Quality education', foresees that by 2030, there will be a guarantee that all students acquire the necessary skills to promote sustainable development (UN Brazil, 2022).

And, further, target 15.5 of SDG No. 15, 'Terrestrial Life', determined that urgent and significant measures should be taken to reduce the degradation of natural habitats, halt the loss of biodiversity, and, by 2020, protect and avoid the extinction of endangered species (UN Brazil, 2022).

As for its physical characteristics, the Primer is composed of 11 pages of 29.7 x 21.0 cm paper, printed in black and white. Its cover was printed in couché paper and in color and presents its main human characters, Doragildo and Ritinha; and the main characters that represent the poisonous venomous anthropomorphized animals that occur most in the state of Tocantins (scorpions, snakes, and freshwater rays), that is, the Scorpionildo, the Rattlesnake, and the freshwater ray (figure 4).

Figure 4 - Cover of the 'Coloring Booklet: Venomous Animals, Humans, and the Environment'. Note the characters of humans and anthropomorphized animals in question (scanned image)



Source: From research (2022).

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The back cover presented the fact sheet, the research team, the funding agents, and the institutions participating in the booklet. The back cover contains the logos of the supporters for the production of the material and real photos of poisonous venomous animals, which were worked on in its content and occur in Tocantins. The latter were taken by members of the Research Group on Venomous Animals of the Federal University of Tocantins (UFT).

As for the textual elements, this Primer was prepared to contain three 'information nuclei' that were merged for its composition. They are: 1) the nucleus of short texts or contextualizing textual pills; 2) the nucleus of information through 'Did you know?

This organization of the elaborated Educational Primer is aligned with that described by Alves et al. (2019); Bueno (2010); Silveira et al. (2009). For them, this type of educational technology must present knowledge of reality and of the subjects addressed, must have a pre-defined theoretical basis, and use playfulness and creativity in its elaboration.

The first core, the 'Small Texts' or 'Textual Pills', contextualized the environmental problem in question. This nucleus brought dialogues between the human characters of Doragildo, Ritinha, and the teacher, pointing out respectful and fairer solutions that can be adopted when faced with the encounter between human beings and scorpions, or between human beings and freshwater rays, for example.

The second core, 'Information', was called 'Did you know? This device exposed scientific information about the objects in question, in this case: concepts about the ecosystem, about the therapeutic serum, and about the morphophysiological, ecological, and evolutionary aspects of both snakes and freshwater rays.

The third core, 'Playful Activities' and creativity stimulators, as suggested by Alves et al. (2019); Regis et al. (1996); Sena (2015), involved credible situations that could occur when humans meet venomous animals. The intention was to provoke the interaction and intervention of the reader participating in the educational reading, since

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he would be induced to make choices, facing the problem situations generated by the supposed encounters.

The playful and creative activities adopted to integrate the 'Coloring Booklet' were: a) coloring the characters and the scenarios of the stories and solving the '4 mistakes game', providing the participant with the opportunity to review the morphophysiological characteristics of the animals in question, as well as inviting him/her to look again at the scenario (environment) of the encounters; b) circle and call, presupposing the previous classification or identification of the animals in question; c) escape from the labyrinth, implying in making choices; and d) do a crossword puzzle, stimulating the rereading of the textual pills presented or, still, of the texts of the core '*Did you know?* '.

According to Guillem and Viadel (2020), when figures are filled with colors, it is inevitable that the visual appeal of the story increases. In the case of the Primer, this intentionality was sought.

Peres and Ramil (2018) verified satisfactory results in studies carried out by means of activities to connect and to circulate in educational primers applied to children. The similar activities in the 'Coloring Booklet' are an opportunity for the participating reader to review the classification of snakes or, furthermore, review the content of the booklet referring to the identification of poisonous and venomous animals. When asked, the child may be interested in re-reading the information contained in the other nuclei of the educational material. For Moretto (2010) to access the cognitive levels of TB learning of 'classification' and 'identification' it is necessary to previously access the basal cognitive level of 'knowledge'.

Marques (2018) proposed a metaphorical reading for the use of the playful activity of 'labyrinth escape' in teaching materials. The labyrinth represents a tangle of paths, that is, of possibilities. Therefore, this metaphor was well incorporated into the 'Coloring Booklet', when Ritinha meets a scorpion and there are different decisions that can be taken, with equally different and even opposite consequences. The reader, in this case, after reading the textual pill about the causes of this type of encounter and how to avoid it, is invited to help Ritinha to get out of this 'labyrinth', that is, 'this situation', to find the 'way out of the labyrinth', that is, to 'adopt the most sensible

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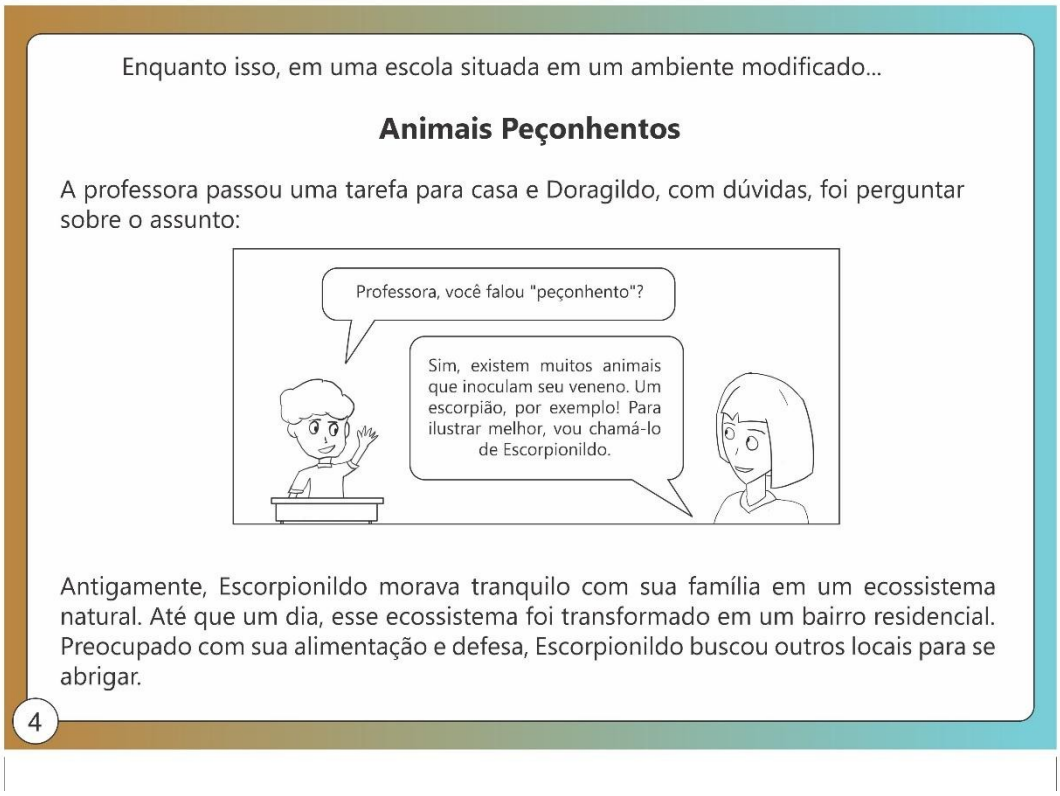
solution'. Note that the expression 'more sensible' was bolded in the command of the activity, in order to provoke the participant (Figure 5, A and B).

Figura 5 (A e B) - Exemplo de pílula textual (A e B) e de atividade lúdica de fuga do labirinto (B) da 'Cartilha para Colorir: animais peçonhentos, seres humanos e ambiente'



(A)

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(B)

Cartilha para Colorir: animais peçonhentos, seres humanos e ambiente (Corrêa & Seibert, 2019, pp. 4-5).

Considerações finais

However, it was concluded that the 'Coloring Booklet: venomous animals, humans and environment' gathered the main characteristics of this type of educational material, because it united the set of information supported by the theoretical apparatus of Integral Ecology, the specific skills and abilities for the problem in question and the related SDGs.

This demonstrated its innovative aspect, as it is a concrete proposal to provide children and youth readers with a new, fairer, and more coherent view of their interaction with venomous animals in the environment modified by their species.

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RESUMO:
As cartilhas educativas são ferramentas didáticas eficazes para a popularização da ciência e, em específico, quando o assunto são os animais venenosos peçonhentos. No geral, as cartilhas abordam os agravos sofridos pela população em decorrência dos encontros desses animais, cada vez mais frequentes, devido às modificações ambientais em decorrência do modelo de desenvolvimento adotado. Quando muito abordam as causas desses encontros, deixando de criar oportunidades para que o leitor reflita sobre sua interação com esses animais. Sendo assim, objetivou-se elaborar uma cartilha inovadora, em prol desta interação ambiental entre ambos, na perspectiva da Ecologia Integral e dos Objetivos do Desenvolvimento Sustentável preconizados pela Organização das Nações Unidas no Brasil. Utilizou-se de técnicas de pré-escrita; delimitou-se a realidade e o assunto por meio da triangulação dos dados teóricos embasadores; e usou-se técnicas lúdicas, para atrair o público infanto-juvenil. Obteve-se, então, a "Cartilha para colorir: animais peçonhentos, seres humanos e ambiente", inédita e inovadora, cujo foco não esteve no agravo, mas sim na interação ambiental humana com esses animais.

PALAVRAS-CHAVE: Animais peçonhentos; Ecologia Integral; Competências; Habilidades; Agenda 2030.

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RESUMEN:
Los cuadernillos educativos son herramientas didácticas eficaces para la divulgación de la ciencia y, en concreto, cuando se trata de animales venenosos. En general, los cuadernillos abordan los problemas que sufre la población a raíz de los encuentros de estos animales, cada vez más frecuentes, debido a los cambios ambientales derivados del modelo de desarrollo adoptado. A lo sumo abordan las causas de estos encuentros, sin crear oportunidades para que el lector reflexione sobre su interacción con estos animales. Por lo tanto, el objetivo fue elaborar un folleto innovador, a favor de esta interacción ambiental entre ambos, desde la perspectiva de la Ecología Integral y los Objetivos de Desarrollo Sostenible recomendados por las Naciones Unidas en Brasil. Se utilizaron técnicas de preescritura; se acotó la realidad y, sobre el tema, se realizó la triangulación de los datos teóricos subyacentes; y se utilizaron técnicas lúdicas para atraer a niños y jóvenes. Se obtuvo entonces el “Cuaderno para colorear: animales venenosos, humanos y medio ambiente”, inédito e innovador, cuyo foco no estaba en la enfermedad, sino en la interacción del medio ambiente humano con estos animales.

PALABRAS CLAVE: Animales venenosos; Ecología Integral; Habilidades; Habilidades; Agenda 2030.