SEVEN
publicações acadêmicas

PROFESSIONAL EDUCATION IN SUSTAINABLE GASTRONOMY: RESULTS AND SOCIO-ENVIRONMENTAL IMPACTS

EDUCAÇÃO PROFISSIONAL EM GASTRONOMIA SUSTENTÁVEL: RESULTADOS E IMPACTOS SOCIOAMBIENTAIS

FORMACIÓN PROFESIONAL EN GASTRONOMÍA SOSTENIBLE: RESULTADOS E IMPACTOS SOCIOAMBIENTALES

https://doi.org/10.56238/sevened2025.029-094

Edson de Souza Pereira[1], Lucio Fabio Cassiano Nascimento[2]

ABSTRACT

This study analyzed the contribution of a professional education course in sustainable gastronomy to the promotion of conscious practices in the food sector. The research involved students and professionals from the sector, throughout theoretical and practical activities based on RDC No. 216/2004 and current health regulations. The results demonstrated significant progress in the adoption of good hygiene and sanitation practices, waste reduction, and more efficient use of inputs, in addition to strengthening critical awareness of food vulnerability. Participants began to identify themselves as promoters of change, replicating what they learned in their family and professional contexts. The analysis showed that the environmentally focused training strengthened students' social commitment, generating significant transformations in daily habits. It is concluded that the training experience fostered the emergence of more reflective individuals committed to sustainability, expanding their actions toward integrated and responsible local development.

Keywords: Environmental Education. Sustainability. Food Security. Food Waste.

RESUMO

Este estudo analisou a contribuição de um curso de educação profissional em gastronomia sustentável para a promoção de práticas conscientes no setor alimentício. A pesquisa envolveu estudantes e profissionais do setor, ao longo de atividades teóricas e práticas fundamentadas na RDC nº 216/2004 e em normas sanitárias vigentes. Os resultados demonstraram avanços significativos na adoção de boas práticas higiênico-sanitárias, na redução do desperdício e no uso mais eficiente dos insumos, além do fortalecimento da percepção crítica diante da vulnerabilidade alimentar. Observou-se que os participantes passaram a se identificar como promotores de mudança, replicando os aprendizados em seus contextos familiares e profissionais. A análise evidenciou que a capacitação com enfoque ambiental potencializou o compromisso social dos alunos, gerando transformações relevantes em hábitos cotidianos. Conclui-se que a experiência formativa favoreceu o surgimento de sujeitos mais reflexivos e comprometidos com a sustentabilidade, ampliando sua atuação em prol de um desenvolvimento local integrado e responsável.

[1] Master's student in Local Development. Centro Universitário Augusto Mota (UNISUAM).
E-mail: edsonsouzapereira45@gmail.com Orcid: https://orcid.org/0009-0007-8373-4315
[2] Dr. in Materials Science. Instituto Militar de Engenharia (IME).
E-mail: lucionascimento@souunisuam.com.br Orcid: https://orcid.org/000-0003-3484-145X

Palavras-chave: Educação Ambiental. Sustentabilidade. Segurança Alimentar. Desperdício de Alimentos.

RESUMEN
Este estudio analizó la contribución de un curso de formación profesional en gastronomía sostenible a la promoción de prácticas conscientes en el sector alimentario. La investigación involucró a estudiantes y profesionales del sector, mediante actividades teóricas y prácticas basadas en el RDC n.º 216/2004 y la normativa sanitaria vigente. Los resultados demostraron avances significativos en la adopción de buenas prácticas de higiene y saneamiento, la reducción de residuos y un uso más eficiente de los insumos, además de fortalecer la conciencia crítica sobre la vulnerabilidad alimentaria. Los participantes comenzaron a identificarse como promotores del cambio, replicando lo aprendido en sus contextos familiares y profesionales. El análisis mostró que la formación con enfoque ambiental fortaleció el compromiso social de los estudiantes, generando transformaciones significativas en sus hábitos diarios. Se concluye que la experiencia formativa fomentó el surgimiento de individuos más reflexivos y comprometidos con la sostenibilidad, ampliando sus acciones hacia un desarrollo local integrado y responsable.

Palabras clave: Educación Ambiental. Sostenibilidad. Seguridad Alimentaria. Desperdicio de Alimentos.

1 INTRODUCTION

Traditionally, culinary learning took place in an essentially practical way, transmitted from generation to generation or through direct experience, without the requirement of academic training or structured scientific foundation.

The scenario began to change with the implementation of public policies aimed at professional education, such as the National Program for Access to Technical Education and Employment (PRONATEC), created by Law No. 11,513/2011, which significantly expanded access to specialized training courses.

The growing demand for qualified professionals in segments such as tourism, events and hospitality, especially in the state of Rio de Janeiro, has accentuated the relevance of training in gastronomy. However, the merely technical focus is not enough: it is essential that these courses contemplate contemporary dimensions, such as ecological environmental efficiency, the fight against waste and the guarantee of food security.

In the field of gastronomy, ANVISA's Resolution RDC No. 216/2004 constitutes an essential regulatory framework, by defining hygiene and safety parameters for food services. This regulation has guided both the productive sector and pedagogical practices in training courses.

In this context, the integration between gastronomy, health, and sustainable resource management emerges as a strategic path for human and community development. It is in this context that this research was developed at the Nilópolis State Technical School (ETE Nilópolis), seeking to understand how the Healthy and Sustainable Gastronomy course can stimulate conscious eating habits, strengthen health safety and promote socio-environmental responsibility among students.

2 MATERIALS AND METHODS

A relevant differential of this investigation was the context of application: the Healthy and Sustainable Gastronomy course offered by ETE Nilópolis, a unit of the Technical School Support Foundation (FAETEC), located in a municipality characterized by high population density. This territorial cut gives uniqueness to the study, as it shows how educational practices aimed at safe food conditions and ecological efficiency can generate concrete impacts in peripheral urban communities. *"I had never taken a course like this. It was the first time I understood that cooking can change people's lives"* (P7, 2025).

The investigation was carried out over six months, involving a class composed of 17 participants, including students in the process of qualification and workers already inserted in the food sector, which favored the diversity of empirical and analytical contributions. *"Everyone came here for a reason: I wanted to learn at home, others were already thinking about selling food"* (P5, 2025).

The target audience was composed of students enrolled in the Healthy and Sustainable Gastronomy course, in the modality of Initial and Continuing Education, requiring only elementary education as a prerequisite. Participation occurred voluntarily, after presentation of the objectives and conditions of the investigation. The group involved both students in the process of qualification and workers already inserted in the food sector, which expanded the diversity of empirical and analytical contributions.

Regarding ethical issues, legal protocols were complied with, including obtaining the Letter of Consent from the institution, signing the Informed Consent Form (ICF) and authorizing the use of the participants' image. The study fully complied with the guidelines of Resolution No. 466/2012 of the National Health Council. *"I felt respected from the beginning, we signed and understood everything that was going to be done"* (P2, 2025).

The research followed a qualitative approach of exploratory character, complemented by quantitative elements. For data collection, three main instruments were used: (i) mixed questionnaires, containing open and closed questions; (ii) semi-structured interviews, which allowed for a deeper understanding of the reported experiences; and (iii) observation and photoFigureic records, made during practical and theoretical activities. *"I liked it because it wasn't just paper, we talked, showed how to do it in practice"* (P6, 2025).

The sample of the work was composed of 17 participants, including students and professionals from the food sector, enrolled in the Healthy and Sustainable Gastronomy course. To preserve anonymity and ensure compliance with the ethical guidelines of Resolution No. 466/2012 of the National Health Council, the research subjects were coded from P1 to P17. Table 1 presents the general profiles of those involved, allowing a more qualified analysis of the statements without nominal identification.

Table 1

Coding of the Research Participants

CODE	PROFILE	SEX	RELEVANT NOTE
P1	Beginner student	M	First experience in a gastronomy course

P2	Food professional	M	He was already working as a self-employed entrepreneur
P3	Food professional	M	He was already working as a bartender
P4	Young person in technical training - TEA	M	He likes to venture into the kitchen
P5	Home/Crafts	F	Reported changes in the use of bark and stalks
P6	Student of Ens. Medium-	F	Loved participating in the vegetable exhibition
P7	Retired	F	Seeks reinsertion in the market and gastronomy
P8	Undergraduate student of Ed. Fís. in the making	F	He worked in a community daycare center
P9	From the home / Dentist	F	Mother of the young man with ASD
P10	Caregiver for the elderly	F	Did you like to know about the use of leftovers
P11	Nutrition Undergraduate in Training	F	I already knew concepts about CF
P12	Unemployed	F	I was looking for training to generate income
P13	Single mother	F	Learned food safety practices
P14	School cook	F	Applied techniques in school meals
P15	Young person in social vulnerability	F	Reported improved self-esteem and waste
P16	EJA Student	F	Interest in eco-gastronomy, sustainability
P17	Self-service restaurant cook	F	Applied HR at work and hygiene

Source: Survey data (2025).

The pedagogical practices were carried out in the classroom and in the experimental kitchen of the institution. The content covered was based on the current Brazilian health legislation, which guides good food handling practices, with emphasis on hygiene, risk prevention and rational use of inputs. *"It was in the kitchen that we really learned. Putting your hand in the food made all the difference"* (P11, 2025).

The data obtained were organized into four axes of analysis: (i) safety and hygiene in food handling; (ii) strategies for reducing waste and reuse; (iii) development of critical awareness focused on the sustainable management of resources; and (iv) dissemination of knowledge in family, community and professional environments. *"Now I wash everything the right way, before I didn't even know I needed it"* (P10, 2025). *"I started to save peel and stalk, and I already make a new recipe with it"* (P5, 2025). *"I learned that every part of the food has value, even the one I threw away"* (P15, 2025).

The integration of the collection instruments configured the methodological triangulation of the research. Each technique fulfilled a specific and complementary role: the questionnaires allowed mapping initial perceptions and changes declared by the students; the interviews deepened the understanding of the experiences lived during the course; and the observational records captured the effective practices and interactions in the pedagogical environment. This combination resulted in a comprehensive and consistent view of the data, strengthening the scientific validity and educational relevance of the study.

3 RESULTS AND DISCUSSION

The results showed significant improvements in the adoption of good hygiene practices, in the more complete use of inputs and in the reduction of the volume of waste generated in the preparation. The activities developed stimulated a critical reflection on socio-environmental responsibility and safe food conditions, leading the participants to recognize themselves as multiplying agents of knowledge in their family and professional environments. *"After the course, I started using peel and stalk that used to go to waste, and I realized that the flavor is not as bad as I imagined"* (P4, 2025).

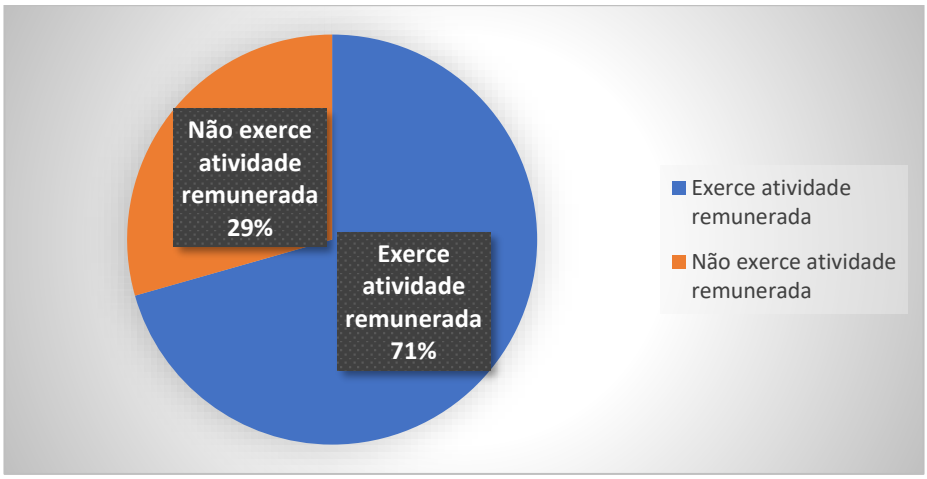
The analysis revealed difficulties in consolidating new habits, especially in the face of cultural practices and eating routines that are already rooted. Even so, the results converge with studies that point to professional training in gastronomy as a strategy to promote socio-environmental transformations, with repercussions both in the domestic sphere and in the labor market. In this sense, the Healthy and Sustainable Gastronomy course proved to be an effective pedagogical proposal, capable of combining technical qualification and socio-environmental awareness.

3.1 SOCIAL ASPECT

Figure 1 shows the occupational situation of the participants: 71% have paid activities, while 29% do not perform formal functions. This data suggests that, even though they were already in the job market, many students sought in the course an opportunity to update, exchange experiences and strengthen social bonds. *"Even though I was already working, I came to seek an update. Here we exchange a lot of knowledge"* (P14, 2025).

Figure 1

Social Aspect of the research participants

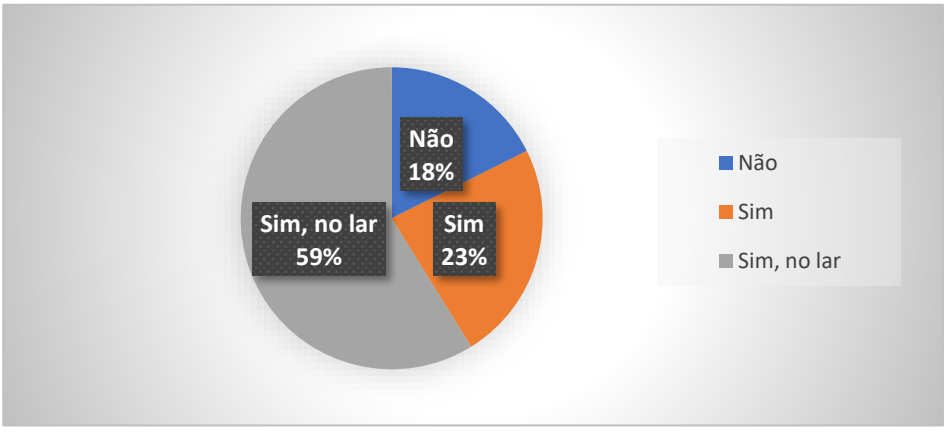


Source: Research Data (2025)

Figure 2 shows the frequency of work in the preparation of meals at home, indicating that 59% cook daily at home. This finding reveals the importance of integrating technical training with the practical reality of students. *"I make food every day at home, but I had never thought about calculating how much I wasted"* (P5, 2025).

Figure 2

Activity in food service or with food



Source: Research Data (2025).

The results show that gastronomic training has gone beyond the technical dimension, also consolidating itself as a space for coexistence, dialogue and construction of professional identities. In this scenario, the challenge arises to ensure that certification is not only formal,

but effectively represents a critical and transformative education, in line with curricula that reconcile science, practice, and socio-environmental responsibility.

Among those who do not have a direct link with the area, the report of a participant who took her son, diagnosed with Autism Spectrum Disorder (ASD), to follow the practical classes stands out. The young man showed enthusiasm and curiosity for the universe of cooking, remaining engaged and frequent, even when his mother, a dentist, faced difficulties in reconciling the professional routine with the course. This episode illustrates how the training space was also configured as an inclusive and welcoming environment. *"My son calmed down when he stirred the ingredients. This space was welcoming for both of us"* (P9, 2025).

In the field of gastronomy, such a perspective implies fostering skills that enable students to solve concrete situations and apply the knowledge acquired in everyday realities. It is expected that these professionals, upon completing the course, develop both technical skills and interpersonal skills, applying practical solutions in various contexts and transferring the knowledge obtained to new experiences throughout their career.

3.2 FORMATIONS OF SCIENTIFIC CONCEPTS

The incorporation of scientific concepts, especially from biology and mathematics, proved to be decisive in the training process of the participants. Many reported that, by understanding basic principles of environmental and personal hygiene, as well as the calculations necessary for culinary preparation, they were able to apply this knowledge in a practical and contextualized way in their routines. *"Now I can explain why it is important to wash with solution and not just with water. Before, I just did it without understanding"* (P17, 2025).

The course reinforced that food handling is not restricted to the preparation itself, but involves a set of steps — from the selection and storage of inputs to cooking, transportation, and distribution. This understanding is in line with RDC No. 216/2004, which establishes parameters to ensure the quality and safety of food. In this context, the handler assumes a central role in the prevention of hygienic-sanitary risks, becoming a strategic agent of food safety.

It was also observed that many participants, although they already applied empirical practices at home or at work, did not have the necessary technical vocabulary to explain or justify certain procedures. To fill this gap, biblioFigureic surveys and practical exercises were

carried out, which facilitated the appropriation of scientific terms and their application in real situations. This process brought students closer to the academic discourse, without disregarding the previous knowledge brought from everyday experience.

3.2.1 Hygienic-sanitary quality of food

Microbiology stood out as a fundamental axis in the training, especially for the contents related to personal hygiene, environmental control and the hygiene of vegetables. The participants understood that microorganisms perform different functions in the food environment, with pathogens being the main causes of foodborne diseases.

Throughout the course, the relationship between these theoretical notions and the practices of manipulation was reinforced. In the context of sanitary control of food, the relevance of pathogens was evidenced, whose action can trigger poisoning when there is no adequate care. The proposed activities, therefore, emphasized essential preventive measures — such as the correct hygiene of hands and utensils — since contamination often occurs through contact with surfaces or individuals carrying it.

The reports collected show that the practical application of this knowledge promoted effective changes in the participants' routines, both in the professional and domestic environments. The practical experience of cleaning vegetables with a sodium hypochlorite sanitizing solution was consolidated as one of the most significant moments of the training. In line with the idea that the goal is not to completely eliminate microorganisms, but rather to reduce their presence to levels acceptable for human consumption (Forsythe, 2002). *"I thought it was exaggerated to measure the soaking time, but I saw that the result of cleaning changes"* (P6, 2025).

Figure 3

Food hygiene

Source: Survey data (2025).

The integration between microbiology and decent food access proved to be essential for the students to internalize not only theoretical knowledge, but also replicable practices, which are fundamental to public health and responsible action in the food sector. An example of this occurred during the practical experience of cleaning vegetables with sodium hypochlorite sanitizing solution, following the official recommendations: adequate proportion, contact time and rinsing in drinking water. This experience transformed technical guidelines into concrete procedures, reinforcing the perception of the handler as a central agent in the prevention of contamination.

The records of the activity confirmed that the participants understood the relevance of rigor in the hygiene process, recognizing that apparently simple actions — such as the correct dilution of the product and the exposure time — are decisive to ensure the safety of the food. In line with the technical literature (Forsythe, 2002; Teichmann, 2009), the results showed that the practice in the didactic laboratory contributed both to the acquisition of technical skills and to the development of a critical posture in the face of ensuring access to adequate food.

Thus, the experience of hygiene has consolidated itself as one of the most significant moments of training, preparing professionals capable of applying microbiological principles in different scenarios of action. As Silva Júnior (2008) points out, the human being is one of the main vectors of pathogenic microorganisms, which reinforces the need for preventive measures against cross-contamination. The nutritional composition of foods themselves, as they are conducive to microbial growth (Forsythe, 2002), reinforces the importance of adopting constant care.

The realization of this practical activity enabled the participants to understand, in an applied way, the importance of the correct hygiene of vegetables for dignified food access. In addition, it favored the active involvement of the group and the multiplication of orientations in their social and family contexts. *"I came home and taught my family how to use the right solution, no one uses only vinegar anymore"* (P10, 2025).

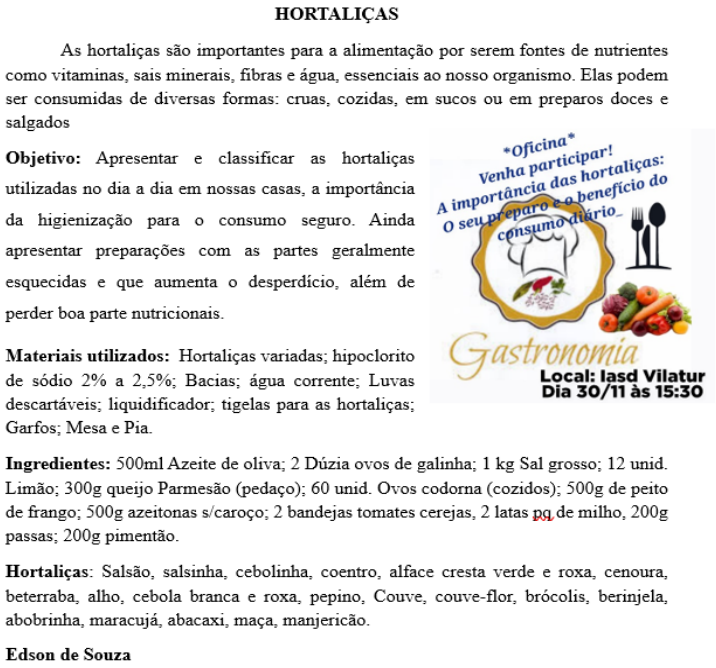
In this way, scientific knowledge combined with practice has proven to be capable of forming more aware and committed professionals. Practical learning strengthened the understanding of the handler's responsibility, showing that small gestures, when correctly executed, can have a great impact on the prevention of foodborne diseases.

3.2.1.1 Multiplier potential of participants in their communities

For this purpose, through an invitation to a workshop according to figure 4, a lecture was held on the importance of hygiene for safe consumption. Preparations using generally forgotten parts of food were also presented, which contribute to increased waste and loss of nutritional value.

Figure 4

Workshop on hygiene and consumption of vegetables



HORTALIÇAS

As hortaliças são importantes para a alimentação por serem fontes de nutrientes como vitaminas, sais minerais, fibras e água, essenciais ao nosso organismo. Elas podem ser consumidas de diversas formas: cruas, cozidas, em sucos ou em preparos doces e salgados

Objetivo: Apresentar e classificar as hortaliças utilizadas no dia a dia em nossas casas, a importância da higienização para o consumo seguro. Ainda apresentar preparações com as partes geralmente esquecidas e que aumenta o desperdício, além de perder boa parte nutricionais.

Materiais utilizados: Hortaliças variadas; hipoclorito de sódio 2% a 2,5%; Bacias; água corrente; Luvas descartáveis; liquidificador; tigelas para as hortaliças; Garfos; Mesa e Pia.

Ingredientes: 500ml Azeite de oliva; 2 Dúzia ovos de galinha; 1 kg Sal grosso; 12 unid. Limão; 300g queijo Parmesão (pedaço); 60 unid. Ovos codorna (cozidos); 500g de peito de frango; 500g azeitonas s/caroço; 2 bandejas tomates cerejas, 2 latas pq de milho, 200g passas; 200g pimentão.

Hortaliças: Salsão, salsinha, cebolinha, coentro, alface cresta verde e roxa, cenoura, beterraba, alho, cebola branca e roxa, pepino, Couve, couve-flor, brócolis, berinjela, abobrinha, maracujá, abacaxi, maça, manjericão.

Edson de Souza

Source: Research Data (2025)

In the workshop held in the neighborhood of Vilatur, municipality of Saquarema-RJ, participants were presented with the proper hygiene procedures and essential care in the handling of food, from pre-preparation to consumption, considering that it would be ingested in natura. Figure 5 shows the main stages of the process, including the initial washing, immersion in sanitizing solution, the recommended exposure time, rinsing and the final presentation of the ready-to-eat vegetables. During the practice, doubts were clarified as to the most suitable chemicals and the ideal period of action. Common practices were also discussed, such as the use of lemon or vinegar as substitutes, emphasizing that these methods do not have the same effectiveness.

Figure 5

Stages of cleaning and preparation of vegetables presented

Source: Research Data (2025)

The realization of this practical activity, taking the knowledge acquired in the course to the relatives of one of the participants, enabled the participants to understand, in an applied way, the importance of the correct hygiene of vegetables for food safety. In addition to reinforcing the knowledge presented, the workshop favored the active involvement of the group, encouraging the adoption of good handling practices and the multiplication of these guidelines in their different social and professional contexts.

3.2.1.2 Vegetables and their relevance to gastronomy education

The presence of vegetables in everyday food has gained increasing prominence, not only for their nutritional value, but also for the role they play in health-related educational practices. The direct contact of students with these foods during practical classes proved to be essential to stimulate awareness about the correct hygiene and appreciation of this food group.

In gastronomy, vegetables take on different forms of consumption: they can be served raw, cooked, cold or hot, composing salads, starters or main courses. According to Araújo (2011), the term refers to garden products, including leaves, roots, bulbs, stems, flowers, seeds and fruits. In common language, there is a distinction between vegetables and legumes – a popular classification that does not always correspond to the botanical division.

According to the Food Guide for the Brazilian Population (BRASIL, MS, 2014), these foods are classified as regulators and recommended in three to five daily servings, given their contribution to the prevention of chronic diseases. In addition, the same document points out that the form of preparation can vary widely: sautéed, roasted, breaded, in soups or purees, which expands its possibilities of insertion in the daily menu.

During the research, participants were asked to organize the most common vegetables into classification categories. This activity reinforced concepts and demystified popular beliefs. *"I swore that cucumber was a vegetable, but I learned that it is a fruit. Today I teach this even to my friends"* (P1, 2025).

When constructing Table 2, which represents a list of some of the most commonly used vegetable species in the course, and which are usually those that are also in the homes of many available students, figure 4 represented through hygiene served as an activity for classification. According to Ornellas (2001, 8th ed., p.170 and 171), we have:

Table 2

Vegetable Classes

VEGETABLES				
Roots	Stem		Leaves	Fruits
	Tubers	Bulbs		
Sweet potato	Yam	Onion	Bertalha	Pumpkin; Chayote
Carrot			Spinach	Pod; Bell pepper
Manioc			Cabbage	Tomato;
				Cucumber
				Okra; Courgette

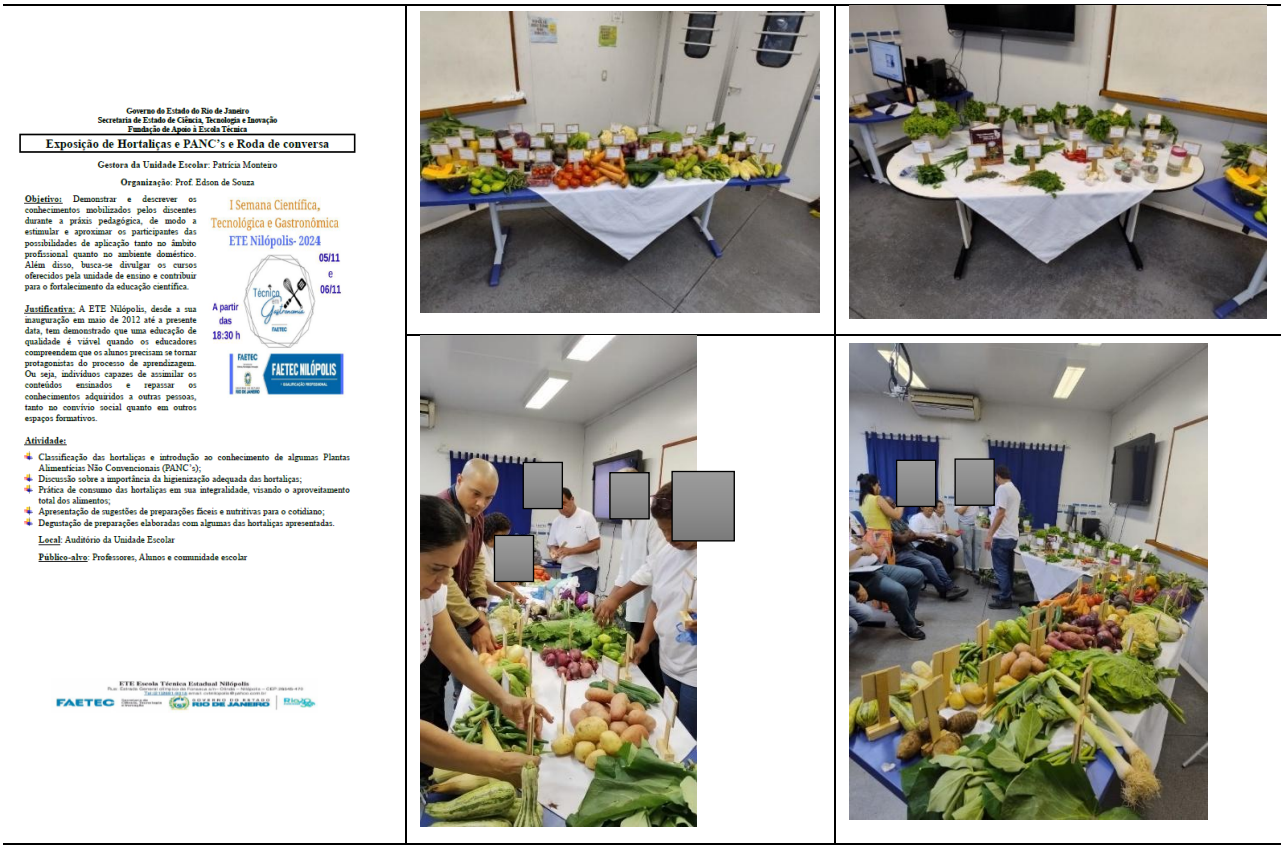
Source: Ornellas (2001)

Figure 4 presents the activity whose educational process was developed around the classification of vegetables, showed gains in the conceptual domain, but also in the change in perception about the importance of these foods in everyday life. The practice contributed

to bringing participants closer to scientific knowledge, while reinforcing values linked to ecological efficiency and ensuring access to adequate food.

Figure 6

Vegetable exposure for classification



Source: Research Data (2025)

In summary, the classification activity seen in table 3 and exhibition was able to broaden the understanding of diversity, nutritional value and ways of preparing vegetables. In addition, it enabled students to share the knowledge acquired in other training spaces, acting as multipliers and strengthening food education in the school and professional context.

Table 3

Classification activity of the I Science Week

VEGETABLES								
Roots	Tubers	Bulbs	Stems	Leaves	Flowers	Seeds	Fruits	Mushrooms

Sweet potato Carrot Beetroot	Potato Yam Yams.	Onion Garlic Leek.	Asparagus Celery Chard	Cabbage Lettuce Spina free Parsley Tell her.	Articho-fra Broccoli Cauliflower.	Pea Pod Bean Green corn.	Pumpkin Chayote Bell pepper Tomato Cucumber.	Champignon; Funji Shiitake;

Source: Research Data (2025)

Thus, experience confirms that practical pedagogical activities favor healthier eating habits, strengthen food security and train conscious professionals for sustainable action. In this context, the practice with aromatic herbs (Figure 7) integrated theory and practice by stimulating the recognition of the species most used in cooking, highlighting their characteristics, applications and benefits for health and professional gastronomy.

Figure 7

Aromatic herbs used in gastronomy

Source: Research Data (2025)

In this way, the experience contributed to strengthening the participants' learning, expanding their perception of the role of herbs in the sensory enhancement of food and in promoting health. In addition, the importance of such pedagogical practices as a teaching strategy was evidenced, favoring the construction of scientific knowledge combined with culinary knowledge and stimulating the adoption of more conscious and sustainable eating habits.

3.2.1.3 Mathematics: Factors that help in the quantities of food

The concern in the face of the arithmetic difficulties observed motivated the application of activities involving fundamental concepts of fractional numbers. It is clear that mathematics, like other sciences, must be constructed in a contextualized way. The mathematical knowledge we have today is the result of historical evolution and the motivation of human cultures over time.

Motivating the teaching of a science developed in historical contexts different from the current one is a challenge. School mathematics, when it is not contextualized, becomes a distant and unattractive knowledge for students.

According to D'Ambrósio (2005, p. 31), this distance occurs because the mathematics taught today still bears marks of a past, remaining tied to problems from other times. In this way, it ends up being perceived as a "dead" science, little related to the needs and urgencies of the present.

Recognizing this challenge implies understanding that teaching must accompany social and cultural transformations. Therefore, the research sought to bring mathematical concepts closer to the students' reality, teaching reason in a playful and practical way. For this, accessible resources were used, such as food, scales and calculators, enabling students to assimilate the concepts in a contextualized way, aimed at defining quantities and planning purchases for culinary preparations.

In the art of cooking, several mathematical concepts could be applied in a concrete way. The weighing and proportion in the preparation of fresh pasta exemplify this practice. *"I've never used scales at home, now I don't make a recipe without weighing the ingredients"* (P2, 2025).

These concepts, central to mathematics, have strong applicability in everyday situations, such as cooking, where they are essential for the adjustment of portions, the equivalence of measurements and the nutritional balance of foods (D'AMBROSIO, 2001;

LORENZATO, 2006). In the school context, its interdisciplinary approach enables the student to understand the social and practical function of this knowledge, expanding logical reasoning and critical autonomy.

Figure 8

Preparation of fresh pasta with vegetable

			
A - WEIGHING	B - MIXING	C - BEATING	D – FINALIZATION

Source: Research Data (2025)

In this sense, the preparation of fresh pasta is an excellent example of how mathematics applies directly to culinary practice. A classic example, commonly adopted in gastronomic teaching environments, is the ratio of one unit of whole chicken egg for every 100 grams of wheat flour. According to Teichmann (2009), fresh pasta tends to double in volume during preparation, and it is possible to obtain up to 200 grams of ready-made pasta using only one egg, as long as the ideal proportion of water for cooking is also respected — recommended at the ratio of 1 liter of water for every 100 grams of pasta.

To ensure the standardization and quality of the fresh pasta, the process began with the weighing of the inputs, a fundamental step to ensure the correct proportion between flour, eggs and other ingredients. In this specific preparation, cooked and processed spinach was incorporated, aiming at the nutritional enrichment of the pasta with fiber, iron and B vitamins. The inclusion of the vegetable not only enhances the functional aspect of the recipe, but also contributes to the characteristic green color of the product.

In addition, the correct application of these mathematical relationships can contribute significantly to the reduction of food waste, by favoring the conscious use of inputs and the full use of ingredients (SILVA; COAST; ALMEIDA, 2017).

3.2.1.3.1 Applications of the correction factor in food planning

Knowing how much food to buy and how much it can yield requires simple arithmetic calculations, but they involve rational numbers, often perceived as obstacles. One of the main concepts used was the Correction Factor (FC) or Edible Part Index (CPI), which relates the gross weight (CP) to the net weight (PL) of food, considering inevitable losses such as peels, seeds, wilted leaves and shavings (Ornellas, 2001).

The Correction Factor represents a quantitative relationship that allows estimating the losses occurred in the pre-preparation of food, such as peels, seeds and other inedible parts, and is indispensable for calculating the real yield of the inputs used in culinary production (Ornellas, 2001).

The formula used is: FC = PB ÷ PL, with useful derivatives:

- **PB = FC × PL**
- **PL = PB ÷ FC**

These relationships can be applied to any amount of food, making culinary planning more accurate and cost-effective. The main difficulties perceived in culinary preparations are not in the execution of the recipes, but in defining the exact quantities to be produced, either to avoid waste or to ensure that all diners are properly served.

According to Teichmann (2009, p. 348), "an important item, when listing the amount of food needed to prepare a dish, a meal, a buffet, etc., is the loss that these foods will suffer when being handled".

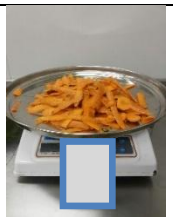
The most significant losses in the gastronomic field occur, in general, during the handling of vegetables, meats and other foods, largely due to the disregard of the yield of edible fractions that can be used in preparations. The correction factor, according to Teichmann (2009), refers to the portion of the food that will be presented clean. It is important to note that the preparation results in the amount initially planned, while the cost is calculated on the quantity purchased, and not on the portion actually consumed.

The practical activity in figure 9 consisted of determining the CF of carrots, relating 2090g to CP and 1480g to PL 1480 g. Initially, with the recording of the gross weight of the food (Figure 9A), in the case of the peels resulting from the cleaning (Figure 9B) and, finally, the clean weight of the portion effectively usable (Figure 9C). From these data, the formula FC = CP ÷ PL was applied, making it possible to calculate the real yield of the input and

evidencing the importance of this index for purchases, costs and the standard of culinary preparations.

Figure 9

Correction factor - Carrot

 A – Gross Weight	 B - Shells	 C -Clean Weight	In the experiment with carrots, it was found that the correction factor (HR) resulted from the ratio between gross weight and net weight after discarding the peels. The calculation showed a significant reduction in the food available for use, highlighting the relevance of CF in yield control and culinary planning.

Source: Research Data (2025)

When comparing the results obtained with the reference values in the literature, it was found that the carrot correction factor found in the experiment (1.41) was higher than that reported by Teichmann (2009), which presents 1.17 as the average index. The analysis of the inputs revealed discrepancies between theory and practice, indicating that factors such as the peeling technique, quality of the vegetable and skill of the handler can directly impact the real yield of the food.

The practical activity with vegetables allowed calculating correction factors and comparing the results with the literature. The analysis of the data reinforced the importance of this index in purchase planning and cost control. *"When I saw that carrots lose almost 30% when peeling, I started to plan the purchase better"* (P2, 2025).

In the process of constructing scientific knowledge, the ratio between two quantities was worked out, obtaining a fundamental index for analysis. This index, applied to the per capita estimate of food, proved to be essential for culinary preparations, being essential both for the purchase plan and for the definition of the appropriate quantities in each recipe. Such principles were applied in a contextualized way at the Vegetable Exhibition, whose activities integrated knowledge of mathematics and nutrition with the aim of promoting healthy and sustainable eating practices (COUTINHO; SILVA, 2020).

In order to evaluate the real yield of food in relation to the indices described in the literature, the CF of different vegetables was determined. The analysis included cassava, pumpkin and bertalha, allowing to verify the practical applicability of this parameter in the

context of experimental research. The results obtained by the research subjects were organized and compared with the reference values established by Teichmann (2009), including the minimum and maximum recommended ranges for some foods, as shown in Figure 10.

Figure 10

Correction Factor – Vegetables

Cassava peels, (B) Pumpkin peels and seeds, (C) Bertalha stalks

Food	Gross weight	Weight of Shells	Clean Weight	FC
MANIOC				2120g ÷ 1470g = 1.44 Teichmann (2009) 1,39 – 1,60
PUMPKIN				1890g ÷ 1630g = 1.16 Teichmann (2009) 1,15 – 1,64
BERTALHA				1000g ÷ 640g = 1.56 Teichmann (2009) 1,78

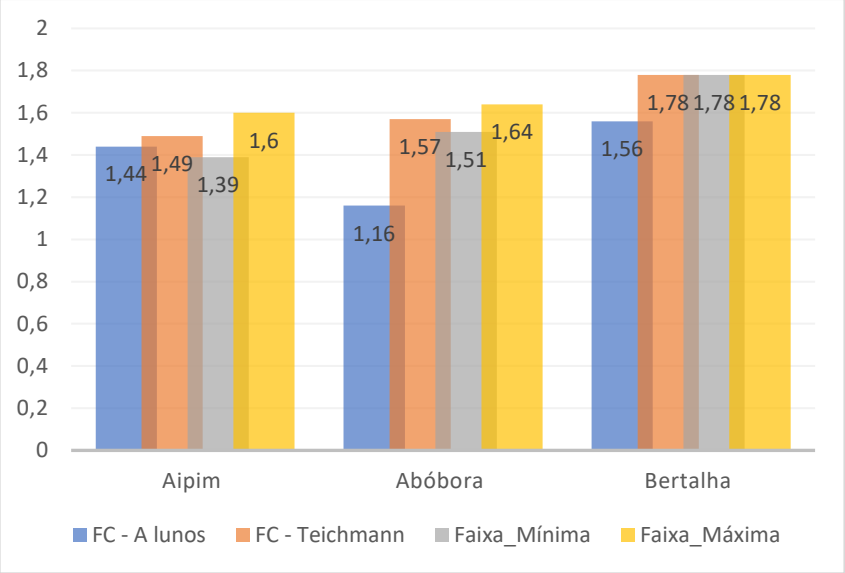
Source: Research Data (2025)

These data were presented to the students so that they could understand how to calculate the physical loss of food — peels, stalks, seeds — and, consequently, accurately define the actual amounts to be used in the recipes. For students of the professional course in gastronomy, this knowledge is essential to act efficiently from the purchasing phase to the organization of quantities during preparation.

Thus, mathematical reasoning, in this context, ceases to be an abstract concept to consolidate itself as an indispensable tool for culinary practice, grounding the comparative study of correction factors, as shown in Figure 11.

Figure 11

Comparison between HR Correction Factor: Research x Literature



Source: Research Data (2025)

The analysis of the data in Figure 3 reveals important differences between the correction factors calculated by the students and the values presented in the literature. While the result of cassava remained within the reference range, pumpkin presented a much lower index, suggesting greater loss during manipulation or variation in the quality of the raw material. In bertalha, a value close to, but lower than the reference, was observed, indicating that practical preparation can impact the final yield.

The understanding of the calculations of the correction factors led to the understanding of the yields as a percentage of clean ready-to-use foods. The conditions are predictable through the conditions of handling and acquisition of good quality product. Table 5 corresponds to the ratio of each 1000g by FC, resulting in the parts that were effectively used.

Table 5

Income by FC

Food	FC	Yield %	FC Teichmann (2009)	Yield %
CARROT	1,41	70,9	1,17	85,4
MANIOC	1,44	69,4	1,39 – 1,60	62,5 – 71,9
PUMPKIN	1,16	86,2	1,15 – 1,64	60,9 – 86,9
BERTALHA	1,56	64,1	1,78	56,1

Source: Research Data (2025)

The income obtained in the research showed differences in relation to Teichmann (2009). Carrots had a lower value (70.9% against 85.4%), while cassava (69.4%) was within the reference range (62.5%–71.9%). Pumpkin achieved a high yield (86.2%), close to the upper limit described (86.9%), and bertalha presented a higher rate than that cited by Teichmann (64.1% against 56.1%).

The collected data indicate that the correction factors are directly influenced by both the handling conditions and the quality of the raw material, which reinforces the importance of experimental practice in the professional training course. This approach contributes to the critical formation of students and favors a more effective teaching focused on food planning.

4 FINAL CONSIDERATIONS

The research showed that training in Healthy and Sustainable Gastronomy, guided by interdisciplinary principles and aligned with health quality and sustainability standards, produced relevant effects in the technical, social and environmental spheres. The integration between theoretical foundations and practical experiences enabled participants to assimilate knowledge about hygiene, full use of inputs, calculation of the correction factor and conscious management of resources, with a focus on reducing waste and promoting collective health.

The results showed the strengthening of critical awareness, expanding the students' perception of their role as agents of change in family, community and professional contexts. The incorporation of scientific concepts from the areas of biology, mathematics and eco-gastronomy was enhanced by contextualized didactic methodologies, which valued both empirical knowledge and concrete application in real situations.

The valorization of pedagogical practice was also highlighted, stimulating autonomy and the ability to solve daily challenges. This experience favored not only technical

improvement, but also engagement in ethical, environmental and social issues, in line with global sustainable development goals, especially those related to food security and quality education.

Despite the advances, some limitations should be acknowledged: the study took place in a single local context, which restricts the generalization of the results, and the follow-up period was short, making it difficult to analyze lasting impacts. It is recommended that future research adopt longitudinal methodologies and cover more diverse audiences and territories, expanding the understanding of the effects of this training modality.

In summary, it is concluded that professional qualification initiatives based on significant educational practices can transform local realities. The course analyzed proved to be effective in consolidating a gastronomy aligned with health, dignified food access and socio-environmental responsibility, forming critical, engaged and prepared subjects to act consciously in their communities.

REFERENCES

Araújo, W. M. C., Montebello, N. P., Botelho, R. B. A., & Borgo, L. A. (Eds.). (2011). Alquimia dos alimentos (2nd rev. and exp. ed.). Brasília, Brazil: Senac-DF.

Brasil. Agência Nacional de Vigilância Sanitária. (2004, September 16). Resolução da Diretoria Colegiada – RDC nº 216, de 15 de setembro de 2004. Dispõe sobre o regulamento técnico de boas práticas para serviços de alimentação. Diário Oficial da União, seção 1. Retrieved June 30, 2025, from https://bvsms.saude.gov.br/bvs/saudelegis/anvisa/2004/rdc0216_15_09_2004.html

Brasil. Ministério da Educação. (2025). Programa Nacional de Acesso ao Ensino Técnico e Emprego (PRONATEC). Retrieved June 30, 2025, from https://www.gov.br/mec/pt-br/pronatec

Coutinho, C. C., & Silva, A. P. (2020). Educação alimentar e ecogastronomia: Diálogos possíveis. Revista Ciência em Extensão, 16(2), 101–112.

D'Ambrosio, U. (2001). Educação matemática: Da teoria à prática (3rd reprint). Campinas, Brazil: Autores Associados.

Forsythe, S. J. (2002). Microbiologia da segurança alimentar. Porto Alegre, Brazil: Artmed.

Lorenzato, S. (2006). O saber e o fazer em educação matemática. Campinas, Brazil: Autores Associados.

Ornellas, L. H. (2001). Técnica dietética: Seleção e preparo de alimentos (8th ed., S. Kajishima, Ed.). São Paulo, Brazil: Atheneu.

Silva Junior, E. A. (2008). Manual de controle higiênico-sanitário em alimentos (6th rev. and exp. ed.). São Paulo, Brazil: Varela.

Silva, M. C., Costa, D. R., & Almeida, M. T. (2017). Aproveitamento integral dos alimentos: Uma alternativa contra o desperdício. Revista Brasileira de Educação Ambiental, 12(1), 95–106.

Teichmann, I. M. (2009). Tecnologia culinária (2nd ed.). Caxias do Sul, Brazil: EDUCS.