FOOD AND NUTRITION IN COLLECTIVE HEALTH
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Paths for the articulation of Food and Nutrition Education with the school curriculum: an experience report in the context of elementary school

Caminhos para articulação da Educação Alimentar e Nutricional com o currículo escolar: relato de experiência no contexto do ensino fundamental

Abstract

Objective: This study aims to report the experience of the construction and implementation of school-based food and nutrition education (SFNE) transversal actions to an elementary school curriculum. ***Method:*** The actions were conducted between August and December 2020 in a public school in the state of Paraíba, in Brazil, based on the content of the Brazilian Food and Nutrition Education Framework for Public Policies and on the Dietary Guidelines for the Brazilian population transversally associated to cognitive development and topics in Portuguese and Mathematics classes. ***Results:*** In the results, the strategies of the Food and Nutrition Education (FNE) actions executed were described, as well as the articulations to the school's curricular components, according to the school age of the students. With the experience, ludic resources, such as games and story-telling, were observed as a strategy necessary to the engagement of students in the actions. The articulation of FNE with the school curriculum was viable due to the availability of the current pedagogic planning by all teachers in the school. The conduction of the FNE actions adapted by school age granted a more satisfactory learning and better participation of the students. ***Conclusion:*** The transversal FNE actions were challenging and demanded creativity, rapport between educators and the school's management team, as well as planning adequately done considering territorial singularities and those of each school cohort.

Keywords: Healthy eating promotion. Children development. School health services.

Resumo

Objetivo: Este artigo visa relatar a experiência da construção e implementação de ações de Educação Alimentar e Nutricional (EAN) transversais aos componentes do currículo escolar do ensino fundamental. ***Método***: As ações foram realizadas entre agosto e dezembro de 2020 em uma escola pública na Paraíba, com base em conteúdos previstos no Marco de EAN para as políticas públicas e no *Guia alimentar para a população brasileira*, transversalmente associados ao desenvolvimento cognitivo e conteúdos de português e matemática. ***Resultados***: Nos resultados foram descritas as estratégias aplicadas nas ações de EAN e na articulação com componentes curriculares da escola, segundo a idade escolar dos alunos. Com a vivência observou-se, no recurso lúdico, como jogos e contação de histórias, uma estratégia necessária ao engajamento dos alunos nas ações. A articulação entre EAN e o currículo escolar foi viável devido à disponibilização do planejamento pedagógico em curso por todos os professores da escola. O desenvolvimento de ações de EAN

adaptadas à idade escolar do aluno garantiram melhor aprendizado e participação dos escolares. *Conclusão*: As ações transversais de EAN são desafiadoras e demandam criatividade, vínculo entre os educadores e a equipe da escola e planejamento adequado à realidade territorial e das turmas.

Palavras-chave: Promoção da Alimentação Adequada e Saudável. Desenvolvimento infantil. Serviços de Saúde Escolar.

INTRODUCTION

Food and Nutrition Education (FNE), for being a plural and continuous knowledge field seeking health promotion based on healthy eating habits and on autonomy, arouses problematizing approaches of the educational actions, considering food systems and their interactions with different actors, sectors and territories, which are inserted in the same field.

This concept of FNE had a trajectory of depreciation until the 1990s with the "teach how to eat" decontextualization, and of national and international recognition after that decade when its importance was made clear in the scenario of public health and policies. The implementation of the *Programa Fome Zero* (Hunger Free Program) in 2001 marked such recognition for contemplating FNE actions and highlight the demand for the inclusion of this theme in the school curriculum until elementary school.[1]

As a result, the increase in FNE action in the public level stimulated the promotion of eating practices based on the subject and on the democratization of information. In 2011, on that perspective of public construction, the development of the Brazilian Food and Nutrition Education Framework for Public Policies started with the participation of actors from several sectors of the government and civil society. The Framework aimed to guide actors regarding FNE based on the principals and the recommendations of public sectors and equipment which may be utilized in the FNE practices, such as the health and education sectors and the school space.[1]

The FNE practices in public schools have support from the Brazilian National School Feeding Program (PNAE, in Portuguese) which contributes to the growth and development of students by the serving of meals and FNE action which strengthen the forging of healthy eating habits, respect to local eating culture, sustainability and the assurance of the right to school feeding.[2] Schools make it possible to develop critical thinking and contribute to making decision with the potential to transform realities that demand the assurance of the human right to healthy and adequate eating, and that lead to better quality of life.[3,4]

According to Silva et al.,[5] FNE practices presuppose innovative methodologies which pedagogically use food and transversally inserted themes related to food and nutrition in the school curriculum. The insertion of FNE in the school curriculum is stablished by the Resolution n. 6/2020 which guides how eating, food and nutrition should be approached, as well as the development of healthy life practices in the perspective of food safety and food security incorporated to the school curriculum.[6]

Approaching food and nutrition in a perspective broadly ampliated with problematizing strategies and methodologies which contextualize the school environment, extrapolating the traditional view of knowledge transmission, is challenging.[7,8] The contextualized approach stimulates children's cognitive development – the changes and the stability of the mental capabilities of children which present singularities in different stages of childhood.[9] The way such actions are executed should be discussed, their limitations should be observed, as well as possibilities taking well-succeeded experiences as reference.[1]

The objective of this article is the report the experience of the construction and implementation of school-based food and nutrition education (SFNE) transversal actions to an elementary school curriculum, in components of the Portuguese and Mathematics classes, and also reflect about FNE transversality in different school subjects, by the use of ludic methods, adaptation to the school age and stimuli to cognitive development.

METHODS

This is a report based on the experiences of the participants of the "FNE in the School Environment" extension project in FNE actions developed in the Tutorial Education Program (PET) of the Tancredo de Almeida Neves school

(from now on mentioned as "school") – an elementary and middle school level institution of the city of Cuité, Paraíba, Brazil.

The project has been active since 2016 and it is an initiative of the Center of Research and Studies in Nutrition and Public Health (Núcleo PENSO) of the Nutrition Undergraduate Program of the Federal University of Campina Grande, in the campus of Cuité.

During the second semester of 2019, the project's objective was to promote transversal actions in FNE which contributed to the cognitive development and abilities related to the Portuguese and Mathematics classes.

The activities and the curricular components delineated for the project were determined bases on two demands raised by the school. The first was presented by the school's director, which was the need to prepare students for the *Prova Brasil* – an exam for the evaluation of the quality of the educational system in Brazil by standardized tests and sociodemographic questionnaires – which would happen in the end of 2019 and had Portuguese and Mathematics as its main topics. This demand motivated the team to promote the articulation of FNE action with the cognitive development and abilities related to the Portuguese and Mathematics classes. The second demand was raised by teachers regarding the use of active methodologies which promoted students' interest and learning.

The FNE actions were based on the Brazilian Food and Nutrition Education Framework for Public Policies[1] and on the Dietary Guidelines for the Brazilian population.[4] The principals I, III and IV stablished by the FNE Framework are social, environmental and economic sustainability; valuing of the local food culture and respect for the diversity of opinions and perspectives, considering the legitimacy of knowledge of different natures; food as a reference and the valuing of culinary as an emancipating practice. Besides the support to sustainability, regional food culture and culinary practices by its principals, the Dietary Guidelines for the Brazilian population guided specially the activities which aimed to exercise the classification of food by their processing level: unprocessed or minimally processed, processed and ultra-processed food.

For the articulation with the curricular components of the Portuguese and Mathematics classes, the school's bimonthly planning was used, which was composed by learning objectives, content/topics and strategies for each grade. The team of the project linked the FNE themes to the school's existing. Activities approaching the cognitive abilities of perception and logic thinking was planned for pre-school and first year groups, for which the learning objectives did not contemplate specific contents of the Portuguese Language and Mathematics, but were directed to experiences which promoted, for example, speech development, counting and learning about sizes.

A total of 248 students were enrolled in the different levels of the school: Education for the Youth and Adults (34), Elementary School I (152), and Pre-school (62). The activities of the project involved 164 students of the eight elementary and pre-school groups (except the 5th grade due to a request from the school), between August and December 2019, with the team composed by 12 participants of the "FNE in the school environment" extension project divided into two groups (six in the morning period, and six in the afternoon period) to execute activities in all the groups sequentially.

The planning was conducted in the week prior to the action with the definition of the objective and the main FNE theme, the methodologic strategy and the articulation of the activity with the curricular components. The strategies and activities which integrated the educational actions were adapted according to the group (pre-school to 4th grade). The education material was elaborated by the project's team prioritizing the use of recycled and low-cost material.

The interaction with the teachers did not happen directly from the planning activities; however, an evaluation was done to highlight the strengths and weaknesses of each activity, gathering suggestions and alternatives for the

challenges encountered, by the end of every activity with discussions between the project's participants and the project's adviser.

The results of this report discuss the FNE actions executed in the school considering three themes: (1) *Strategies for Food and Nutrition Education: the use of ludic resources; (2) Articulation of FNE with cognitive development, Portuguese and Mathematics; and (3) Adaptation of activities according students' school age.*

RESULTS AND DISCUSSION

The FNE actions executed in the school during the second semester of 2019 are described in Tables 1 and 2. The first table contains information about the activities articulated the cognitive development with the Portuguese Language, while de second displays the articulation of cognitive development with Mathematics. The educational action contains three elements: objective of the actions, methodologic strategy and the articulation of the activity with the curricular components. In the tables are presented six objectives, 15 strategies and 20 activity articulations. There are differences in the number of objectives, strategies and articulations owing to the fact that the objectives stablished were linked to different strategies and activities, considering school age and learning objective..

Table 1. Description of the actions developed by the UFCG Food and Nutrition Education in the School Environment Extension Project articulated with the Portuguese Language class in the Tancredo de Almeida Neves school. Cuité-PB, Brazil, 2019.

Action number / Objective	Description of the educative action	Articulation with the Portuguese Language and the cognitive development
1 Sensitize students to the importance of the selective collection of garbage and recycling for the community.	*1. Strategy: storytelling* *Story:* Little Red Riding Hood Description: the story was adapted to the selective collection of garbage theme and recycling. In the enactment, the main character went to his grandmother's house to help her to organize the trash cans for selective collection. After the garbage were separated according to the type, the 'hungry Wolf', appeared in the garbage seeking for food. The Wolf did not know that garbage had been separated according to its type (paper, plastic, metal, glass, and organic) and in trash cans of different colors. Little Red Riding Hood then taught the Wolf how to organize the garbage and even offered him something to eat. *2. Strategy: circle games and reading of poems adapted to the theme* Description: texts were distributed to students based on poems and circle time songs. Initially, a collective reading of the poem "Sorting is needed" was done. After that, two circle time songs adapted to the theme of selective collection of garbage and recycling ('Escravos de Jó' and 'Cai cai balão' – two well-known Brazilian circle game songs) were sung by the project's team. As an activity, students were incentivized to fill in blanks in the texts creating rhymes with the words "collectors", "blue" and "recycling".	**Pre-school:** recognize the colors of the selective collection of garbage and painting. **1st grade:** Writing for the creation of messages for the "Wolf". **3rd grade:** Reading and interpretation of texts and recognizing of rhymes between words.
2 Approach concepts of organic and non-organic garbage in the perspective of sustainability.	*1. Strategy: storytelling* *Story:* One Day in the Park! Description: the project's team created this story in which two girls who are friends meet in a park. One of them delivers a letter inviting the other one to a picnic. In the letter are listed the food which they should take to the park to share. Some of the food produced organic waste (e.g., apple stalks, banana peels) and others produced non-organic waste (e.g., juice cartons, straws). During the narration, students had to identify and decide in which trash can to discard the garbage. At the end, students wrote a note and inserted it in an envelope fixed to an illustrative poster with the image of the Earth and the sentence "Leave a message to the environment". *2. Strategies: storytelling and educative game* *Story:* The Recycled Cat Description: the project's team created this story which tells the experience of a girl who confectioned a cat with recycled materials at school, and after arriving who shared what she had learned with her brother. The "Recycled Cat", main character, was confectioned with cardboard, PET bottle, and a softer container). After telling the story, an educative answer or pass question game was played. Students were split in groups and questions were asked regarding the elements of the fictional narrative presented.	**3rd grade:** Narrative text reading, writing, and interpretation, and personal letter's structure and function. **4th grade**: review of fictional narrative elements (characters, space, time, plot).

Table 1. Description of the actions developed by the UFCG Food and Nutrition Education in the School Environment Extension Project articulated with the Portuguese Language class in the Tancredo de Almeida Neves school. Cuité-PB, Brazil, 2019 (Continues).

Objetivo		Descrição da ação educativa	Articulação com a língua portuguesa e o desenvolvimento cognitivo
3	Strengthen the knowledge about the classification of unprocessed and processed regional food.	*1. Strategy: educative game* Description: The Senses' game Students were individually stimulated to try to recognize the shapes, textures, and sizes of regional foods which were hidden in a bag.	**Pre-school and 1st year:** recognizing different shapes, textures, and size using the tact.
		2. Description: Hangman The names of regional fruits and other unprocessed and processed food were used in this game. After discovering the food, students had to classify them as unprocessed or processed.	**2nd grade:** reading, constructing, and interpreting words.
		3. Description: guessing games Texts with tips and characteristics of regional unprocessed and processed food were used in this game. Students were split in groups and were stimulated to guess to what food the text was referring. After that, students classified each food in unprocessed or processed.	**3rd and 4th grades:** reading, constructing, and interpreting words.
4	Valuing the northeastern food production and culture reinforcing the knowledge about the classification of food.	*1. Strategy: storytelling* *Story: "The Did You Know It? News Program"* *Description: This story was created by the project's team and simulated a News Program called "Did you know it?", of which the hosts informed about the shape, colors and benefits of regional food. Students interacted with the hosts to discover the different types of northeastern food. Some food was distributed to the participants, and they chose names and last names to the food. Finally, students were offered mashed pumpkin for tasting.*	**Pre-school:** recognizing colors and shapes **1st grade:** writing as a way communication mean and writing names and last names.
		2. Strategy: dynamic "Tongue Twister Soup" *Description: The project's team created tongue twisters. Each text was printed in different colors, its words were cut out in separate pieces and put inside a pan, simulating a soup. Students were asked to assemble the tongue twisters according to the colors for association and lastly read and comprehend the text.*	**2º grade:** text reading and interpretation
		3. Strategy: narrative and resolution of a problem situation *Problem situation: "Little Johnny Prepares his Breakfast"* *Description: the situation created by the project's team was an interaction between Little Johnny and his mother through a written message which contained instructions about how Little Johnny should prepare his breakfast in the morning. Students were stimulated to help Little Johnny according to his mother's directions.*	**3º grade:** leitura, estrutura e função do gênero textual. **4º grade:** recognizing the elements of the fictional narrative about the problem situation (space, time, characters, and plot) and the recreation of the story with new characters..

Elaborado pelos autores (2020)

Table 2 Description of the actions developed by the UFCG Food and Nutrition Education in the School Environment Extension Project articulated with the mathematics class in the Tancredo de Almeida Neves school. Cuité-PB, Brazil, 2019.

Action number / Objective		Description of the educational action	Articulation with the mathematic abilities and cognitive development
1	Identification of food according to the unprocessed and processed food groups aiming to promote healthy eating choices.	*1. Strategy: storytelling* *Story:* "Grocery Day!" Description: the project's team created this story which has as characters Paulinho and his mother who write a grocery list. Paulinho's mother asks him to go to the supermarket to buy some food. Students interact with Paulinho, helping him to count food items present in the grocery list and to separate them according to the unprocessed and processed classification. After that, students had to identify, separate, count and place the food in different bags.	**Pre-school:** identifying numbers and counting, from 1 to 10, the food figures according to their classification, and also motor and creative development from the painting of the food mentioned in the story. **1st grade:** identifying numbers and counting, from 1 to 20, the food figures according to their classification, and also motor development through writing the numbers identified when counting the food.
		2. Strategy: storytelling *Story:* "Paulinho's Birthday" Description: the project's team created this story in which Paulinho and his mother go to the supermarket to purchase some ingredients needed to prepare hot dogs and fruit salad which would be served in Paulinho's Birthday. Paulinho's mother took two bags to the supermarket to separate the unprocessed and processed food items from each other. Students interacted with Paulinho and helped him to choose which product should go in each bag.	**2nd grade:** creating of groups and summing. A chart of numbers was shared with students (e.g., 8 buns, 4 apples) and students were stimulated to create groups of 10 items.
		3. Strategy: storytelling and educative game *Story:* "Grocery Day!" (Described above) Description: The "Grocery Day" story was presented. A grocery list with the amount of unprocessed and processed/ultra-processed food was exposed on the board. Math operations and problem situations involving the four operations were created based on the grocery list shared with the students who were stimulated to solve the math problems.	**3rd grade:** conducting basic math operations. Cards were distributed to students containing simple math operations (addition and subtraction) involving, in a ludic way, food instead of numbers. **4th grade:** solving problems using math. The class was divided into two groups who were responsible for finding the solutions for the problems.
2	Valuing northeastern regional food culture.	*1. Strategy: Storytelling* *Story:* "The Mango and her Friends" Description: the project's team created this story which had "Mango" and her mother as characters who were preparing a snack for her friends. They needed help to count the number of fruits which they would need to prepare the snack. Thus, the main character, "Sr. Math" entered the scene to incentivize students to count the printed fruits shown.	**Pre-school and 1st grade:** recognizing numbers, counting exercises and identification of food colors and shapes.
		2. Strategy: reality simulation Description: a street market simulation was assembled. In the scenario, there were fruits containing price labels (printed images) on one table. Two groups of students were stimulated to go shopping in the street market. The groups were given a limited amount of money (fictional bills) and two bags (one for picking fruits from the Northeast, and another for fruits from other regions). Lastly, when shopping was over, each group's experience was discussed.	**2nd, 3rd and 4th grades:** conducting basic math operations focused on the experience of managing the use of money for purchasing food. The difficulty level was of the math operation varied according to the grades.

Elaborado pelos autores (2020).

Strategies for the Food and Nutrition Education: the use of ludic resources

As exposed in Tables 1 and 2, different ludic resources were used in the FNE actions, such as storytelling and enactment, educative games, circle game songs and music. Important studies in the field highlight that the use of ludic resources through games, dances, playing and storytelling, with clarity in the learning objectives turn the school space into an environment which approximates students and knowledge and stimulates learning, as well as the strengthening autonomy and abilities.[3]

In Tables 1 and 2 are described the use of storytelling in 10 strategies, with the use of adapted stories, the creating of original stories, as well as stories which corresponded to the problem situation. Among the storytelling methods were: (1) enacting ("Little Red Riding Hood", "One day in the park!"), (2) use of puppets ("The recycled cat") and (3) narrating ("Circle time songs and reading of poems adapted to the theme", "The *Did You Know It?* News Program", "Little Johnny Prepares his Breakfast", "Grocery Day!", "Paulinho's Birthday", "Mango and her friends").

The action 1 (Table 1) brings in its first strategy the adaptation of the plot of the "Little Red Riding Hood" tale to the theme of selective collection of garbage. In the enacting of the story with costumes and adornments, the symbology of the modifying agents in the context enacted displayed by the characters upon the children stimulates them to relate to the story and lead to the reproduction of the characters' practices. The creation of new stories also contributed to the learning process, especially those which encouraged the practical execution of the contents approached. For instance, in the second strategy of the action 4 (Table 1), strategy 4 in which the puppet of the main character was confectioned with recycled materials to generate reflections on sustainability and recycling – a target subject linked to the activity's objective.

The storytelling does not mandatorily require theatrical resources, so it may be conducted in different ways in accordance with the team's reality and abilities. The confectioning of materials for the activities was challenging due to the limitation of financial resources. Facing that, the project's team sought financially and environmentally sustainable alternatives, such as using materials of easy acquisition and articulating activities to reuse materials.

The story "One day in the park!", in action 1, strategy 3 (Table 1), brings the differentiation of the types of organic and non-organic trash. With what the students learned, they wrote a letter to the world for raising awareness. This resource contributed to the developing of cognitive abilities with the stimulus to the capacity of rationalization and creation, besides the improving of reading, language and social and intellectual identity of the child through the insertion of reading and writing,[10] promoting pleasure and compromising which serve as foundation for the writing process. For Silva,[11] the use of puppets and dolls is a pedagogic alternative to promote the development of capacities based on fun resources, as well as incentive to observation, perception, internalization and assimilation by the child.

Regarding the use of educative games as a ludic resource, these were applied to five strategies, being some associated to storytelling. Table 1 presents different games, such as 'The Questions and Answers game' (Action 2, strategy 2), and 'The Senses game', 'Hangman' and Guessing games (Action 3, strategies 1, 2, and 3, respectively). Table 3 presents the mathematical educative game (in Action 1, strategy 3), and the reality simulation game (Action 2, strategy 2). "Hangman" (Action 3, strategy 5 – Table 1) aimed to stimulate the interpretation of short texts and remember concepts seem about FNE. The blackboard in the classroom was used to show the missing words corresponding to the blanks in the short texts that were read by the team.

The use of educative games goes beyond their being appealing, contributing also to the child's development and overcoming challenges faced in each stage of the games, involving their participation as a part of the knowledge structuring process. Games give students the opportunity to reflect, experiment, create and transform the world in a powerful and challenging process.[12] Thus, game stimulate students' different abilities, such as the motor, social and affective ones, besides oral and written language, and logic thinking.[13]

The experience with the 3rd and 4th grades was initially based on games' competitive approach; However, discontentment was observed due to the competitivity, even when the prizes were distributed equally among students. According to Ke and Grabowski,[14] the use of games improved results when compared to the traditional teaching method, especially when cooperative games were used. Gonçalves[15] advocates that competition and cooperation are inseparable When using games on account of the necessity group cooperation for winning. The use of educative games is potentialized with the balance between competition and cooperation, exploring positive aspects of the competition, such as the group's resilience, acceptance and respect for the rules and for the other groups and participants involved in the game.

Other ludic resources presented on Table 1 were poems and circle game songs (Action 1, strategy 2), rhymes and tongue twisters (Action 4, strategy 2). The action 1 (strategy 2 – Table 1), presented a poem "Sorting is needed" and adapted circle songs to the theme of selective collection of garbage (*'Escravos de Jó'* and '*Cai cai balão*' – two well-known Brazilian circle game songs). The tongue twister used in Action 4 (strategy 2 – Table 1) was based on the valuing of the northeastern food culture theme and demanded from students the association of words and the interpretation of the tongue twister.

Even with the different ways to use words, the circle game songs, poems and tongue twisters have common characteristics which contribute to the child's learning, for instance, the wordplay (shapes and sounds), the rhythm (regular timing for speaking and sounds) and the repetition. According to Oliveira and Coelho,[16] these ludic resources are included in orality plays, which promote the developing, enabling children to notice the sonority of words and the creation of rhymes.

The use of ludic approaches is positive for FNE practices in the school, for children's development, and also for the construction of FNE which arises autonomy and making healthy choices. Besides that, the use of creative material, of low cost and easy confection favors the continuation of the FNE action and the invocation of classroom resources.

Articulation of the FNE with the cognitive developing, Portuguese Language and Mathematics

The project's actions articulated FNE with specific abilities linked to the Portuguese and Mathematics classes. In the Table 1, the abilities related to the Portuguese Language can be observed (text writing, reading and interpretation, recognizing rhymes between words, structure and function of text genres, the review of elements of fictional narrative and the writing as a communication mean), while Table 2 display those related to Mathematics (number counting, forming groups of 10 units, practice of the base math operations, and the resolution of math problems). The applicability of this articulation was possible on account of the integration between teacher and the project's team, both in the sharing of bimestrial plans and during the activities' executions in the classrooms.

As an example, Action 2 (Table 1) connected the selective collection of garbage theme with a review of fictional narrative elements – a 4th grade Portuguese Language topic. In this action, storytelling ("The Recycled Cat") was used, including the definition of the narrative elements (character, space, time and plot) and a game of questions and answered directed to the identification of narrative elements. Regarding the Math topics, Action 1 (Table 2) articulated the classification of food according to the Dietary Guidelines for the Brazilian population with the identification and counting of numbers through storytelling ("Grocery Day!"), of which the plot presented a grocery list containing unprocessed and processed food allowing number identification and counting.

Transversal FNE actions require the articulation with curricular components to be the main core of planning, in a way that the necessary information is provided to students for allowing them to execute the final activity of articulation of FNE with curricular component. The FNE transversality is inserted in debates upon the regulations which insert the promotion of healthy eating in the school curriculum (Interministerial Ordinance N. 1010/2016)[17]

and guide the use of food as a pedagogic tool, including FNE as a transversal theme in the school curriculum (FNDE Regulation N. 06/2020).[6]

On this topic, Silva et al.[5] verified that the insertion of FNE practices in the multidisciplinary context is limited, being inserted in the school curriculum of only 9,1% of the FNE activities in schools of the State of Goiás-GO. The authors highlighted as challenges for the execution of those actions: the absence of perception from the school professionals on the important of inserting FNE in the school curriculum, the professional qualification of the dietitians and their role as educator, and the presence of education policies and programs like PNAE. The challenge of the professional qualification in health was also experienced during the actions implemented by the extension project.

The qualification of dietitians, even with advances, still focus on a biomedical approach which little explores the wide concept of health. Moreover, there is limited investing in the communication abilities of the future health professionals while they are still in college, and it was due to that the planning the actions required resilience from the team to overcome the limitations of high education qualification and to seek for communication abilities.[18] Borsoi, Teo and Mussio[7] noticed that the majority of FNE applications at the school surveyed used technical methodologies, and that the inexistence of FNE actions was linked to the limitations in the qualifications of the professionals.

Another challenge was the unevenness of the productivity of students in the same classroom. According to De Souza,[19] some students reach the middle school level with difficulties and unprepared to fulfill the school curriculum stablished for many reasons, from students' singularities on the learning process to the arriving of new students in the school.

Overcoming challenges was possible since the there was a team effort for facing obstacles in the academic qualification of the projects' participants, as well as the support from teacher in the classrooms, who, for being experienced, contributed to the identification of students who had more difficulties, and also contributed to the elaboration of methods to assure that students would keep their attention during the activities (dividing them into groups), making the activities become more inclusive and equanimous.

Adaptation of the FNE activities to students' school ages

The FNE actions described in Tables 1 and 2 used educative strategies and activities for the articulation of adequate curricular components considering the school age of students, with different levels of complexity aligned with the specific learning objectives for each student group.

As an example of that adaptation, Action 3 (Table 1), specifically on strategies 1, 2 and 3, applied different educative games: (1) 'The Senses game', to promote recognizing shapes, textures and sizes (pre-school and 1st grade), (2) "Hangman", seeking the interpretation of short texts and word construction (2nd grade), and (3) guessing games, seeking text interpretation (3rd and 4th grades). Similarly, Action 1 (Table 2) presented the adaptation of the following activities: (1) counting food (pre-school and 1st grade), (2) grouping food in 10-unit groups (2nd grade), (3) addition and subtraction operations (3th grade), and (4) solving math problems (4th grade). The availability of the bimestrial plan of pedagogic activities and the support of teachers in the class room enabled the adaptations.

The ludic materials and the narrative methods adopted in the storytelling were also adapted according to students' school ages. In the pre-school, 1st and 2nd grade groups, it is important to use theatral enactments and puppets, while with the 3rd and 4th grades, it was observed a better acceptance of activities with narratives based on daily situations. The planning of the FNE activities in the school context should consider the different stages in children's development to grant the interest, the adequate interaction of the students with educators, and the learning process.

Childhood stages present different characteristics: start of exploration of the tact, movement, textures, shapes, sounds and motor coordination (0-2 years old), fantasy, inventions and creativity (2-4 years old), acceptation and assimilation of rules (4-6 years old), higher visual and auditive discernment, memory, acceptation of rules, competitivity and better group coping (6-8 years old), higher capacity of reflection, reasoning and group coexistence (8-10 years old), and lastly, more restricted group experiences marked by the frequent gender dispute and segregation (10-12 years old).[9]

The development of activities that generate learning presuppose the use of age-coherent methodologies for the target audience to enable the communication between the participants of the action. According to Hart et al.,[20] the food and nutrition thematic may be delivered as long as approached in accordance with students' cognitive capacity and their participation in the learning process. Therefore, avoiding the standardizing of educational activities is essential when the learning objective is planned to reach different groups and school ages in the same school.

CONCLUSION

This experience report presented the viability of transversally developing FNE actions articulated with curricular components and of reflecting about their challenges. The integration between teachers/director and the actors responsible for the FNE activities in the school, the use of ludic resources as foundation and the adaptation of activities to students' school ages contributed to overcoming difficulties. The execution of transversal FNE activities require integration between teachers/directors and actors responsible for the FNE agenda in the school. Listening to demands, considering the experience of teacher and participating in activities other than those of the project were essential to strengthen the bond with the school.

The use of ludic resources enabled higher interest, students' capabilities in interpretation and communication, highlighting the idea of stimulating the teaching and learning process to happen in a creative way, and not in the traditional one.

The approximation of the Portuguese and Mathematics contents contributed to the valuing of the activities for matching the objectives of the school, especially regarding the *Prova Brasil*. The set of good results of the actions was potentialized by the adaptation of the activities to the school age, which arose the curiosity of the students for what was new and challenging.

The application of the knowledge here for the development of FNE activities articulated with other curricular components with students of higher school ages and in other cities is a recommendation of this report for verifying the limits and potentialities of the replication of the dynamics used in this experience, being relevant also for the analysis of the impact of FNE activities for the long term and with the more frequent and constant conduction.

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Contributors

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