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The experience of an agroecological school garden as an interactive and creative health promotion strategy

A experiência de uma horta escolar agroecológica como estratégia interativa e criativa de promoção da saúde

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Abstract

The school is an important place for the establishment of links between health and education, and it is also a suitable tool for Health Promotion. School gardens have emerged as innovative strategies with great potential for the development of health and nutrition issues. The objective of this study was to analyze a school garden as a health promotion strategy from the students' perspective. The subjects of this study were 10- and 11-year-old students (n=49) who were asked to draw a picture followed by an individual report about their experiences in the school garden, a method known as draw-and-tell. The analysis of these reports allowed to pinpoint categories relative to Health Promotion principles, such as equity, social participation, empowerment and sustainability, and personal skills development, as well as Nutrition Education and Food and Nutrition Security. School gardens are a powerful pedagogical strategy for Health Promotion. School gardens may also integrate actions in food and nutrition education and environmental education, through creative and interactive activities that stimulate the children's involvement.

Keywords: Gardening. Health Promotion, Food and Nutrition Security. Child. Feeding Behavior.

Resumo

A escola é um importante espaço para estabelecer relações entre saúde e educação e também uma ferramenta adequada para a Promoção da Saúde. Hortas escolares têm emergido como uma

tática inovadora com grande potencial para o desenvolvimento de questões de saúde e nutrição. O objetivo deste estudo foi analisar a horta escolar como uma estratégia para a Promoção da Saúde, a partir da perspectiva dos próprios estudantes. Foram sujeitos do estudo 49 alunos de 10 e 11 anos de idade, convidados a elaborar um desenho e narrar individualmente suas experiências sobre sua participação na HE, método conhecido como *draw-and-tell*. A análise dos relatos permitiu a identificação de categorias relacionadas à Promoção da Saúde, como os princípios da equidade, participação social, empoderamento e sustentabilidade e o campo de ação de desenvolvimento de habilidades pessoais; bem como à Educação Alimentar e Nutricional e à Segurança Alimentar e Nutricional. A HE apresenta-se como uma potente estratégia pedagógica para a Promoção da Saúde. A atividade também pode integrar ações de educação alimentar e nutricional com ações de educação ambiental, através de atividades criativas e interativas que estimulam o envolvimento dos alunos.

Palavras-chave: Jardinagem. Promoção da Saúde. Segurança Alimentar e Nutricional. Criança. Comportamento Alimentar.

Introduction

The modern concept of Health Promotion evolved and gained strength in several countries, especially in Canada in the 1970's as a response to the challenges that began to be faced by health: social, political and cultural changes; and the weakening of the biomedical paradigm.[1,2]

The Ottawa Charter for Health Promotion is a reference in this area, and it emphasizes the importance of five fundamental strategies of action: building and implementing healthy public policies; creating health-promoting environments; strengthening community actions; developing personal skills and reorienting health services;[1,3] also, it has the following principles: empowerment, social participation, holistic concept of health, equity, multi-strategies, intersectionality and sustainability.[4]

A new understanding of the environment was presented at the Sundsvall Conference, and along with it there was an alert for the requirement of health-promoting environments.[5] The 20th International Union for Health Promotion and Education Conference, held in 2010, emphasized, as a priority, the implementation of conjoined Health Promotion actions, and the development of society, taking into consideration the dynamics of a globalized, modernized and urbanized world, and establishing the commitment to create a link between Health Promotion and sustainable development.[6]

In recent years, health promotion has been increasingly featured in the field of public policy in Brazil owing to the political framework that promotes debate on the topic and also to the knowledge produced regarding its cross-sectional nature.[7] Thus, the scope of the interventions contained in the ambit of the recently reviewed National Health Promotion Policy (Política Nacional de Promoção de Saúde)[8] has been expanded, including the field of food and nutrition and defining the interfaces of health promotion with other public policies in the areas of health and education.[9]

With regard to the field of food, this cross-sectional aspect is evident in guidelines, such as the Landmark Reference of Food and Nutrition Education for Public Policies (Marco de Referência de Educação Alimentar e Nutricional)[10] and the new Dietary Guidelines for the Brazilian Population (Guia Alimentar para a População Brasileira)[11], which contain elements based on the concept of Health Promotion as the development of a sustainable food system for promoting healthy environments; access to quality information and food (in a broader sense), appreciation of cooking and development of cooking skills for personal empowerment and autonomy; promotion of self-care and autonomy, through empowering educational processes; and intersectoral approaches for the promotion of Food and Nutrition Security.[8,10]

Schools can be an important place for building an association between health and education because they are the place where children and adolescents have the opportunity to learn new subjects, build their own opinion and share them with their family by means of many activities. Moreover, schools are a new social tool, which contributes to Health Promotion and may meet individuals' health needs,[12] especially those relative to food and nutrition, because schools are identified as a field of nutrition education practices in an integrated and complex approach.[13,14]

School gardens have emerged as an innovative pedagogical strategy with a growing potential to work with health, nutrition and environment education, as shown by some studies.[15-18] The use of school gardens in Brazil is not new, yet scarce studies addressing the use of this type of strategy with students are available.[16] Two public power initiatives promoting the development of school gardens in Brazil are worth of mention: the Health at School Program (Programa Saúde na Escola), which promotes pedagogical school gardens as a strategy for knowledge building and skills development among school children, enabling them to produce, discover, select and consume foods in an adequate, healthy, safe and playful manner;[19] and the joint initiative of the Food and Agriculture Organization (FAO) with the Brazilian Education Development Fund (FNDE), called "Educating with School Gardens (Educando com a Horta Escolar), which provides educational activities in food and nutrition within schools through school-based gardens and practical classes in a range of different subjects involving both teachers and students, and fosters an integrated discussion on food, nutrition, the environment and school curriculum.[20] Some studies have reported experiences and topics within schools involving the gardens implemented under the program, including agroecology,[21] science teaching,[22] sustainable practices;[23] environment education,[24] among others. Studies have also reported that as children's exposure to vegetables increased, their

vegetable intake increased, and this event may have positive impacts on attitudes, preferences and eating behavior. Vegetable garden experiences offer an understanding of seasonality of food, add a sensible perspective to learning, and promote a better understanding of sustainability and the origin of food.[25] Working in school gardens has been related to an increase in knowledge of nutrition and in preference for fruit and vegetables among children, in addition to changes in vegetable consumption behavior.[26] However, no studies have been found that describe school gardens as a health promotion strategy or address such gardens from a health promotion perspective (objective of present study).

It is extremely important to understand students' perception about the activities performed in the school in order to analyze an activity that intends to be critical and dialogical. One needs to look into the perception of the impact of what was assimilated into the participants' lives. Thus, the objective of this study was to analyze, from the students´ perspective, the use of school gardens as a health promotion strategy.

Methods

This study was conducted as part of the project "Urban Agriculture, Health Promotion and Food and Nutrition Security in the city of Embu das Artes".

Theoretical Basis

Qualitative research denotes an activity where the observer is centered within the world with a set of materials and interpretive practices rendering the world visible in different ways.[27] Thus, the theoretical structure of a study dictates its focus and hence its methods and techniques for investigation.[28]

In this regard, the theoretical-methodological basis of the present study is phenomenology, which seeks to understand the intersubjective experience that makes up the world of life,[29,30] i.e. understanding phenomena based on the actual experiences of the subjects. The choice for the data collection instrument and subsequent analysis of the data was based on this perspective.

City where the study took place

The city of Embu das Artes is located in the metropolitan area of the state of São Paulo. It takes up an area of about 70 km² and has an urban population of 240,230 inhabitants, composed of 48.6% of males and 51.4% of females.[31] Regarding the public education system, in the year of 2012, there were 13,946 children enrolled in 26 elementary schools.[32]

Some experiences with agroecological urban agriculture (UA) development gained strength within the city in 2008, and one of their starting points was a local project called *Programa Fonte Escola* (PFE), which was started by a non-governmental organization in partnership with the local government, in 2006.

PFE developed activities with groups of children from public schools in the city of Embu das Artes, and provided pedagogical support, school activity complementation, and environmental issues for educators.[33] The project "Hortas Escolares" ("School Gardens") started in 2009, and offered educators a training course in agroecology, which was composed of theoretical and practical learning,[34] and encouraged nine public schools to start a garden. Nowadays, four of the schools still run the project.

Participants

Four schools within the Embu das Artes' school district, which had a garden, were visited in the months of April and May of 2012. After examining the reports of the visits, the researchers chose, for the present study, the school that had a teacher working only at the school garden. At this school, the curriculum structure ensured a time slot for the so-called "gardening class", which was planned according to the subjects being taught inside the classroom. The researchers contacted the school board to explain the study objectives and request authorization to conduct it. The Elementary School had a total of 590 students who were distributed in 18 classrooms.

A convenience (non-probability) sampling was used and the choice of the subjects was intentional, in the sense that they were those who presented the necessary conditions to provide all relevant information to the study.[35] The fifth-grade students were the ones who had the opportunity of participating in the garden-related activities for a longer period of time (since the beginning of the project). Therefore, the participants of this study were 10- and 11-year old students, enrolled in the fifth grade, who had been participating in the garden activities for at least one year. A total of 22 girls (44.9%) and 27 boys (55.1%) participated in this study, representing 71 % of all fifth-grade students.

Instruments

The interview can be defined as a moment in which ideas are organized, i.e. an interaction situation that produces a discourse and transforms meanings at different levels.[28] The interview, as a traditional research instrument, is generally adult-centered.[36]

Children have been treated as passive objects and known usually only through the observations and considerations of adults, both in clinical practice and in research studies. In a research with

adolescents ages 10 - 16, Drew et al[37] stressed the importance of considering children and adolescents as competent social actors, and claim that qualitative approaches have been sought in order to allow youngsters to express themselves.

Thus, art activities and techniques may be a powerful way for children to express their points of view.[38] They help children organize their thoughts on the subject that is being presented to them, allowing a concrete exteriorization of these thoughts, and making it easier for youngsters to express themselves when they are questioned about the matter.[39]

These activities and techniques are rarely used separately, but as a support for other data collection techniques such as interviews,[38] or when a child or adolescent is asked to tell a story.[39,40]

Drawing is a valuable technique for encouraging children and adolescents to participate in research studies, in such a way that it will be meaningful to them, but will also help researchers capture what is taking place in the youngsters' minds, something that is not possible to do when using other methods.[37] Moreover, as Driessnack[40] states, "The opportunity to draw is familiar, typically perceived as fun and nonthreatening (…)." (p.1418).

In her systematic review, Driessnack[41] points out that drawing has contributed as facilitators of communication with children. The author suggests that through this methodology, children should be given the choice of sharing their own explanation, narrative or story about the drawing instead of having an adult interpret it for them. The recommendation is that once the drawing is finished, the researcher will spend some time discussing it with the child.[38]

For understanding the students' experience in the garden, the children were asked to individually draw a picture and then tell a story about that drawing, which was recorded.

Procedure

This study was approved by the Research Ethics Committee of the School of Public Health at the University of Sao Paulo (OFCOEP 056/12), and the Office of Testing, Research, and Evaluation for the state public school system where the study took place. Subjects and their parents had the opportunity to ask questions and signed their consent by signing an Informed Consent Form.

Data was collected within three days in October 2012, during the "gardening class". For each day of data collection, the class teacher accompanied the facilitation process with the researchers who asked each student to draw a picture and describe their experiences according to the following instructions: "Draw a picture about your own participation in the school garden. Then, tell a story about what the garden means to you". All the 69 students who were attending class participated, so that no child felt excluded, but we only recorded the story of 52 children who had parental or guardian consent. The consent form allowing the students to participate in the study was given by

a researcher to the parents during a parent-teacher conference at the school, two weeks prior to the activity with the students. At this conference, parents could ask questions about their children's participation in the research. Each teacher sent a consent form to those parents who were not present at the meeting. Because there were problems with the audio recorder, three stories could not be transcribed or analyzed, hence only 49 out of the 52 stories were analyzed.

Data Analysis

The audios were transcribed and placed together with their respective drawings. The drawings were not analyzed neither interpreted. The association of the audios with the drawings helped the researchers to better understand children's narratives, once the stories were produced based on the drawings. The collected material was classified and organized into a database for analysis and data synthesis. The contents were analyzed according to the themes, taking into consideration the children's recurrent and frequent expressed opinions about each theme. The analysis was performed considering Health Promotion areas and principles as categories *a priori* and taking into consideration categories that came up during the analysis of the children's statements**.** Three of the five authors analyzed data independently, and the composition of each category was based on discussion and consensus.

Results

The garden and the principles and areas of Health Promotion actions

Table 1 shows some examples of the children's statements about Health Promotion principles and areas of action.

Table 1. Excerpts from students' statements categorized according to the Health Promotion areas and principles. Embu das Artes- SP, Brazil, 2012.

Health Promotion Categories	**Statement excerpts from students**
Development of personal skills	*"The garden represents, to me, further learning; learning how to plant, learning many things. I learned many things with the garden. I learned to plant, to treat the plants better. I learned to harvest.".*
	"It's because I liked the plants a lot, you know? We build a bed and it was really cool... the bed that we made for the chard and the cabbage. It's like this, we took the water, we chose the plant, cabbage or chard, I chose the chard and then in twos we planted it like this. We dug, put in the chard or the cabbage, then watered it and some days later we put an empty water gallon, took it out and it grew. Then, we took it home. It was really cool.".
Social participation	*"(...) the garden teacher came into the classroom with some little pieces of paper and gave one to each of us. Then, she told us to draw the bed design that we wanted, and write on our names and the class we are from on it. Then, we put everything together, and it was tied between the cloud, the skull and the Japanese flag. Later, she asked each of us about the one we wanted, and we counted the votes. That time the skull won and the following week we built the bed.".*
	"Then we could decide if we wanted to plant chard or cabbage. I chose chard, Lucas and me. (...) I liked it because we always do this, right? We had never had the opportunity of choosing between one plant and another.".
Empowerment	*"Uhm, (...) On Friday, we went there. Some people came here and we went on teaching. Each one worked with a bed, it was nice. We were like the teacher yesterday, Friday, I mean. It was really nice. That's it; I think that's it.* ***And what did you think was good about being a teacher?*** *Ah, it is nice. We were teaching. Just some little kids didn't pay attention, but most of them did.".*
	"Also, I had a dream that I had a garden in my house. I talked to my aunt, to my dad and to my mom. We built one, so every weekend we go there and take care of it. (...) There was one day I brought some packages that my father said he wasn't going to plant anymore, he was gonna throw them away. I told him "don't throw them away", I picked them up and brought them to school.".
Equity	*"(...) there is a bench here, this one here is elevated because there is a boy in the 4th-grade, in the morning, that can't squat, so they did this one for him.".*

to be continued

Continuation of Table 1

Health Promotion Categories	Statement excerpts from students
	"*We have to take good care of the plants so they can sprout and grow well. So, when they are ready, fully grown, we'll pick them up and eat them. We can also water them every day to give life to them.*".
Sustainability	"*I want to tell you that the garden can also be art and science. (...) Because, for example... You can make art; you can use a PET bottle that is not being used, so it won't harm the environment. (...) And also, some things that are old and are not being used can be reused, recycled. (...) For example, a tire and a PET bottle.*".

Regarding personal skills development, the students' statements showed that through participative work, the children learned to: organize the beds and the garden area; take general care, such as planting, fertilizing, watering, harvesting, etc.; and use some planting techniques. There was also development of agroecological planting skills such as the use of composters and the importance of insects and companion planting.

The children not only had the opportunity to learn planting techniques but were also encouraged to work together. Thus, social participation could be identified in the statements, as they mentioned the task sharing, when everyone took part in the activities somehow, thus bringing forth teamwork. Still regarding social participation, the statements also addressed the democratic process of choosing the bed designs that had been proposed by the students, as well as the choice of the seedlings to be planted by each class, from a selection offered by the garden teacher.This process gave the children some autonomy for making choices, and made them feel more like an active part of the garden building and development process, which made children get more involved with the activity.

The students' statements also showed that they had indeed learned from the activities during the participative processes. Thus, empowerment was identified in the students' statements about the opportunity to teach and share the knowledge they acquired along with children from another school. Empowerment could also be identified in statements about the development of home gardens after having the school garden experience.

When telling about a classmate with special needs who might have been prevented from participating in the garden, a student reported the strategy that was implemented to allow this classmate to take part in the activity. This report shows the perspective of ensuring equality.

During the visit to the school, the researchers observed that there was an elevated bed that met the needs of that student with special needs.

The statements showed that the project had some aspects relative to environment sustainability, because the students not only worked with recycling materials, but also appreciated the care for nature, as exemplified by the agroecological farming practice. The students reported how PET bottles were used to give shape to each bed and how the tires were used as vases, and described the use of compost from organic trash.

The garden, the didactic methods and Nutrition Education

Table 2 shows examples of children's statements about the garden, the pedagogical methods and Nutrition Education.

Table 2. Excerpts of students' statements organized according to the categories that came up from the analysis. Embu das Artes - SP, Brazil, 2012.

Categories	Excerpts of students' statements
The garden and didactics	"*There are some times that we go there for science class, we take the magnifying glass to see the pests. It's cool.*"; "*I also learned that the plants do photosynthesis from 6am to 6pm. From 6 in the morning to 6 in the evening*"; " *The teacher told everyone to plant 5cm [deep] using the ruler and 30cm of the other plant. And we did it.*".
The garden and Food and Nutrition Education	"*I like the garden and the planting, the watering and the harvesting process, very much. And when we are going to eat the thing that we planted, it's like the food is tastier, we remember everything that we did.*".
	"*The garden means also the most important thing in the school for me. Because the garden feeds us, we can take things home (...)".*
	"*There is one [a garden] that is my grandma's and one that is my mother's and my aunt's. [Interviewer: Ah, and what do you plant there?] Beets, collard greens, chives, chicory and ginger and yam. I weed, plant the collard green, the lettuce. We already planted beets, lettuce and broccoli there.".*
The garden and FSN	"*The garden means a food center to me, which can produce more for sending food to the market, so they can sell, because of those poor people who cannot eat some things. Then we can be happy and they can be happy, too. The teacher showed us a video from Africa, in which the children were very thin, that's why we want to produce more, so we can feed them, right?.*

In addition to the categories considered *a priori*, other categories came up, related directly to the pedagogical aspects of the garden and to the interaction between the activities developed in the garden and the school's subjects. The statements pointed out that science and mathematics were also taught during the gardening classes, allowing the children to observe and put into practice the knowledge acquired inside the classroom.

A connection with the cultivated food was also identified in the children's statements, because the experience in the garden, the monitoring of plant growth and the harvest process encouraged the consumption of these foods. The school also encouraged vegetable consumption because it included, eventually, these foods in the meals served at the school. It is also important to notice that the students knew the names of several vegetables, which shows that they had indeed internalized what they learned and that those foods brought a different meaning to their daily life. Furthermore, the students talked about the "taste" of the foods, which is important for identifying with food and having a stimulus to consuming these foods.

It should be noted that the concept of food and nutrition security was strongly present at the statement of one child; participating in the garden and having the teacher approach the food subject the way she did, led to a contact with the human right to food and also to the perception that the garden may contribute for implementing such right.

Some examples of drawings made by the children are shown below (Figures 1 and 2).

Figure 1. Drawing from C.G.F, female. Embu das Artes - SP, Brazil, 2012.

- Child 1 – Sonimar*, ours is 14 cm long, we measured it Sonimar!
- Child 2 – It's true.
- Teacher – Great job!
- In the hands of the Teacher – Delicious.
- Child 3 and 4 – We have finished!

*Sonimar is the gardening class teacher.

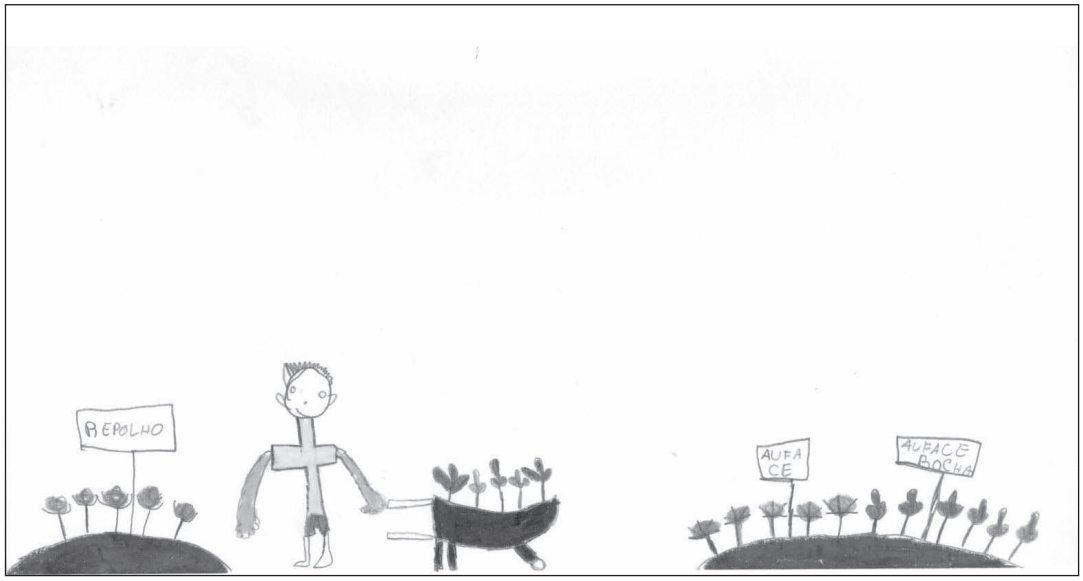

Figure 2. Drawing by G.V.I.S, male. Embu das Artes - SP, Brazil, 2012.

- Signs at the beds – 1. Cabbage; 2. Lettuce; 3. Red lettuce.

Discussion

This study aimed to analyze the school garden as a health promotion strategy from the children´s perspective. The use of the draw-and-tell methodology proved adequate and contributed to the achievement of this objective.

The school garden is part of a well-established and successful program that emerged from organized civil society actions, which reaches other schools in the city, and has been identifying interesting strategies for school pedagogy.

The outcomes of gardens relative to Health Promotion have been little explored by the academy. To the best of our knowledge, this is the first study to relate Health Promotion areas and principles to School Gardens.

Having the garden at school proved to be a powerful tool for promoting health, thus highlighting areas and principles through an integrative practice, as shown in Figure 3.

Figure 3. A layout of Health Promotion areas and principles and the relationship established between them based on the issues taken from statements.

Two types of actions were found, regarding sustainability: having a teacher who was solely responsible for the garden enabled the sustainability of the activity itself, ensuring a lasting and strengthening process; and the development of environmentally sustainable practices in the garden. In fact, according to Ziglio et al.[42] sustainability has a double meaning: creating initiatives that comply with the principles of sustainable development, and ensuring a process that sustains itself over time. The continuity of health promotion policies is especially important, considering that these policies are initiatives of a complex nature, and involve several processes of transformation that have medium and long-term impacts.[43] According to Jacobi,[44] "The notion of sustainability implies a necessary connection between social justice, quality of life, environmental balance and the need for development with the possibility of self-support" (page.43-4)

Empowerment and social participation are highlighted as the key principles, but an effective and concrete social participation is established as the essential goal of Health Promotion.[45] Participation is understood as the involvement of those stakeholders – members of the community and related organizations, policy makers, and others – in the process of choosing priorities, making decisions, implementing and evaluating iniatives.[4,43] It should be emphasized that this program started through the initiative of the organized civil society in partnership with the local government; it involved educational institutions and professionals from other sectors, and it provided the active collaboration of the students in the entire process of developing the garden.

The concept of development of personal skills found in the Ottawa Charter for Health Promotion is associated with the idea of empowerment at the individual level, as a process of capacity building (knowledge acquisition).[1] This was evidenced by the children's ability to share their acquired knowledge with their families and other children. According to Westphal,[46] personal skill development can be made possible through educational strategies and capacity building programs that enable the individuals to participate, hence creating supportive Health Promotion environments and developing personal skills relative to embracing healthy lifestyles. Several skills were developed in the garden, but it is worth mentioning the freedom of choice, the participative and integrative work among the children, and the active participation in decision-making and in the work performed, which reinforces the concept of citizenship.

Regarding equality, there was a great effort of those involved in the activity to include all the children in it, with a special emphasis in some adaptations of the class to meet the special needs of a particular child. According to the Ottawa Charter for Health Promotion,[47] the importance of this principle refers to minimizing the differences and offering equal opportunities, as described:

> Health promotion focuses on achieving equity in health. Health promotion action aims at reducing differences in current health status and ensuring equal opportunities and resources to enable all people to achieve their fullest health potential. This includes a secure foundation in a supportive

> environment, access to information, life skills and opportunities for making healthy choices. People cannot achieve their fullest health potential unless they are able to take control of those things which determine their health. (page 1).

It can be also highlighted that few intervention studies have addressed the pedagogical possibilities of gardens inside the school environment, neither how it can be a strategic action by integrating some relevant topics of the present, such as sustainability and nonconventional food production; and it can be an important strategy for integrating what was learned inside the classroom with practical activities. Iuliano et al.[15] claims that gardens can be used as pedagogical tools and promote participative and significant learning. They allow the integration of several school subjects, nutrition education development, and they also address subjects relative to environmental issues and health.

The children's statements were filled with referrals for being able to accomplish tasks from the knowledge acquired in the classroom, and also in practical activities in the garden, such as in Math and Science classes. This is a relevant fact, since traditional education rarely relates the contents of different course subjects, which may be a limiting factor for learning. Moreover, the chance of working with environment and nutrition education though these activities was emphasized in the children's statements. The garden activities allowed them to establish a relationship with the environment, because they were in close contact with nature, something that is embedded in the school role of producing knowledge, and they developed skills and abilities that also value the environmental dimension.[48] In Brazil, the education system is, in general, fragmented and loose, and the school curricula do not interconnect, impairing the commitment of social practices that demand more critical and competent training.[49]

In a literature review of intervention studies that had Nutrition Education strategies in schools, Ramos et al.[50] identified that in addition to the little scientific production in the area, the articles they found were usually focused on fighting and preventing obesity, keeping the behaviorist perspective of education in the undertaken strategies.

Recently, a new government strategy has highlighted the importance of developing Nutrition Education activities based on a horizontal approach to encourage the autonomy of the subjects. Moreover, this new guideline for public policies points out some principles for developing actions, such as: exploring the food system; recognizing food's cultural, social and emotional aspects; encouraging cooking practices as a nutrition education strategy and as a possible emancipatory practice; promoting the autonomy for choice; and understanding education as an ongoing process and autonomy generator.[14]

In Brazil, the recognition of nutrition education as a strategy, required to achieve the human right to food and to ensure food and nutrition security, points out the necessity of developing studies to propose educational strategies that follow those principles.[51] Therefore, the experience of the school vegetable garden presented in this study not only meets these principles proposed for Nutrition Education strategies, but also provides important elements for developing health education strategies from a non-normative educational perspective.

Some studies have shown that the garden brought health benefits for children such as changes in eating habits – an increase in fruit and vegetable intake[52-54] and an increase in the variety of the fruit and vegetables that are consumed.[55] Children also showed greater interest or were more willing to taste fruit and vegetables,[53-57] showed an increase in the capacity to identify fruit and vegetables,[54,55,57,58] and there was a decrease of child obesity rates. The results for food and nutrition, in this study, showed many aspects, e.g., incorporating the concept of Food and Nutrition Security, and also issues relative to eating behavior and food consumption. Food and Nutrition Security is known as:

> (...) the realization of the right of all to regular and permanent access to quality food in sufficient quantity, without compromising access to other essential needs, based on health promoting food practices that respect cultural diversity and that are socially, economically and environmentally sustainable[59] (page 10).

The results found in this study indicate important possibilities for developing Health Promotion actions within the school environment, in a participative and significant way for students.

Notably, there is a great opening for the students to get involved in the activities, and they are curious about it as well. Thus, the children's involvement must go through some participative and dialogical didactic method with the intention of enhancing the learning process, both for environmental education and the regular school curriculum, which begins to make sense for the students to put them into practice in their everyday lives. Regarding Nutrition Education, activities that work with the five senses (through playful strategies), while trying new foods and preparing recipes at school and at home, are shown to be more significant and important than working only with "technical" information, in face of the modern food context we live in.

In addition to including the garden in the school's political and pedagogical project, and in the course curriculum structure, this experience shows that it is possible to build public policies that are better integrated to the local dynamics and that connect the different sectors and subjects with the perspective of a better education. Therefore, local and national public policies need to support these initiatives for them to be feasible and sustainable.

Regarding limitations, this study is based on the experience of the same age group, which may restrict different perspectives about the same experience and have a negative effect on the generalization of the results for different age groups. Data were collected inside the classroom, a place where the grown-up figure usually characterizes authority, even though the methodology chosen had more of a relaxed and informal nature.

Conclusions

School gardens are a powerful pedagogical strategy for Health Promotion and reveal important contributions for personal skills development, thus creating health promoting environments, social participation, empowerment and equality. Gardens may also integrate food and nutrition education actions with environmental education actions, through creative and interactive activities that stimulate the children's involvement.

Contributors

Doria, NG worked in all steps: study design; collection, analysis and interpretation of data, manuscript writing and proof-reading of final copy; Coelho, DEP helped with manuscript writing and proof-reading of final copy); Garcia, MT was involved in manuscript writing and proof-reading of final copy); Watanabe, HAW participated in study design; analysis and interpretation of data, manuscript writing and proof-reading of final copy; Bógus, CM participated in manuscript writing and proof-reading of final copy.

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