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Article

Health education: the approach on drugs in didactic books of biology

Educação em saúde: abordagem do tema drogas em livros didáticos de biologia

Educación en salud: enfoque de las drogas en libros didácticos de biología

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Abstract

Our goal is to analyze the approaches on drugs in didactic books of biology. The research is of a qualitative approach and it uses the content analysis as a referential. We realized that the majority of the texts are of biomedical approach with only one of behavioral approach, and two of socio ecological approach. There are also parts identified with more than one perspective, in addition to a mistake in the definition of a fungus species. We highlight the importance of expanding the approaches related to the topics of health and drugs in didactic books without restricting itself to the processes of sickness of the body.
Keywords: Drugs. Health Education. Didactic Book.

Resumo

Objetivamos analisar a forma como o tema drogas é abordado em livros didáticos de biologia. Esta pesquisa apresenta abordagem qualitativa e utiliza o referencial da análise de conteúdo. A partir da análise, percebemos que a maioria dos trechos analisados é de abordagem biomédica, com apenas um de abordagem comportamental e dois de abordagem socioecológica. Também foram identificados trechos que contêm mais de uma abordagem, além de um erro conceitual relacionado à caracterização de uma espécie de fungo. Destacamos a importância de uma ampliação de abordagens para

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os temas saúde e drogas nos livros didáticos não se restringindo aos efeitos negativos e aos processos de adoecimento do corpo.
Palavras-chave: Drogas. Educação em Saúde. Livro Didático.

Resumen

Nuestro objetivo es analizar cómo se aborda el tema drogas en los libros didácticos de biología. Esta investigación presenta un enfoque cualitativo y utiliza el marco de análisis de contenido. A partir del análisis nos dimos cuenta de que la mayoría de las secciones analizadas son biomédicas, con solo una de enfoque conductual y dos con un enfoque socio-ecológico. También se identificaron extractos que contienen más de un enfoque, además de un error conceptual relacionado con la caracterización de un hongo. Destacamos la importancia de ampliar los enfoques sobre la salud y las drogas en los libros didácticos sin limitarse a los efectos negativos y los procesos de enfermedad del cuerpo.
Palabras clave: Drogas. Educación en Salud. Libro Didáctico.

Introduction

The World Health Organization (WHO, 2020) highlights basic principles for health, including the physical, mental and social well-being besides the lack of diseases, thus, being one of the main human rights with no racial, religious, sexual or sociocultural distinction. In Brazil, the Political Constitution of the Brazilian Empire (Brazil, 1824) had education as an obligation of the State as it can be seen in Art. n° 179, about the inviolability of the civil and political rights of Brazilian citizens, in the addendum XXXII, which postulates free primary instruction. The transition of the Brazilian monarchical constitution to the federal constitution (Brazil, 1988) follows the resignification of the concept and value of health in people's lives with its implementation as a civil right in Art. n° 6.

Cultural and historical contexts, and political and socio-economic conditions influence the social conception of the meaning of the word health (Martins, 2017). In ancient societies, health was linked to science and to a spiritual orientation, such as in Egypt, India and China. For example, in the Egyptian mythology, the goddess Isis rescues the body of the god Osiris fragmented by his brother, Seth, and performs the first process of mummification. The ancient Egyptians, 3200 BC - 332 AD, have produced medical knowledge through the dissection of bodies and identification of organs to embalm and mummify them. Also, for the cirurgical knowledge of cataract removal and by techniques of vaccination and pharmacology (Pinheiro, 2019).

The naturalist philosophy gave birth to new ways of thinking in ancient Greece. In the book *Republic*, Plato exposes his political, philosophical, aesthetic and juridic thoughts. In

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one of the dialogues about human identity he considers that "virtue will be, as it seems, a type of health, beauty and well-being of the soul" (Plato, 2013, p. 141)[1]. To him, there is a specific function to each part of a person. For example, the function of the eyes is to see the physical environment, and in this same reasoning, the soul also has a specific function, which is: "to supervise, govern, deliberate and all acts of the same kind" (Plato, 2013, p. 42).

The naturalist philosophy would also give birth to the medical science that sought for natural explanations to health and disease. Hippocrates, 460-370 BC, said that temperance and harmony, in other words, avoiding any type of excess, are effective means to prevent diseases. Thereby, health would be a state of healthy mind within a healthy body. He taught his students about medicine and the medical ethics guideline. "For example, a doctor cannot prescribe addictive medications for healthy people" (Gaarder, 2003, p. 68). In Rome, Galen, 129-210 AD, influenced that perspective of health through his anatomical and physiological studies on dissection of animals (Labate et al., 2008). That perspective of medicine built a model of health based on anatomical and physiological aspects to cure diseases and established the state of sickness opposed to the state of health. That type of approach turns environmental questions into less significant and even reduces them to possible causes of diseases, such as the ones caused by microorganisms and by physical and chemical agents (Martins, 2017).

The rationalist thinking emerges in the 18th century inside of the French age of enlightenment context. The natural science of that age supposed that nature was totally rational and the rationalists had the purpose of creating a moral, ethical and religious foundation subjugated by man's reason. That way of thinking, reduced only to reason, ignores metaphysical subjects because they are considered unnecessary (Gaarder, 2003). Thereby, in a reductionist perspective of health and education, the range of intervention of medical knowledge is extended, which creates the phenomenon known as social medicine, described by Foucault (2003) through four concepts: the biohistory, starting in the 18th century with interventions of health public policies; the medicalization, in which the body, behavior, and human existence are investigated by medicine through systematized researches and the development of health institutions; the health economy, in other words, the integration and improvement of health services besides the consumption of its products within the economic development of privileged societies; and the biopolitics, that considers the body as a productive force of work in the capitalist paradigm.

In the 20th century, the phenomenon of medicalization converges with the expansion of the pharmaceutical industry. The medical performance in the first moment intervened at political level, but the second moment extrapolated the medical science authoritarianism

[1] All original quotes in Portuguese were translated to English by the authors of this article.

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to all aspects of human life (Labate et al., 2008; Zorzanelli & Cruz, 2018). One problem related to the medicalization in Brazilian society is the way that different social classes are treated in that perspective, which has the intention of securing health, education, and security to wealthy social classes while the health of people associated with urban violence, crimes, drugs, and prostitution is promoted so that they cannot offer health risks to wealthy people (Tamer, 2005).

The distinction between a legal drug to an illegal one comes from many interests of many sectors of societies "as it can be exemplified by the movements that start with the opium wars in the 19th century until the national prohibition act of 1919" (Labate et al., 2008, p. 91). However, the word drug has been used to talk about one of the main worries of public health because of its seeming threat to personal and collective health besides its immediate association with crime and violence, turning them into a risk for society. There are dilemmas on the predominant interpretation of the usage of drugs associated with the abusive usage and addiction over illegal substances. "When we think about drugs we associate them to the usage of cocaine, weed, crack, etc., in other words, prohibited substances. But some substances are part of our routines, and even though they are not illegal they can be harmful" (Brazil, 2012, p. 12).

The abusive usage of prescribed drugs is more usual with many formulations disponible at drugstores and on the illegal market. That way, debates about addiction issues emerged because of losses to public health and security besides the prejudice on marginalized people, such as prostitutes, transwomen, afro-Brazilian and indigenous communities, creating the necessity of prescribing laws that prohibit the consumption of those drugs, exemplified by the Law n° 11.343 (Brazil, 2006; Labate et al., 2008; Spencer, 2012).

The relationship between drugs and contemporary societies is marked by the contradiction of instigation and repression of the usage of those substances. For example, many beer advertisements are broadcasted to instigate the consumption of alcohol, and also objectify women's bodies. At the same time, the Law n°. 11.705 (Brazil, 2008) imposes controlling measures for the consumption of alcoholic beverages (Labate et al., 2008). Another problem to be highlighted is the consumption of smuggled drugs, such as weed, cocaine, crack, and even cigarettes, alcohol, and prescribed medications. Even though the drugs sold at drugstores have been previously tested to verify their security and utility before they can be used by the consumer, it does not mean that they cannot be used inappropriately. They are produced under a strict standard control of quality and then evaluated clinically. However, if medical orientations are not well explained or if a person uses a medication inappropriately, it can cause side effects. The drugs of unsure sources do not meet the hygiene requirements and there could be contaminants, thinners, and

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poisons. That way, organized crime would also be linked to the problems of public health (Spencer, 2012).

The threshold between what is considered to be a legal drug to what is considered illegal, the different sources of drugs and their effects, and the usage context and its relation to the paradigm of capitalism are themes that, according to the National Curricular Parameters - PCN - (Brazil, 1997), have to be dialogued at school. It is important to consider the different realities of students, the acknowledgement of correct information, the ideas and feelings related to drugs, as much as a dialogue with families and the school community to enable the deconstruction of possible prejudiced perspectives about that theme. However, with the theme drugs being suppressed on the National Common Curricular Base - BNCC - (Brazil, 2018), the dialogue turned to be harder because of the mandatory requirements that the new document proposes opposed to the PCN which was not mandatory, but a guide. Comparing both documents, it came to notice that the texts produced for the BNCC are superficial and repetitive. The drug theme was reduced to only medications, being considered synthetic substances which modify an organism's behavior. The health theme is addressed by the words 'personal health' and 'collective health', and by generalist directions. For example: "to debate about what is needed to promote individual and collective health, including public policies" (Brazil, 2018, p. 327), which gives the impression of being a cliche.

One of the issues related to drugs to be dialogued is about the abusive usage of those substances and addiction as a possible consequence. Which factors make a person search for pleasure in drugs, and sometimes lose their self-respect for it? Even though the idea of degradation is more associated with the consumption of drugs, the feeling of pleasure is consensual in medicine. The pharmacological studies point to different effects in the central nervous system for different drugs. The cultural point of view states that they can have economical or sacred value. According to *Álcool e Outras Drogas* (Alcohol and Other Drugs), produced through a partnership between the Ministry of Education and the Ministry of Health:

> The historical records show that people have been seeking and using substances that modify their mood, senses, consciousness, and their emotional state. In the past, those substances had a well defined position and their usage was controlled and secured by society. In the globalized world, those substances have been turned into profitable goods produced for large scale consumption. Also, there are changes of social context because of the increasing inequality in which the usage and abuse of alcohol and other substances (including medications) are considered to be a support to face emotional, social, and economic difficulties, in other words, to accomplish the expected life projects. (Brazil, 2012, p. 44)

However, for the State to be able to deal with addicted people, it came with public policies instead of simply prohibiting the usage of drugs. The public policies are educational strategies for harm reduction. One of the most known is to make disposable

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materials available, such as syringes and needles for injectable drug users, and individual orientation to avoid sharing syringes and a possible infection. That strategy was slowly extended for alcohol and crack users due to them forgetting to use condoms while having sex (Brazil, 2012). That type of strategy associated with habits considered dangerous and risky by the medical community focuses on the instruction of addicted people and it represents a behavioral approach on health, which consists of indications for habit changes by a health professional (Martins, 2017).

Ayres (2002) remarks on his rehearsal on HIV/AIDS that, the first lesson learned with educative and prophylactic practices is that advertisements that cause fear on people are ineffective and make them avoid the situation instead of wanting to know about the issue. Those initial campaigns about prevention while having sex or in the usage of intravenous drugs show that fear cause an increase on prejudice, being one of the main elements to be deconstructed during epidemics.

It is important to take in consideration that children and teenagers bring within themselves the values and behaviors related to health that they have learned with their family, friends, and media before going to school. As childhood and youth are decisive moments for the construction of values or virtues, the school has an important role over the development of those kids. "At school, the kids should learn first about controlling their desires, to develop courage, and then to use their intellect to achieve wisdom" (Gaarder, 2003, p. 106). Besides the classic concepts of virtues, there also is solidarity. According to Tamer (2005), solidarity is the principle that translates the right to development, peace, and to an environment ecologically balanced.

Since the year of 1970, the human and social sciences have been developing with the freedom of speech and the means of communication being popularized (Bardin, 2016). The way that people deal with their health and other situations related to it are questions for social research (Flick, 2013). While the technologies have been improving, knowledge became an instrument in the capitalist way of life. In the midst of an overload of information on digital environments, the didactic books or textbooks are still one of the most used resources at school and, thus, they deserve attention in aspects of content and the way these contents are addressed.

Through the textbooks, it is possible to notice the way that drugs are addressed in a pedagogic context. Therefore, this article is intended to analyze the way that drugs are addressed in textbooks of biology besides identifying the nomenclatures associated with them and to characterize the approaches on health education.

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Methodology

The approach of this research is qualitative. The documents are central elements of analysis for this research, and they can also be utilized with other types of methodologies of qualitative approach (Mcculloch, 2004).

The printed version of a collection of textbooks named *Biologia Moderna* (Modern Biology), by Amabis and Martho (2016a; 2016b; 2016c), composed of three books, was chosen to be analyzed. The first volume is destined to the 1st year of high school, the second volume is destined to the 2nd year of high school, and the third volume is destined to the 3rd year of high school. The standard for selection of these textbooks was to be part of the National Program of Textbooks and Didactic Material - PNLD, for the years of 2018, 2019, and 2020. To analyze and interpret the content of this collection, the analysis of content, by Bardin (2016), was used, which is a set of methodologies applied to the speech, which can be verbalized or written. The analyzed materials went through phases in order to organize the steps of the process, which are: pre-analysis; exploration of the materials; processing of results, inference, and interpretation.

Firstly, an initial reading was made to identify the parts that are related to drugs and to which contents they are usually attached. That is, the floating reading: "the first activity consists of establishing a contact with the documents to be analyzed and to get to know the text through impressions and orientations" (Bardin, 2016, p. 126). Then, with the rule of exhaustiveness, which postulates the necessity of accuracy while analyzing the materials for the inclusion of all important elements. Thus, the identified passages were analyzed once more with the rule of homogeneity, which postulates accurate standards for the choice of elements that are inside of the context of this research. Therefore, the descriptors of words linked to drugs and health education were organized inside of two boxes.

The content of Forensic Toxicology, by Spencer (2012), and the PhD thesis on health education and the usage of drugs, by Lima (2013), were chosen to identify parts of the texts related to drugs. In search of contextual concepts, it was noted that some poisons as much as toxins can be used as drugs, depending on the dosage and the context of application of the substance while some drugs can cause intoxications in organisms if used in high dosages. That is why we consider it relevant to include descriptors for drugs, poisons, and toxins. These definitions were organized in the box 1 as it is presented below:

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Box 1
Definitions of drugs, poisons, and toxins

Word	Definition
Drugs	Are chemical compounds that can be natural or synthetics and can modify a biological system, either physiologically, psychologically or both. Nowadays, the word drug can have different meanings, such as the medication capable of curing, the substance used to obtain recreational pleasure, to escape from problems and reality, and even an object of addiction.
Poisons	Are compounds that have an ecological role. A poisonous organism (ex: black widow and rattlesnake) injects its venom through bites to protect itself. Also, many poisons are used in medicine. For example, the usage of arsenic in treatments of cancer, and the venom of snakes for the production of serums.
Toxins	Are considered subproducts of venoms, which are produced specifically by living beings, such as frogs, bacteria (ex: botulism and tetanus), and some plants. A toxic organism can cause unintentional damages through ingestion, inhalation or skin contact.

Source: Spencer (2012) and Lima (2013).

The next step was to seek the concepts of approaches in health education. The interface between the areas of education and health results in an educational process with the purpose of creating knowledge and to stimulate practices related to personal and collective health. To justify the approaches, it was chosen the PhD thesis of Martins (2017). The descriptors were organized inside of the box 2:

Box 2
Approaches on Health Education

Approach	Perspective
Biomedical	Reduces health to the state of absence of diseases and emphasizes diagnosis, treatment, and cure of the body. It is an approach criticized by its reductionist and relativist features of the medical knowledge on health. This perspective focuses on anatomical and physiological aspects.
Behavioral	Focuses on indications of healthy habits at personal level. Sometimes, the targets are healthy individuals of a community, focusing on risky behaviors instead of specific diseases.
Socioecologic	It extends health to the collective sphere to include more people. Therefore, health can be understood as the biopsychosocial and ecologic well-being of humans. In addition to the biological part, it also includes physical, social, economic, and political factors that are related to health.

Source: Martins (2017).

The data produced through the analysis and identification of passages of texts related to drugs were organized according to each type of approach on health education. Thus, they are used as examples of biomedical, behavioral, and socioecological approaches. Also, there are passages that present a superposition of approaches.

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Results and Arguments

This article represents a partial view about the theme proposed due its limitation to only one collection of textbooks composed of three volumes. Even though the focus of this article is of qualitative approach, we consider it important to present the quantity of texts that address the theme of drugs found through the volumes. There is not a specific chapter or topic that portrays that theme directly.

After the analysis, 66 text passages related to drugs were found in the collection of textbooks. A total of 25 text passages can be found on the main contents of the textbooks: 24 biomedical; and one socioecological. The other 41 text passages can be found in boxes of curiosities and extras: 25 biomedical; one socioecological; one behavioral; and 14 in superposition. In addition, there is a predominance of text passages related to drugs, but there are also four text passages related to drugs and toxins, three related only to toxins, and three related to poisons.

The results obtained from the methodologies described above were organized in boxes, which have examples for each health education approach besides one box for approaches in superposition. The examples of biomedical approaches can be seen below in box 3:

Box 3
Biomedical approach

Example
Most cells have a small quantity of smooth endoplasmic reticulum; however, that type of reticulum is abundant in liver cells that act on toxins, alcohol, and other drugs to inactivate them and ease their excretion.
Another area that has been gaining lots of investments for research is pharmacogenomics. It is the study about the reaction of different genotypes to one medication. Nowadays, there are tests capable of predicting how a person will react to the medication being consumed.

Source: Amabis and Martho (2016a, p. 87; 2016c, p.94).

Regarding the descriptor for the biomedical approach, it was identified that it portrays the physiological reaction of an organism to the consumption of drugs. The description of the path of a drug, poison or toxin inside of an organism, beginning with absorption, then distribution, and metabolization until the moment of excretion, including the way that a specific substance will be metabolized by different molecules of the body are studied in pharmacokinetics. The first example (Amabis & Martho, 2016a, p. 87) talks about the path of toxins, alcohol, and other drugs, which initiates through oral absorption and the liver will be the organ that acts on the metabolization of exogenous chemical compounds, working as a natural barrier that decreases the final effect of a compound. According to Spencer (2012), the nasal and intravenous paths of absorption do not have an organ that acts as a filter like the liver. In those cases, the effect of exogenous chemical substances

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will be almost immediate and in full capacity, in other words, the biodisponibility of a chemical substance in the circulatory system is greater when it enters the organism through nasal and intravenous paths while it is weaker through oral path.

The knowledge about anatomy and physiology related to the consumption of chemical substances are examples of contents taught in science literacy and consequently in health education. According to the committee of National Academies of Sciences, Engineering, and Medicine (NASEM, 2016), the capacity of using scientific knowledge, in theory and practice, relies on the level of contact of a person with methods and products created inside of a society. That capacity is related to scientific literacy, which is desired for individuals, and for the well-being of communities and societies. More than basic knowledge about scientific facts and contemporary definitions, it includes the understanding over scientific processes and practices about the routine of a professional, and the capacity of evaluating products made by scientific researches, turning people able to engage in civic decisions. Although, poorest people tend to have less educational opportunities, contributing to the difficulties to access public health services, such as the Unified Health System - SUS.

In addition, it can be noticed that biomedical science is constantly improving in terms of technology for diagnosis and treatments of many diseases. Therefore, the technologies and methodologies applied to the health area are always being upgraded. One example of this area is pharmacogenomics as in the second example of box 3 (Amabis & Martho, 2016c, p. 94).

However, that scientific progress is followed by environmental destruction and by an increase of social inequalities. "The main issue of societies changed from the development and implementation of new technologies for the management of risks associated with existing technologies" (Pietrocola & Souza, 2019, p. 63). This is the point in which education stands out for its capacity to transform the way of thinking of people, when it stimulates the idea of social justice. "It is necessary to follow the path of solidarity to create a culture of human rights in each community. To live and practice them in daily life. To fight for them" (Tamer, 2005, p. 63).

Below, in box 4, it can be found one example of behavioral perspective of health:

Box 4
Behavioral approach

Example
To prevent cardiovascular diseases, the tabagism has to be avoided besides adopting a diet with few saturated fats, especially the ones of animal source. Moreover, it is important to maintain a weight that is compatible with age and height, to exercise regularly, and to avoid stressful situations.

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Source: Amabis and Martho (2016b, p. 223).

It is important to highlight that only one text passage was identified by the descriptor of behavioral approach on health (Amabis & Martho, 2016b, p. 223). It can be noticed that drugs are seen as harmful and, thus, should be avoided. There is also a recommendation of new habits, such as the practice of physical activities, in other words, a set of behaviors to be changed by the person. People usually do not know how to behave when they até facing new situations and many of them do not feel comfortable in conversations with health professionals. Therefore, the indication of healthy habits is very positive.

> The regular practice of physical activities in puberty and adolescence is an essential component for a healthy growth and development. It furthers the identification of possibilities of expression and the usage of force and movements, having an important role for both body and mind. It also contributes to bodily transformations and relations in groups. (Brazil, 1997, p. 278)

Below, in box 5, there is an example of socioecological perspective of health:

Box 5
Socioecological approach

Example
The agricultural development also has contributed to the pollution of soil and water. Synthetic fertilizers and agrotoxics (inseticides, fungicides, and herbicides) used in abusive quantities on crops pollute soil, water, and rivers. It eventually intoxicates the agriculturist and his family while it kills many living beings of ecosystems.

Source: Amabis and Martho (2016c, p. 272)

Only two text passages were identified by the descriptors of socioecological approach, which has an integrative perspective about the interaction of human beings, environment, and health. Both text passages have similar content and because of that, only one of them was chosen (Amabis & Martho, 2016c, p. 272).

According to Spencer (2012), the intoxication caused by synthetic fertilizers and agrotoxics are examples of poisoning by excessive doses of chemical substances. That type of poisoning occurs through bioaccumulation, which happens when a substance is not excreted by the organism and it is stored in tissues, causing significant health problems to a person, especially by heavy metals. Similarly, another problem indicated by Hoppe and Araújo (2012) is the inappropriate discard of expired drugs, which usually end up in sewer pipes, and consequently in rivers and oceans. Just like synthetic fertilizers and agrotoxics, expired drugs can be accumulated in soils and water, contaminating and unbalancing the environment. Those chemicals will eventually be ingested by animals that are part of a trophic food chain with an increase of the effect of bioaccumulation when it goes from the primary consumer to the second consumer and finally to human food.

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Because of the side effects caused by human actions, there is a necessity for the population to engage with civic processes of management of common goods, such as the water cycle of rivers, oceans, and the sewage treatment plant besides organic wastes and trash, which should be understood in a scientific way at some points (NASEM, 2016). "Nowadays, pollution, nuclear wars, global warming, and side effects of medical therapies are troubles lived by people" (Pietrocola & Souza, 2019, p. 63). It can be noticed with these examples some converging points between environmental education and health education.

The box 6 has examples with two or three perspectives of health. Therefore, these examples were named as approaches in superposition:

Box 6
Approaches in Superposition

Approaches	Examples
Biomedical Behavioral	After World War II, antibiotics started to be used on a large scale, resulting in countless bacteria that are resistant to different antibiotics. The trivial usage of antibiotics should be avoided to diminish the development of resistant bacterias.
Biomedical Behavioral Socioecologic	Nematodes cause wounds on tissues of the stomach until it bleeds. With the blood loss people become anemic, weak, and sad, with a typical pale face (which gives the popular name *amarelão*). These symptoms are more usual in people that live in environments without sanitation, such as the countryside portrayed by Monteiro lobato through his famous character called Jeca Tatu. Like other parasites, it can be prevented with the construction of adequate sanitation so that the eggs of hookworms (*amarelão*) cannot spread in the environment. Another measure is the usage of shoes as they block the entrance of maggots through the feet as it is the easiest way to get infected. Nowadays, there are effective medications against those parasites.

Source: Amabis and Martho (2016b, p. 160; 2016c, p. 123).

At the beginning of the first example (Amabis & Martho, 2016c, p. 123), it talks about the process of organic evolution when it says that countless bacteria have been selected because of the usage of antibiotics and, thus, it is of biomedical approach. The second phrase says that, selected bacteria come from the irresponsible usage of antibiotics and because of that, it should be avoided through changes of behavior to avoid the problem of self-medication and iatrogenic, which is a problem resulted from previsible side effects of therapeutic drugs (Labate et al., 2008).

The second example, with three approaches in superposition (Amabis & Martho, 2016b, p. 160), talks about the problem of hookworms through the character called Jeca Tatu, by Monteiro Lobato. There are debates about the usage of characters created by Lobato due to stereotypes in his works. Jeca Tatu is a caricature of people that live in the countryside, which influenced the way of thinking of many people with the release of his book *Urupês*. Even though it has contributed to health campaigns in Brazil, the

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stereotypes created as social criticisms may have turned into a prejudiced vision of the countryside. Lobato expresses a view that is very similar to what was described by Foucault (2003) on biopolitics in a sanitary model based on England around the 19th century, where the health of poorest people was just a mean of turning them able to work and to do not cause health problems to richer people as it can be seen when Jeca Tatu is turned into a very productive agriculturist after being cured of hookworms.

Another important information is the case of a fungus species that was wrongly described as edible. The *Amanita muscaria* represented on picture 1.12 (Amabis & Martho, 2016b, p. 21) produces a psychoactive named muscimol and a neurotoxin called ibotenic acid, which can cause severe intoxications. The organisms that produce toxins can cause accidents through ingestion, inhalation or skin contact, which is different when compared to venomous organisms, such as some snakes that use their toxins through bites as means of protection against predators (Spencer, 2012).

Lastly, we highlight a predominance of a pathological biomedical approach on drugs. The textbooks usually present an excessive focus on harmful effects of drugs. Teodoro et al. (2017) highlights the usage of non-scientific language that appeals to emotions, causing the feelings of fear, guilt, and disgust. Just like in the campaigns that show drug users that are physically, morally, and psychologically damaged.

Final comments

This work contributes to the debates about the usage of drugs through the perspective of health education in textbooks of biology for high school. We highlight that this work presents a partial view about the theme as the analysis was limited to only one collection of textbooks. It can be noticed that the contents related to drugs are predominantly in the biomedical perspective of health.

Health education seeks the stimulation of critical thinking of students through the reflection about the dialogues at school. Thereby, there is a convergence of different perspectives of life through political and philosophical debates about humanity and society. The knowledge about human biology contributes to healthy habits of life, such as the body's health. The behavioral approach could contribute even more for mental health if it had more relevance in the textbooks.

It is also important to consider that each person lives in a different context and there is a growing necessity for the contextualization of biology contents with the realities of people, communities, and societies, especially because of social inequalities and vulnerable people. The textbooks need to give more space for the dialogue with students

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so that they can express their doubts and feelings related to the theme, making them able to create new meanings for health and drugs.

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