A methodological proposal for the use of short stories regarding the biocultural memory as a pedagogical tool

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Research Methods and Methodology Reviews

Abstract

Background: Since its origin, the human being as a biocultural species has been observing the natural world and forming a set of practices, beliefs and cosmovisions associated with its environment. These practices have been transmitted between generations, primarily through oral storytelling, and have played an important role in human evolutionary history. Narratives and short stories about the natural world have also been essential for the maintenance, inheritance, and transmission of knowledge within the cultural and social group. Short stories can even function as a strategy to conserve or rescue the biocultural memory. The students, as culturally distinct subjects, each have a rich knowledge and reports on their individual experiences and perceptions regarding the natural world. In view of this scenario, of the rich biocultural diversity on a global scale, we propose that such narratives regarding ethnobiology can be highly valuable when included in the educational context as a pedagogical tool. To support this idea, we have presented a methodological proposal that aims to stimulate the writing and discussion of those short stories which highlight the interrelationships between students and nature. This methodological proposal is structured in order to value multiculturalism in the teaching environment, having as its main subjects the students and their past and recent experiences.

Methodological proposal: The present methodological proposal is broken down into five main subtopics, namely: (1) ethical suggestions, in which the teacher should decide whether the data arising from the application of this methodological proposal would be documented and published, (2) procedures for presentation, in which the teacher must give an explanation related to the short stories, explaining to the students what a short story would be, its structure and characteristics, as well as giving examples of short stories related to ethnobiology to the class, (3) writing procedures, where the students will write their own short stories, (4) socializing procedures of the short stories, where written short stories will be read and discussed, and (5) assessment procedures, which are based on student participation during the execution of this practice, interaction during the socialization of the short stories, and the assembly of a panel.

Conclusions: The use of short stories related to students' experiences with the natural world and its elements, or their biocultural memory is a promising pedagogical tool, which can assist teachers in the intercultural dialogue, contributing to a more culturally sensitive teaching-learning processes, in which students' experiences, from writing and socializing short stories, are the starting point for broad and productive discussions, which can be

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applied by teachers across different areas, due to its multi and interdisciplinary characteristics.

Key words: Bioculturality, ethnobiology, ethnobotany, multiculturalism, intercultural dialogue.

Background

Since its origin, the human being as a biocultural species has been observing the natural world and forming a set of practices, beliefs, cosmovisions, among other traits associated with nature. Traditionally, the oral route was the main way of maintaining, inheritance, and transmitting these knowledge systems and biocultural practices, especially the cognitive elements chosen as the most important and/or crucial for human survival, with culture and memory playing an essential role in these interrelationships. Thus, the human memory is the result of interactions between biological and cultural traits, considered as biocultural memory (for more details, see Toledo & Barrera-Bassols 2008). It is important for human adaptation in the most diverse ecosystems and/or environments around the globe (Toledo & Barrera-Bassols 2008). In this way, the human memory can be considered dynamic and its improvement occurs over the generations by natural (Nairne & Pandeirada 2016) and cultural selection processes (Richerson & Boyd 2005).

This human behavior of observing the natural world, producing knowledge and accepting it in a cultural domain, as well as transmitting this knowledge over the generations, was undoubtedly a key element of great impact on the evolutionary history of our species. Perhaps, one of the most remarkable observations of human beings regarding nature has been the fact that seed germination occurs *in situ*. The human species observed that seeds of the fruits of the trees that fell to the ground, after a certain time and under suitable conditions, germinated and produced trees such as the mother plant, offering over time as an environmental service (provisioning service) in the form of its fruits (Feldens 2018).

Certainly, this observation has become a short story, a style of narration; its transmission took place through language, gestures, or even possibly through observation among the cultural group itself, where the youngest observed the most experienced ones already cultivating their own seeds and practiced imitation. This continuous observation is directly related to the appearance of the first human crops. It is believed that since human agriculture conquered the world, it has become the main factor in transforming the ecosphere, modifying landscapes, interfering in wildlife, domesticating animals and plants, increasing the human population, supporting the emergence of new technologies, changes in the temperature of the planet, causing drastic modifications in the organization of hunter-gatherer groups, and having other diverse impacts on the planet, both direct and indirect (Mazoyer & Roudart 1997).

The oral transmission of these short stories or narratives resulting from experiences with nature occurs across a broad spectrum; from the oldest to the most current human communities/societies (Deldem 2007) and is even correlated with the culture and ideology of the signs constructed in the social interaction (Geraldi 2000).

These short stories, both in their oral as well as in written form, are essential for the maintenance of bioculturality throughout the world, being configured as a strategy to rescue the biocultural memory in the most diverse cultures (Siqueira 2018). According to Fiorussi (2003) a short story is a short narration. It is direct, in which each description and/or term used has great meaning for its understanding. This type of textual genre is characterized by having few personages, a single conflict and climax as well as time and space reduced to an outcome (Sarmento & Tufano 2004). The personages of this type of textual genre are the most diverse possible, the author of the short story is the main character, whose participation/narration highlights its interrelationships with the natural world. Beyond this, the characters can be non-human animals or plants, among several others (Siqueira 2018).

The concept of short stories that we used here is that presented by Siqueira (2018), in which this type of textual genre is characterized by its great flexibility, few personages and is recognized for its short and closed structure. When it is to related to ethnobiology, considered as "*the study of the interactions of people and human groups with the environment*" (see Albuquerque & Chaves 2018, p. 19), they are characterized by presenting their own traits, such as descriptions of landscapes and/or places, plants, animals, among other elements of nature, feelings and sensations experienced, a unique fact from which the narrative is built, among other traits of a more secondary attributes (Siqueira 2018). These short stories have more real characteristics, moving away from fiction, since they are written from real/lived situations in the interactions between people and nature. Despite this, part of the author's idea is to mix reality and fiction to make his/her short stories more interesting.

From the perspective of short stories and the ethnobiology, Duque-Brasil *et al*. (2012) and Souto *et al*. (2016, 2018) organized some books bringing together several short stories, narrations and

chronicles related to ethnobiology/ethnoecology. In these works, there are interesting texts about plants, animals, healers, indigenous peoples, water, homegardens as biocultural spaces, birds, domestication, among other elements that show the interrelationships and cosmovisions of human species with nature.

Considering this exposed scenario and the context of the rich biocultural biodiversity on a global scale, we consider that narratives related to ethnobiology could be better applied if they are included in the educational context as a pedagogical tool. In this way, a sum of research from around the world has shown that students are entities with an opulent and varied knowledge about nature and its elements, such as medicinal plants (Strgar *et al*. 2013, Bruyere *et a*l. 2016, Alves *et al*. 2017, Santos & Campos 2019), fungi (Oliveira *et al*. 2016, Silva 2019), climate change (Pitpitunge 2013, Dewi & Khoirunisa 2018), fish (Sampaio *et al*. 2006, Araújo *et al*. 2011), insects (López *et al*. 2007, Guedes *et al*. 2016), biomes (Souza & Silva 2017, Borges & Simião-Ferreira 2018), snakes (Alves *et al*. 2014), birds (Ortiz *et al*. 2018), amphibians (Oliveira & Silva-Santana 2015), mammals (Kubiatko & Prokop 2009), among other elements of natural resources.

Therefore, a greater understanding of these students' knowledge, through short stories, and their integration with the formal contents of educational curriculum could contribute to a more significant teaching-learning processes, even having a potential influence on changing behaviors, attitudes and levels of awareness associated with the use and management of natural resources in a changing world. Thus, Baptista (2018) in the specific case of the Natural Sciences teaching processes, points out that identifying students' cultural knowledge is a key element for the promotion of intercultural dialogue in the classroom.

For this, in the educational context, one cannot think about the construction of knowledge if one does not take into account the cultural and pedagogical traits that subjects acquire throughout their life trajectory (Quintriqueo-Millán *et al.* 2014), such as the experiences structured by the interactions of the students and natural world.

Recognizing and/or valuing this multicultural universe in the classroom, Medeiros and Albuquerque (2018) brought together the proposals for teaching ethnobiology, dealing with the most diverse topics in this area of knowledge, such as plant classification, variation in local knowledge, preferences for landscapes, productive chains of sociobiodiversity, traditional hunting techniques, extraction of bark from the stem of woody species, among others.

From a perspective of the human being as a biocultural species (Morin 1980), added to the importance of short stories in ethnobiology and taking into account the culturally diverse and heterogeneous educational environment, we present a methodological proposal that aims to stimulate the writing and discussion of short stories regarding to the interrelationships between students and nature. This methodological proposal is structured in a way to value the multicultural environment in the educational context, where the students and their everyday living, past, and recent experiences are the main subjects in its application.

Methodological proposal

This methodological proposal is structured in five main subtopics, namely: (1) ethical suggestions, (2) procedures for presentation, (3) writing procedures, (4) socialization and discussion procedures of the written short stories and, (5) assessment procedures. The teacher, depending on the duration of application of the class and/or the following methodological proposal, may decide to apply it on separate days (each step on a different day), or even in a single day. The direct and indirect relationships of the application of this methodological proposal can be seen in Figure 1.

The direct interrelationships and/or direct relations are those that are established when the subject directly leads the stage or executes some main procedure within the domain of the stage, thus being the most active subject. Already the indirect interrelationships and/or indirect relations are those that are established when the subject does not directly lead the stage or does not perform any main procedure within the domain of the stage, in this case, the secondary subject. All participating subjects are immersed in a multicultural environment (in this case, the classroom) and carry their life experiences with them. Hence, these interrelationships are established in a two-way street, consolidating mutual knowledge-building processes, intercultural dialogues in an effective and more culturally sensitive way.

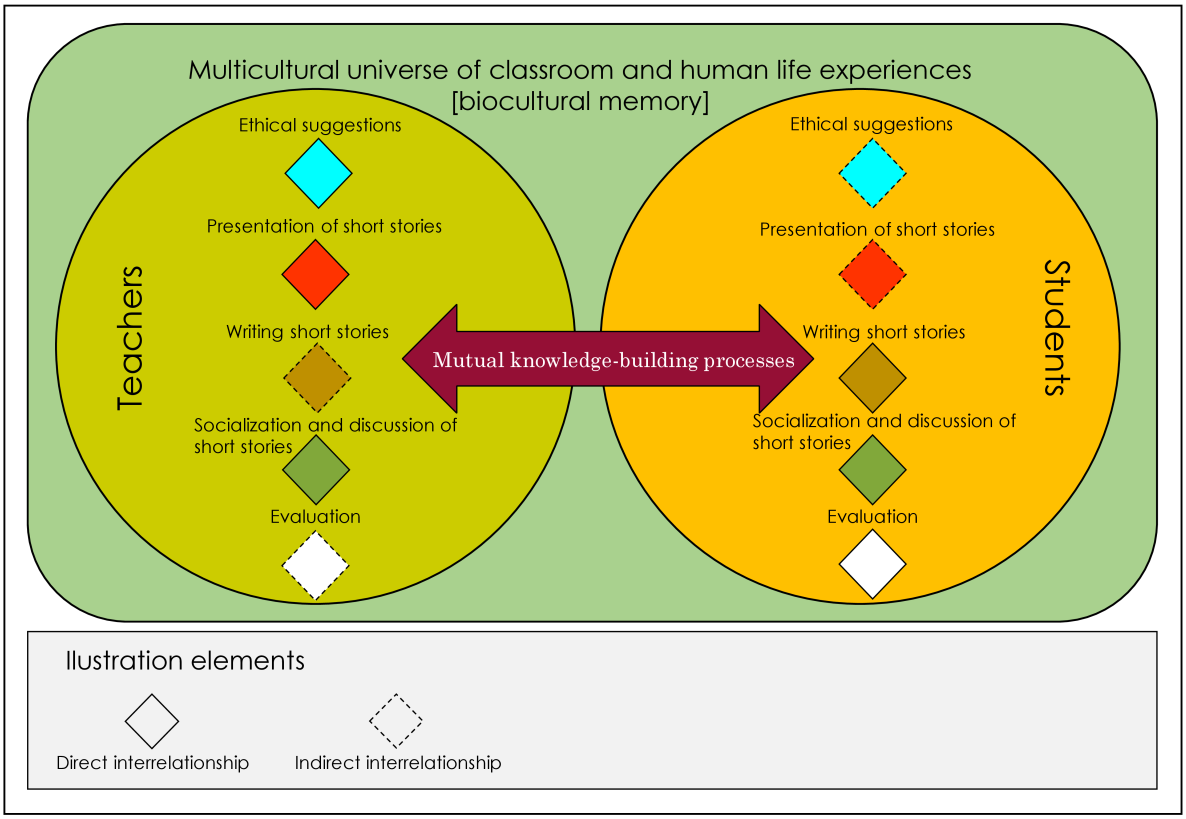

Figure 1. Schematic representation of the indirect and direct interrelationships associated with the stages of the methodological proposal for the use of short stories regarding to biocultural memory in the educational context.

Ethical suggestions

Before conducting any investigation or application of any topic related to ethnobobiology and/or ethnobotany, the investigator must have knowledge of the ethical conduct and/or principles that govern his/her profession (Zank *et al*. 2019). When dealing with human beings, any investigation must have undergone an ethical approval, stating how the data will be collected in a safe manner, the benefits and the risks (in all ethnobotanical research there are risks, from embarrassment, to serious cases that require medical assistance) minimized, in order to ensure the well-being and integrity of the research participants, respecting them in all possible aspects.

For the presentation of this methodological proposal, a prior ethical approval was not required, since we have not conducted a direct investigation with human beings. On the other hand, if it is of interest to the teacher/researcher to document and publish the data resulting from the application of this methodological proposal, we strongly suggest to follow the ethics guidelines of the International Society of Ethnobiology (ISE 2006), of the Latin American Society of Ethnobiology (Villamar *et al*. 2018) and exclusive laws/resolutions of each country (e.g., Resolutions N° 466 of December 12, 2012 and Nº 510 of April 07, 2016, both from the National Health Coincil in specific case for Brazil—Brazil 2012, 2016), among others, that are respected and applied as a basic guiding principle of ethnobiological research.

Procedures for presentation

As a starting point, it is essential that the teacher choose the formal teaching content that he/she wishes to work with in applying the pedagogical intervention that takes the short stories as a reflective practice. From this selection, the teacher starts to identify elements of the students' daily knowledge that may apply to these contents during classes in which the formal curriculum will be taught.

After establishing these topics, as an initial approach to the pedagogical intervention itself, the teacher should give an explanatory context to the short stories, explaining to the students what a short story would be, including its structure and main characteristics. The teacher will be able to read previously published short stories (e.g., Duque-Brasil *et al*. 2012, Souto *et al*. 2016, 2018, Siqueira 2018) to the class, or even better, in any environment, the teachers could write short story based on their own life experiences with the natural/cultural world before reading it aloud to the class.

In this way, we believe that the students will better understand what a short story is and how to write it, not neglecting that these short stories should be written based on their own experiences with nature

and its components (e.g., plants, fungi, animals, algae, among others). Besides that, they must describe the environment in which they found themselves, their characteristics, and other elements that give contours to an in-depth understanding of the theme that will be addressed in the short story. In addition, it would be interesting to describe the sensations experienced.

These short stories must be guided by a main fact, which may be the use of plants or animals as a medicinal resource, a fungi that caught your attention, a fruit tree in the homegarden, or any other fact that has marked you or that is an important element of your life routine, since our interrelationships with the natural world are of immeasurable dimensions and amplitudes.

Writing procedures

After applying the previous steps, the students should write their own short stories. Students are expected to write short stories narrating some of their experiences with nature and several of its components, including plants, animals, fungi, among others. The teacher must accompany the students during this stage and be always assisting the students with possible doubts and/or difficulties that may arise.

This stage is crucial because it is the occasion when students will transcribe moments of the people-nature interaction present in their individual mind or that refer to the local collective memory; therefore, the teacher should be sensitive to identifying possible difficulties during this process, as it is suggested that in the memory and consciousness the scene is easily formed and the thoughts and their recollection flow naturally. However, we consider that at the time of writing these experiences, difficulties may arise, which must be worked on and not become a hindrance to the development of short stories in ethnobiology.

Socialization and discussion procedures of the written short stories

After the writing stage, the students, individually, will be invited to read their short story to the class. Then, the teacher should start a discussion about each short story, generating with the class a reflection on the elements mentioned. In this discussion, when possible, intercultural dialogue should be promoted between the short story and past classes, or even in future classes.

We suggest that this argumentative exchange is important for the valorization of local knowledge and for the establishment of connections between these local cognitive systems and scientific knowledge. This moment can also be important for promoting awareness related to our impact on the environment. There is a possibility that some students may mention some environmental crime, intentional fires that they have witnessed, illegal trade of wild animals, deforestation, pollution of rivers, as well as so many other issues of conflict between human species and environments and its products or elements. The teacher must be sensitive to these possibilities and generate a discussion about the serious impacts that these activities represent for the environment and the survival of non-human and human beings as a way of sowing environmental awareness.

Assessment procedures

The evaluation criterion will be based on the student's participation during the performance of the practice, interaction during the socialization of the short stories and the setting up of a panel. The creation of this panel will begin through collective discussions, as each short story is being read. Its assembly will be carried out from the textual elements identified and categorized by the students as belonging to the local cultural domain, through keywords or collective speeches structured with textual elements from a set of short stories read in class.

In this dynamic, it is suggested that the teacher also conducts the reflections so that the students express their perceptions about the interrelationship(s) or not existing between these elements of the local cultural cognitive system with the methods and/or scientific knowledge chosen to be the thematic focus of this didactic intervention. Thus, at the end of the assembly of this collective panel, everyone will be able to have a good understanding about what, within the chosen general scientific theme, refers to the local identity and what are their possible interactions with Western Science.

In other words, the teacher could, for example, define that the theme of inspiration for literary composition would be the formal content aimed at the conservation of ecosystems. Then, after the writing of the short stories by the students of the discipline, the teacher would start the construction of a panel in which the students themselves would be pointing out the textual elements present in the short stories that refer to nature and its conservation. At this point in the construction of the panel, the students would include the terms that refer to culture, nature and then start to include the terms that make connection with the corresponding scientific concepts. Thus, with the composition of this final panel, the teacher acting as a mediator of the students' cognitive development would initiate a

discussion between the local knowledge about the conservation of ecosystems expressed by the students in their short stories and the scientific content on the same theme.

Here, in order to facilitate students' understanding of the theme worked on, we propose an artificial separation between the elements that refer to nature and culture. However, these dimensions are not isolated, nor do they follow different paths, but rather interact in complex domains and coevolve (Maffi 2001, 2005). Considering this aspect, Hurrel *et al*. (2019, p. 167) point out that "*for the biocultural context, the dissociation between nature and culture has no meaning.*" This artificial separation of terms will allow students to build a more holistic view of the human being as a biocultural species and promote the dialogue between nature, culture (both from their life experiences) and formal content. In Box 1, a general summary of this methodological proposal is outlined.

Box 1. Summarized methodological proposal for the use of short stories regarding the biocultural memory as a pedagogical tool

This methodological proposal is structured in five main subtopics, namely: (1) ethical suggestions, (2) procedures for presentation, (3) writing procedures, (4) socialization and discussion procedures of the written short stories and, (5) assessment procedures:

1. *Ethical suggestions*

   1.1. *It is important to take into account the ethical conducts that guide ethnobiological fieldwork if you wish to document and publish the findings of the application of this methodological proposal. The ethical approval is not necessary if the project is applied in the classroom, without documentation and publication of data, in order to support the construction of knowledge, contributing to the teaching-learning process of students.*

2. *Procedures for presentation*

   2.1. *You must present to the students an example of what a good short story might look like, including its structure and characteristics;*
   2.2. *You must read a short story already published (Duque-Brasil et al. 2012, Souto et al. 2016, 2018, Siqueira 2018), or, even better would be to read a short story of your own authorship.*

3. *Writing procedures*

   3.1. *The students should write their short stories based on their experiences with the natural world and its elements, which may include plants, animals, fungi, algae, landscapes, among others.*

4. *Socialization and discussion procedures for written short stories*

   4.1. *The students must do the shared reading, one by one, of their written short story;*
   4.2. *The teacher will be able to ask each student about the elements mentioned in each short story, being able to associate these elements with themes from past classes, and also mention the short story in future classes, seeking intercultural dialogue;*
   4.3. *The teacher can conduct a discussion taking into account the elements mentioned in the short stories by students from rural and urban areas, since they are different contexts and thus, a variety of elements are expected to be referenced.*

5. *Assessment procedures*

   5.1. *The students should underline/emphasize the terms that refer to nature and its elements;*
   5.2. *The students should make a panel, separating the terms that refer to «culture» and «nature»;*
   5.3. *The students will include in the panel keywords that refer to the contents of Western Science to which the elements of culture and local nature may be related, according to their perception;*
   5.4. *The teacher will be able to evaluate the student's participation and understanding of formal contents that were chosen for the application of this pedagogical practice and, in addition, he/she will be able to perceive if there was an effectiveness in the reflection on the importance of multicultural education, which promotes respect and inclusion social and cultural, in a group process of knowledge construction with their students.*

Final considerations and suggestions

The use of short stories related to students' experiences with the natural world and its elements, or their biocultural memory is a promising methodological proposal as a pedagogical tool, which can assist teachers in the intercultural dialogue, contributing to a more culturally sensitive teaching-learning process, in which students' daily experiences, from writing, socializing and discussion of short stories can be the starting point for broad and productive discussions and reflections about the chosen curricular theme. All of these steps are conducted in a manner that builds the construction of knowledge in a solid, plural and varied way that respects and values the cultural diversity presented in the educational context.

In addition, it is structured to be applied in different contexts, both in rural and urban environments; we also emphasize that the present proposal is flexible and can be adapted to local conditions and needs. In other words, the present methodological proposal is structured in a way to be applied by teachers at different levels of education (such as elementary school, middle school, secondary school, and others), and age of the students, since our experiences with the natural world accompany us throughout life from birth, although many of them in the course of life are forgotten. Accordingly, the proposal may contribute to the «rescue» of biocultural memory, since it encourages students to remember past situations regarding their biocultural experiences.

Indeed, due to its multidisciplinary and interdisciplinary nature, this proposal can be applied across the board and by different teachers from different curricular components, not only in Natural Sciences and/or Biology, but also, for example, in Geography, History, Philosophy, Sociology, and Portuguese Language (in the case of Brazil and other countries that have Portuguese as official language, in other nations their own languages, valuing local and/or indigenous languages).

Declarations

List of abbreviations: Not applicable.

Ethics approval and consent to participate: It does not applicable to the presentation of the following methodological proposal, since we do not conduct interviews or data documentation that required a prior informed consent. However, we strongly suggest to researchers/teachers who want to about document and publish the data resulting from the application of this methodological proposal, that they allow themselves to be guided by the norms and/or conducts proposed by the international and specific codes of ethics of their country.

Consent for publication: All authors reviewed the final version of this document and agreed to its publication.

Availability of data and materials: Not applicable.

Competing interests: The authors declare that there is no conflict of interest.

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Authors' contributions: Conceived of the idea: JIAS; Wrote the first draft of the manuscript: JIAS; Wrote the final versions of the manuscript: JIAS, LSV, MFTM; Supervision: MFTM, LSV.

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Literature Cited

Albuquerque UP, Alves AGC. 2018. O que é Etnobiologia? In *Introdução à Etnobiologia*. 2ª edição revisada e ampliada. Edited by UP Albuquerque & RRN Alves. NUPEEA, Recife, Pp. 19-24.

Alves RRN, Silva VN, Trovão DMBM, Oliveira JV, Mourão JS, Dias TLP, Alves AGC, Lucena RFP, Barboza RRD, Montenegro PFGP, Vieira WLS, Souto WMS. 2014. Students' attitudes toward and knowledge about snakes in the semiarid region of Northeastern Brazil. *Journal of Ethnobiology and Ethnomedicine* 10(30):1-8.

Alves MH, Meireles MPA, Lemos JR. 2017. Percepção dos alunos de duas escolas do ensino básico sobre plantas medicinais, município de Buriti dos Lopes, norte do Piauí, Nordeste do Brasil. *Revista Espacios* 38(50):8.

Araújo RTN, Kraemer BM, Murta PFO. 2011. Percepções ambientais e concepções de estudantes do Ensino Fundamental de Belo Horizonte/MG sobre tubarões. *E-Scientia* 4(1):69-79.

Baptista GCS. 2018. What is the purpose of Ethnobiology in biology teacher training? *Science Education International* 29(2):96-102.

Borges PS, Simião-Ferreira J. 2018. Percepção ambiental dos alunos de Ensino Fundamental sobre a biodiversidade do Cerrado. *Revista Ciências & Ideias* 9(1):1-18.

Brasil. 2012. *Conselho Nacional de Saúde, Resolução Nº 466, de 12 de Dezembro de 2012*. Diário Oficial da União, Brasília.

Brasil. 2016. *Conselho Nacional de Saúde, Resolução Nº 510, de 07 de Abril de 2016*. Diário Oficial da União, Brasília

Bruyere BL, Trimarco J, Lemungesi S. 2016. A comparison of traditional plant knowledge between students and herders in northern Kenya. *Journal of Ethnobiology and Ethnomedicine* 12(48):1-10.

Delbem DC. 2007. Folclore, Identidade e Cultura. *UNAR* 1(1):19-25.

Dewi RP, Khoirunisa N. 2018. Middle school student's perception of climate change at Boyolali District, Indonesia. *IOP Conference Series: Earth and Environmental Science* 200:1-5.

Duque-Brasil R, Soldati GT, Souto FJB, Alencar NL, Ming LC, Coelho FMG. 2012. *"Quando pensa que não..."*: Contos, causos e crônicas em etnoecologia. Grupo ETNOIKOS, Viçosa, MG.

Feldens L. 2018. *O homem, a agricultura e a história*. Editora Univates, Lajeado.

Fiorussi A. 2003. *De conto em conto*. Ática, São Paulo.

Geraldi JW. 2000. Culturas orais em sociedades letradas. *Revista Educação & Sociedade* 21(73):100-108.

Guedes RS, Santos WS, Medeiros FS, Medeiros WP, Almeida ABM. 2016. Percepção entomológica de alunos do ensino médio em escolas da cidade de Patos, Paraíba, Brasil. *Revista Verde de Agroecologia e Desenvolvimento Sustentável* 11(2):1-7.

Hurrell JA, Stampella PC, Doumecq MB, Pochettino ML. 2019. Ethnoecology in pluricultural contexts: theoretical and methodological contributions. In *Methods and Techniques in Ethnobiology and Ethnoecology*. Edited by UP Albuquerque, RFP Lucena, LVFC Cunha & RRN Alves. Second Edition. Humana Press, New York, Pp. 163-186.

International Society of Ethnobiology–ISE. 2006. *ISE Code of Ethics (with 2008 additions)*. Available at: <http://ethnobiology.net/code-of-ethics/>. Accessed 01 June 2020.

Kubiatko M, Prokop P. 2009. Pupils' understanding of mammals: an investigation of the cognitive dimension of misconceptions. *Orbis Scholae* 3(2):97-112.

López BGR, Costa Neto EM, Baptista GCS. 2007. Percepción y conocimiento de los insectos: un estudio de caso con los niños de educación primaria en dos zonas urbanas de Iztapalapa, Distrito Federal, México. *Boletín Sociedad Entomológica Aragonesa* 4:485-493.

Maffi L. 2001. Introduction. On the interdependence of biological and cultural diversity. *In* On biocultural diversity. Linking language, knowledge, and the environment. Edited by L Maffi. Smithsonian, Washington, Pp 1–50.

Maffi L. 2005. Linguistic, cultural, and biological diversity. *Annual Review of Anthropology* 29:599–617.

Mazoyer M, Roudart L. 1997. *Histoire des agricultures du monde*: Du néolithique à la crise contemporaine. Éditions du Seuil, Paris.

Medeiros MFT, Albuquerque UP. 2018. *Práticas para o ensino de Etnobiologia*. NUPEEA, Recife.

Morin E. 1980. L'unidualité de l'homme. In *Philosophe*. Edited by C Delacampagne & R Maggiore. Fayard, Paris, Pp. 41-49.

Nairne JS, Pandeirada JNS. 2016. Adaptive memory: the evolutionary significance of survival processing. *Perspective on Physiological Science* 11(4):496-511.

Oliveira PSF, Silva-Santana CC. 2015. Percepção dos alunos do sétimo ano sobre os anfíbios em uma escola municipal no semiárido baiano, Brasil. *Revista Gestão Universitária* 1-12.

Oliveira TCS, Silva CP, Andrade TEG, Santos RFM, Lima AS, Rocha JRS. 2016. Percepção de macrofungos por estudantes de uma escola pública no Nordeste do Brasil. *Ensino, Saúde e Ambiente* 9(3):54-63.

Ortiz JL, Conkey AAT, Brennan LA, Fedynich LV, Green M. 2018. Wild birds in classroom: evaluation of student affinities, perceptions, and attitudes in response to an experiential curriculum. *International Journal of Environmental & Science Education* 13(10):787-803.

Pitpitunge AD. 2013. Students' perception about climate change. *Asian Journal of Biology Education* 7:1-11.

Quintriqueo-Millán SE, Quilaqueo D, Lepe-Carrión P, Riquelme E, Guitiérrez M, Peña-Cortés F. 2014. Formación del profesorado en educación intercultural en América Latina. El caso de Chile. *Revista Electrónica Interuniversitaria De Formación Del Profesorado* 17(2):201-217.

Richerson PJ, Boyd R. 2005. *Not by Genes Alone*: How Culture Transformed Human Evolution. The University of Chicago Press, Chicago.

Sampaio FAC, Jucá-Chagas R, Teixeira PMM, Boccardo L. 2006. Os peixes e a pesca. Concepções de estudantes do povoado de Porto Alegre, Bahia, Brasil. *Sitientibus - Série Ciências Biológicas* 6(Etnobiologia):44-57.

Santos BB, Campos LML. 2019. Plantas medicinais na escola: uma experiência com estudantes do ensino dos anos iniciais do Ensino Fundamental. *Revista de Ensino de Ciências e Matemática* 10(5):271-290.

Sarmento LL, Tufano D. 2004. *Português*: literatura, gramática, produção de texto. Editora Moderna, São Paulo.

Silva AC. 2019. A visão dos alunos sobre fungos: estudo das percepções e conhecimentos de fungos por estudantes concluintes do Ensino Médio. Master's Dissertation [Graduate Program in Science and Mathematics Teaching], Universidade Federal de São Paulo, *Campus* Diadema.

Souto FJB, Duque-Brasil R, Soldati GT, Ming LC, Costa Neto EM. 2016. *"Quando pensa que não..."* Contos, causos e crônicas em Etnoecologia. Vol. II. Zarte Editora, Feira de Santana/Bahia.

Souto FJB, Soldati GT, Ming LC, Duque-Brasil R, Kubo RR. 2018. *"Quando pensa que não..."* Contos, causos e crônicas em Etnoecologia. Vol. III. UFPA, Belém.

Souza LS, Silva E. 2017. Percepção ambiental do bioma caatinga no contexto escolar. *Revista Iberoamericana de Educación* 73(1):67-86.

Strgar J, Pilih M, Pogačnik M, Žnidarčič D. 2013. Knowledge of medicinal plants and their uses among secondary and grammar school students: a case study from Slovenia. *Archives of Biological Science* 65(3):1123-1129.

Siqueira JIA. 2018. Cuentos en Etnobiología como Estrategia de Rescate de la Memoria Biocultural. *Ethnobotany Research & Applications* 7(4):1-3.

Toledo VM, Barrera-Bassols N. 2008. *La Memoria Biocultural*: La Importancia Ecológica de las Sabidurías Tradicionales. Icaria Editorial, Barcelona.

Villamar AA, Sanabría-Diago OL, Contreras EJC, Medinaceli A. 2018. Código de ética para la investigación etnobiológica en América Latina. *Ethnoscientia* 3(2 Special Issue):1-6.

Zank S, Ludwinsky RH, Blanco GD, Hanazaki N. 2019. Protocols and Ethical Considerations in Ethnobiological Research. In *Methods and Techniques in Ethnobiology and Ethnoecology.* Second edition. Edited by UP Albuquerque, RFP Lucena, LVFC Cunha & RRN Alves. Springer, New York, Pp. 229-253.