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Teaching culinary skills in Nutrition courses: analyzing the perceptions of experts

Ensino de habilidades culinárias em cursos de Nutrição: analisando as percepções de especialistas

Abstract

The study aims to build a consensus among experts on the teaching of culinary skills – CS, in undergraduate nutrition courses in Brazil. A cross-sectional study using the Delphi technique and quantitative and qualitative analysis was based on the perceptions of full-time professors of Culinary Nutrition from 47 public universities in Brazil. A semi-structured questionnaire, with 24 items and freely expressions of participants perceptions on the teaching of cooking skills, were administered in two rounds. Consensus was achieved when the item met three of four criteria: 1. At least 51% of respondents scored 3 - 4 points; 2. Mean results between 3.00 and 4.00 points; 3. A standard deviation <1.5; 4. An interquartile range ≤ 1.0 . The analysis of expert's perception allowed the identification of facilitator items for teaching CS, such as: liking to cook; familiarity with food preparation; participation in moments of intergenerational transmission; technical support in practical classes. The main barriers are: aversion to some foods; restricted time for preparation; purchase of food with better costs/benefits; absence of critical and reflective thinking; and absence of technical support for food purchase. There was consensus on the influence of environment and food systems; the size and layout of laboratories; availability of basic equipment for practical classes; and the pedagogical methodology in teaching cooking skills. Two thematic categories emerged as consensus: culinary skills as a tool for sustainability and individual or collective autonomy in health; and the influence of infrastructure and pedagogical protocols in the teaching of cooking skills. These results can contribute toward the curriculum organization of undergraduate courses.

Keywords: Education. Curriculum. Cooking. Dietary Technique. Infrastructure.

Resumo

O estudo tem como objetivo construir um consenso entre especialistas sobre o ensino de habilidades culinárias – HC nos cursos de graduação em nutrição no Brasil. O estudo transversal utilizando a técnica Delphi e análise quantitativa e qualitativa foi baseado nas percepções de professores de Técnica Dietética, oriundos de 47 universidades públicas do Brasil. Um questionário semiestruturado, com 24 itens e expressões livres das percepções dos participantes sobre o ensino de habilidades culinárias, foi aplicado em duas rodadas. O consenso foi alcançado quando o item atendeu a três dos quatro critérios: 1. Pelo menos 51% dos entrevistados pontuaram de 3 a 4 pontos; 2. Resultados médios entre 3,00 e 4,00 pontos; 3. Desvio padrão <1,5; 4. Intervalo interquartil $\leq 1,0$. A análise da percepção dos especialistas permitiu a identificação de itens facilitadores para o ensino de HC, tais como: gostar de cozinhar;

familiaridade com o preparo de alimentos; participação em momentos de transmissão intergeracional; apoio técnico nas aulas práticas; As principais barreiras são: aversão a alguns produtos alimentícios; tempo restrito para preparação; compra de alimentos com melhores custos/benefícios; ausência de pensamento crítico e reflexivo; e ausência de suporte técnico para aquisição de alimentos. Houve consenso sobre a influência do ambiente e dos sistemas alimentares; o tamanho e o leiaute dos laboratórios; disponibilidade de equipamentos básicos para as aulas práticas; e método pedagógico no ensino de habilidades culinárias. Emergiram como consenso duas categorias temáticas: habilidades culinárias como ferramenta para a sustentabilidade e autonomia individual e coletiva em saúde; e a influência da infraestrutura e dos protocolos pedagógicos no ensino de habilidades culinárias. Esses resultados podem contribuir para a organização curricular dos cursos de graduação.

Palavras-chave: Educação. Currículo. Culinária. Técnica Dietética. Infraestrutura.

INTRODUCTION

The changes generated by the four industrial revolutions, with commercial interests that influence public decisions, have been changing the global population's lifestyle, including reducing the time dedicated to the preparation and consumption of meals.^{1,2}

In Brazil, the Household Budget Surveys³⁻⁵ conducted in 2002-2003, 2008-2009 and 2017-2018 indicate that:

[...] natural or minimally processed foods and processed culinary ingredients are being replaced by processed foods and, mainly, by ultra-processed foods [...] between the 2002-2003 and 2017-2018 POF, the average annual per capita quantity of rice purchased in Brazilian households fell by 37%, ranging from 31.58kg to 19.76 kg in the period. Average per capita purchases of beans, in turn, fell by 52% in the same period, ranging from 12.39 kg in 2002-2003 to 5.91kg in the 2017-2018 POF.³⁻⁵

Furthermore, processed and ultra-processed foods increased their contribution to the total calories consumed by families, in direct proportion to the increase in income.

In the case of processed foods, the increase was from 8.4% in the first income quintile to 11.1% in the last, and in the case of ultra-processed foods, from 12.5% to 24.7%. Among the products that showed an increase in the average per capita quantities purchased between the periods in which the POFs were carried out, prepared foods and industrial mixes stand out (in the order of 56% increase) and 17% for non-alcoholic beverages, generally sweetened.³⁻⁵

For several decades, capitalist mode of food production and advertising strategies, associated with the practicality of consuming food products from industries and food delivery networks, have led to nutritional imbalance in human food consumption.⁶⁻⁸

When analyzing the stability of changes in eating habits, which require external conditions that facilitate internal motivations, a Brazilian study indicated culinary incompetence and a deficiency of dietetics education and training as the complicating factors for the preparation of meals; thus, they contribute to a lower intake of fresh foods and to an increase in the frequency of ready-to-eat foods.⁹

Previous studies^{1,10-12} showed the need to understand how registered dietitian nutritionists (RDN) perceive the act of cooking; in this context, teaching culinary skills (CS) is relevant for dietary competence.

A scoping review study,¹³ which assessed the influence of food and nutrition education, including CS, on individuals' health behavior, stated that RDN have more theoretical knowledge about nutrition-related health than other professionals and are better qualified to teach CS. However, it also stated that these professionals have less practical experience to ensure that the teaching of CS translates into effective behavioral changes when compared to gastronomists. The authors concluded that the transmission of theoretical knowledge is not enough for teaching CS; students should be involved in practical activities with food, planning of menus, and culinary preparation.

This study aims to build a consensus on teaching CS as part of a professional competence for a transformative action that involves the training of RDN, based on the perception of experts. To this end, we identified the facilitating elements and barriers to teaching CS in undergraduate courses and assessed the various thematic categories emerging from participants' views.

The analysis of the results of the consensus study on CS teaching among experts in the field aims to stimulate discussions and debates, by revealing issues that can guide the curricular improvement of undergraduate Nutrition courses.

METHOD

Experts panel

This is a cross-sectional study with a non-random sample comprising professors of Culinary Nutrition (CN) or other Equivalent Curricular Units (ECU) from public universities in Brazil.

Active Nutrition undergraduate courses were identified using the e-MEC^a system. The inclusion criteria were courses that started before 2015, so they would have at least one group of students who graduated, and did not have pending issues recorded in the e-MEC system. The exclusion criteria were being a non-permanent professor, and distance learning courses.

Delphi technique

The Delphi technique is an appropriate tool for studying perceptions because it allows systematizing data and identifying converging and diverging perceptions from opposing perspectives. The aim is to associate perceptions with a forecast (conventional Delphi), construct consensus (normative Delphi), or identify divergent opinions that could create alternatives and improve policies (policy Delphi).^{14,15}

After a history of multiple applications, the Delphi technique is currently applied in more than 20 fields of knowledge, such as Social Sciences, Public Health, Management, and Education. Thus, the use of this methodology by national and international educational studies indicates that it can contribute to the elaboration and reform of curricula, defining competencies, constructing and improving courses, and perceptions of professionals.¹⁴⁻²²

This is a cross-sectional study, with a focus on the professor's perception, collected using the Delphi technique¹⁴⁻²² and a four-point Likert scale^{23,24} (strongly agree, agree, disagree, and strongly disagree). The experts in the field responded to a semi-structured questionnaire with 24 positive and negative items randomly alternated, probe items, one multiple-choice question, and two open-ended questions. There were points where the respondents freely expressed their perceptions; questionnaire administration was completed in two rounds.^{14,22-25} The questionnaire was hosted on the Google Forms platform and the participants were contacted by email.

Statistical analysis and consensus definition

Quantitative data were processed in R Core Team statistical program,²⁶ and the normality of data distribution was previously tested using the QQ plot chart (Quantile-Quantile Plots) and the Shapiro-Wilk normality test.

Consensus was built considering items that met at least three of the following four criteria:^{14-16,18,20,22}

- at least 51% of respondents with a score of 3–4,

^a e-MEC - Brazilian Ministry of Education data system.

- mean score ≥ 3.00 ,
- standard deviation < 1.5 , and
- interquartile range ≤ 1.0 .

The scale was pre-tested with three researchers from private universities with relevant subject-matter expertise, who analyzed the scale for phraseology and clarity.²⁷ Cronbach's $\alpha > 0.70$ was considered as a satisfactory level of internal consistency.²⁸

The split-half method was used to estimate reliability with the Spearman-Brown coefficient being calculated, considering the total score of each individual in the first half of the test and total score in the second half of the test. An $r = 0.80$ was considered as a satisfactory level.^{24,28-31}

Qualitative analysis

Considering CS as a complex and interdisciplinary phenomenon that receives contributions from different disciplines of knowledge besides the Nutrition science, and even though perceptions are difficult to quantify given the symbolic load they carry, we used an interpretive/comprehensive qualitative approach associated with the thematic analysis technique — present in the content analysis methodology. The thematic analysis used the answers to open questions (context units) in an integrated way with the quantitative results (record units) obtained in the closed questions. Hermeneutics was used with the interpretation of meanings based on understanding the language in its context in time and space: an inference, oscillating between the rigor of objectivity and fecundity of subjectivity, acted as an attempt at interpretation. The thematic analysis was composed of a pre-analysis by “floating” reading, followed by the recurrent reading of the interview transcripts, ending with the interpretation of the meanings extracted in each category.³²

Definitions related to culinary skills

An anthropological perspective⁷⁻⁸ was used as the definition of “culinary” cooking (noun and adjective), i.e., as a cultural food system that considers *a priori* the intertwining of nature and culture. It comes from the Latin *culinarius*, derived from the Latin word *culina*, which means kitchen.

It is the art of cooking in the broadest sense. It is a set of practices involving handling food for nutritional purposes. The definition of cooking was used as a verb, in the sense of the act of cooking.

ETHICAL ASPECTS

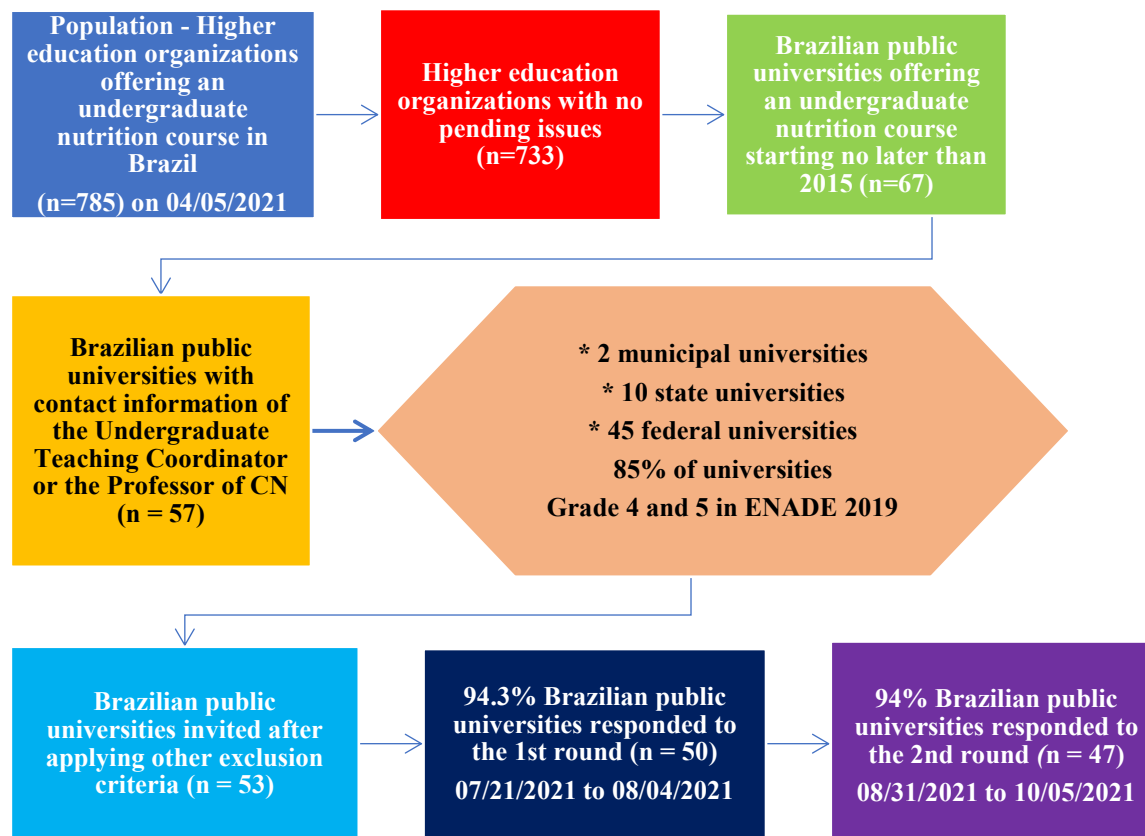
This study was approved by the Ethics Committee of the Federal University of Sao Paulo, under no. CAAE43290721.00000.55.05.

RESULTS

The data collection instrument showed good internal consistency ($\alpha = 0.73$ and 0.72), and reliability coefficients were 0.81 and 0.86 in the first and second rounds, respectively.

The survey of undergraduate courses in Brazil was executed according to Figure 1.

Figure 1. Flowchart of the recruitment process in the national cross-sectional study in Brazil to build consensus on the teaching of culinary skills with 47 public universities; April-October 2021.



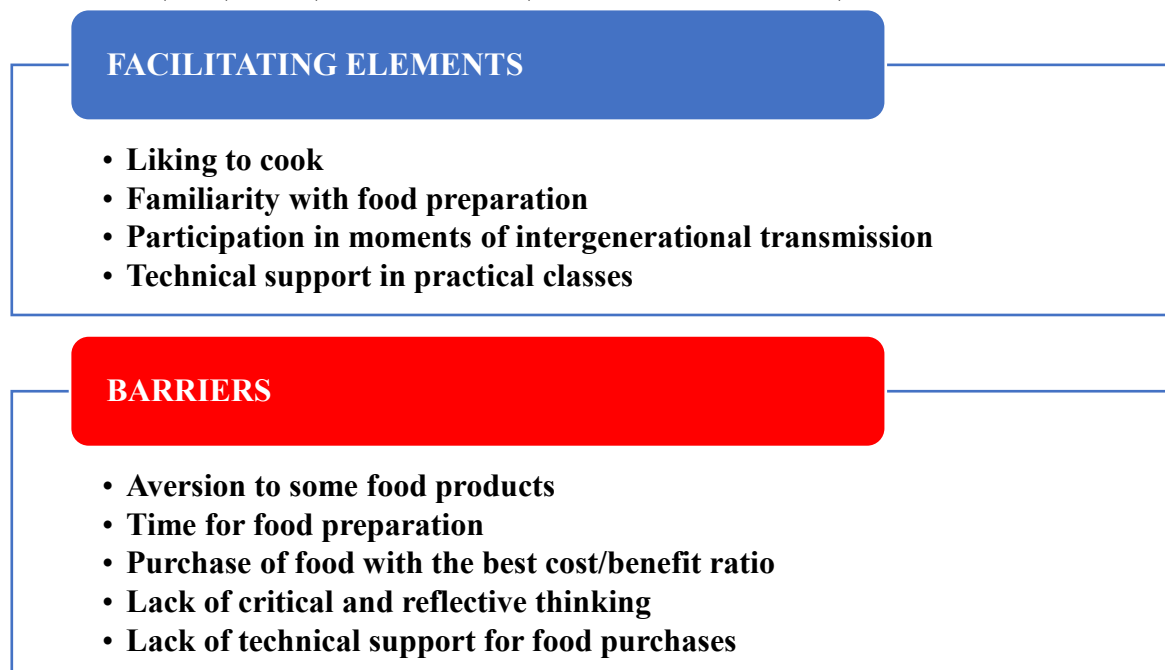
Source: Prepared by the authors.

In the first round, the sample was characterized by 50 respondents (this number represents 94,3% of the universe) and 86% of CN professors trained in Nutrition for at least 10 years. The respondents' mean teaching time was 14 years (SD = 8.33). The mean number of students in the discipline was 37 (minimum of 15 and maximum of 88). On average, 20 students were enrolled in practical classes, ranging from a minimum of 8-40 students per class.

In the second round, the participants received the consolidated results obtained in the first round; thus, each could correct or modify their perception by considering the collective result and justifying their answer in an open space. A theoretical framework in the second round, primarily to help the respondents, followed the item that did not result in consensus in the first round.

An analysis of the respondent's perception allowed to identify the facilitating elements and barriers to the teaching of culinary skills, as shown in Figure 2.

Figure 2. Facilitating elements and barriers to teaching culinary skills in undergraduate Nutrition courses based on the perception of professors from 47 public universities in Brazil; April-October 2021



Source: Prepared by the authors.

Consensus analysis included the division of the quantitative answers regarding CS teaching into three thematic categories: *"The student's knowledge and previous experiences related to culinary skills"* (Category 1, with six items); *"Procedural aspects related to teaching culinary skills"*; and *"Pedagogical political project and teaching infrastructure"* (Categories 2 and 3, with nine items each). Results are presented in Tables 1, 2 and 3.

Table1. Consensus on teaching culinary skills in undergraduate Nutrition courses based on professors' perception in public universities of Brazil; April-October 2021.

Items	Mean		Standard deviation		IQR		Score frequency 3 to 4 (%)	
	1st round	2nd round	1st round	2nd round	1st round	2nd round	1st round	2nd round
<i>Thematic Category 1: Knowledge and previous experience of the student</i>								
1) Enjoying cooking is a facilitator for mastering culinary skills.	3.46	3.51	0.50	0.55	1	1	100.0	97.9
2) Being familiar with food preparation at home is a facilitator for mastering cooking skills.	3.38	3.60	0.53	0.50	1	1	98.0	100
3) Aversion to some food items is a barrier to participation in a practical activity with this food.	2.40*	2.60*	0.64	0.71	1	1	44.0*	63.8
4) Students' lack of prior knowledge about food does not influence teaching of cooking skills.	3.12	2.30*	0.66	0.83	0.75	1	88.0	27.7*
5) Intergenerational transmission of food pre-preparation and preparation is a facilitator for teaching cooking skills.	3.18	3.30	0.52	0.51	0	1	94.0	97.9
6) Lack of critical and reflective thinking in the student makes it difficult to teach cooking skills.	3.16	3.30	0.62	0.51	0.75	1	92.0	97.9

IQR = Q3-Q1: Interquartile range = quartile 3 – quartile 1; *did not meet the criteria. n = 52 and n = 47 in the first and second rounds, respectively.

Source: Prepared by the authors.

Table 2. Consensus on teaching culinary skills in undergraduate Nutrition courses based on professors' perception in public universities of Brazil; April-October 2021.

Items	Mean		Standard deviation		IQR		Score frequency 3 to 4 (%)	
	1st round	2nd round	1st round	2nd round	1st round	2nd round	1st round	2nd round
<i>Thematic Category 2: Procedural aspects related to teaching culinary skills</i>								
1) Environments and food systems influence the learning of culinary skills.	3.58	3.57	0.5	0.54	1	1	100.0	97.9
2) This curriculum unit is responsible for students studying Nutrition to achieve autonomy in cooking skills.	2.90*	2.85*	0.68	0.59	0	0.5	76.0	74.5
3) This is the curriculum unit responsible for students studying Nutrition to develop creativity in cooking skills.	3.10	3.21	0.71	0.62	1	1	84.0	89.4
4) Teaching culinary skills requires efficient use of time to prepare meals.	3.18	3.23	0.44	0.48	0	0.5	98.0	97.9
5) Teaching culinary skills requires learning about buying food with optimal cost/benefit ratio.	3.28	3.43	0.57	0.50	1	1	94.0	100
6) Teaching culinary skills requires the student to learn to adjust the amount of ingredients in recipes.	3.26	3.40	0.53	0.50	1	1	96.0	100
7) Teaching culinary skills does not require students to learn to value food biodiversity when cooking.	3.42	2.64*	0.54	0.79	1	1	98.0	48.9*
8) Teaching culinary skills requires students to learn reuse leftover food.	3.00	3.04	0.70	0.46	0	0	80.0	91.5
9) Teaching culinary skills requires students to learn to cook without using ultra-processed foods.	2.68*	2.87*	0.68	0.61	1	0.5	64.0	74.5

IQR = Q3-Q1: Interquartile range = quartile 3 – quartile 1; *did not meet the criteria n = 52 and n = 47 in the first and second rounds, respectively.

Source: Prepared by the authors.

Table 3 Consensus on teaching culinary skills in undergraduate Nutrition courses based on professors' perception in public universities of Brazil; April-October 2021.

Items	Mean		Standard deviation		IQR		Score frequency 3 to 4 (%)	
	1st round	2nd round	1st round	2nd round	1st round	2nd round	1st round	2nd round
<i>Thematic Category 3: Pedagogical political project and teaching infrastructure</i>								
1) Size of the curriculum unit's laboratory does not affect the teaching of cooking skills.	3.04	3.04	0.97	0.93	1	2.00*	76.0	68.1
2) Laboratory layout does not affect the teaching of culinary skills.	3.30	3.06	0.76	0.84	1	1	86.0	76.6
3) A lack of equipment in the laboratory of the curriculum unit does not influence the teaching of cooking skills.	3.40	2.79*	0.61	0.93	1	1	94.0	66.0
4) Technical support is essential for teaching culinary skills in practical classes.	3.46	3.57	0.61	0.50	1	1	94.0	100.0
5) The curriculum unit allows professors to consider the inseparability of the interface of teaching-research-extension when teaching cooking skills.	3.22	3.40	0.55	0.58	1	1	94.0	95.7
6) A lack of technical support for food purchases is a barrier to teaching cooking skills in practical classes.	3.24	3.47	0.80	0.55	1	1	82.0	97.9
7) Teaching culinary skills requires the use of active methodologies to achieve the competence of transforming action.	3.30	3.30	0.61	0.51	1	1	92.0	97.9
8) Insufficient financial resources for food purchase compromises the teaching of cooking skills in practical classes.	3.34	3.62	0.75	0.53	1	1	92.0	97.9
9) A mastery of culinary skills by culinary Nutrition professors is not essential for teaching.	3.40	2.74*	0.70	0.82	1	1	92.0	55.3

IQR = Q3-Q1: Interquartile range = quartile 3 – quartile 1; n = 52 and n = 47 in the first and second rounds, respectively* did not meet the criteria.

Source: Prepared by the authors.

Two items did not meet the criteria for inclusion in the consensus: “Students’ lack of prior knowledge about food does not influence the teaching of CS” and “The teaching of CS does not require the student to learn to value food biodiversity when cooking.”

The various analysis themes emerging from participants’ views were organized as shown in the discussion.

DISCUSSION

Brazilian public higher education institutions are constantly challenged to offer training processes that promote engagement and social well-being in rapidly changing societies; on the other hand, they face restrictions in the financing policies for academic activities, especially due to their dependence on the state.³³

Scientific evidence that shows student empowerment in the teaching-learning process and access to data and information through the Internet require the use of active methodologies and conceptual approaches that build collaborative relationships that reaffirm academic practices for democratic citizenship. Therefore, it is necessary to recognize university as a place to prepare subjects that advocate active participation in society and exercise their citizenship.³⁴ Thus, it is essential to include theoretical-practical educational approaches from the perspective of strengthening Food Security and Sovereignty (FSS) and ensuring the value of the human right to adequate food (as a cross-curricular theme of pedagogical political projects aiming to contribute toward the training of graduates with a critical and humanist profile in dietary care.³⁵

In the case of teaching CN or other ECUs, some authors have provided reflections on the role of Dietetics based exclusively on chemistry as a form of scientific theory — which explains, for example, distortions such as dietary advice that emphasizes the use of supplements to the detriment of the indication of basic foods that require culinary skills for healthy consumption. Dietary recommendations focused exclusively on nutrients ignore the environmental, cultural, socioeconomic, and political values related to commensality.^{11,36}

The analysis of studies and regulations on the subject demonstrated the need to identify the perceptions of the academia to assess the influence of teaching CS in dietary competence while training RDN.

Several authors corroborated the facilitating elements and barriers to teaching CS, given their individual or associated relevance.³⁷⁻⁴³ An integrative review study that raised several perceptions about cooking in the home environment⁸ has highlighted the importance of developing contact with individuals who cook to stimulate or strengthen CS and value the social aspect of connecting with others by expressing care.

It is widely acknowledged that even though a food is initially perceived as “neutral,” or even as a preference, it can later be considered unpleasant or dangerous. This change can happen when ingestion is followed by some sort of malaise, which usually occurs after a single negative experience, within a gap of a few hours between exposure (ingestion) and outcome (malaise). These aversions can occur even when the person “knows” that the food consumed did not cause the outcome.⁴⁴ Sensory perception of food is complex and is loaded (recorded) in a person’s memory for years, which means that pleasure or displeasure with a food is not only related to its taste but also to the complex network of emotions and memories that accumulate over a lifetime.⁴⁵

Consensus built around the “efficient use of time to prepare meals and purchase food with a better cost/benefit ratio” concurs with the available scientific evidence that the perception of culinary behavior can be strongly influenced by the pressure of time and price of foods.^{1,8,41,46}

Thematic categories of discourse analysis and consensus

Category 1: Culinary skills as a tool for promoting sustainability and individual and collective autonomy in health

Category 1 contemplates food consumption from an environmental perspective, wherein planning and preparing meals involves using finite natural resources and may demand excessively from production systems, reducing biodiversity and/or generating excessive greenhouse gas emissions.⁴⁷

Aiming to contribute to sustainability by strengthening regenerative food systems, Culinary Nutrition Teaching (CNT) plays a relevant social role when associated with extension and/or research actions with farmers and the family agroindustry, which also utilizes people’s traditional knowledge — such as the sustainable planting and farming practices of the *quilombola* communities—whenever possible.

In fact, the proposal to use more plant foods — especially those regionally available and culturally accepted — and limiting the use of animal-origin items in practical CN classes indirectly contribute to lesser stress on the food system.^{48,49}

Since the mid-twentieth century, there has been a reduction in the frequency of cooking with basic ingredients, especially in developed countries. Although mastering CS is not the only factor, it is a tool with the greatest potential to modify this behavior.^{6,41} It is important to highlight the current trend with respect to interference and consequent tensions related to the consumption of ultra-processed foods around Nutrition students and professors and RDN, captured by the media, presenting the different views defended by the food and pharmaceutical industry on certain public policies.³⁶ A previous study⁵⁰ states that “Massive investments in advertising forged the notion that cooking was antiquated — a waste of time incompatible with a life style based on speed, productivity, and efficiency.”

Considering the CS category as a tool for promoting individual and collective autonomy in health, the data show that during the first as well as second round, a consensus emerged that CNT “requires that undergraduate Nutrition students learn to adjust the amount of ingredients in the recipes and reuse leftovers, focusing on good food handling practices”, as indicated by some authors.^{39,51,52} Another study⁴⁶ reported that people with less time to cook enthusiastically found that preparing a large amount of the recipe and freezing the surplus for later consumption is an efficient strategy to ensure healthy eating.

Professors perceived that “CNT contributes to the promotion of autonomy and development of creativity in undergraduate Nutrition students by applying their scientific knowledge”. As expected, it is acknowledged that creating new culinary recipes based on available ingredients requires creativity, and promotes autonomy and self-confidence, a perception historically corroborated by several authors.^{8,37,52}

Some studies reported that the main barriers to strengthening culinary skills include cooking under pressure or time constraints, a lack of theoretical and practical culinary knowledge to satisfy different tastes, prejudice and beliefs associated with some preparations, limited access to some foods due to financial reasons, and low availability of certain ingredients in the surroundings. The main facilitators are the ability to plan and organize meal preparation, the desire to save money and consume healthy preparations, and the perception that cooking is pleasant.^{1,41,46}

When examining the significance of cooking, it was found that, particularly for adolescents, learning to cook was important to promote the independence and responsibility of preparing their own meals.³⁸

Some professors participating in this study reported that “autonomy and creativity in CS” must be promoted - in an interdisciplinary manner - not only in multiple curriculum units during the course but also in the undergraduate thesis. Other participants reported that CS must be improved through continuing education after graduation; that is, the responsibility of CN for promoting CS in the graduation of RDN would only be partial, although they agree that this is the typical disciplinary space for studying CS.

According to an integrative review study,⁸ the motivation for CS involves affective, volitional, cognitive, and practical factors. Thus, the teaching of CS must encourage the practice considering the affective components of behavior, such as experimentation and leisure, in addition to cognitive elements such as nutritional and economic outcomes. It is worth emphasizing that the concept of autonomy, which is at the core of the Kantian theory, is expressed not only in rational self-determination but also in moral values that involve social relationships, thus not individualistic and isolated from the surroundings.⁵³

Aiming to identify scientific gaps in the relationship between culinary skills and health, a research study concluded that acquiring culinary skills is a complex task, and it is not recommended to reduce the act of cooking only to the ability to perform technical operational tasks. This is because it causes the error of simplifying the various activities involved in planning, organizing, and preparing a meal across varied historical, cultural, and generational contexts. In addition to technical skills and cognitive knowledge, this author considers that perception, attitudes, beliefs about the act of cooking, and culinary self-confidence influences what and how to cook.⁵⁴

Category 2: Infrastructure and pedagogical methodology as conditioning factors in teaching culinary skills

Some public universities justify the difficulty in promoting autonomy and creativity through CS in CNT by pointing to problems in the political-pedagogical project of the course, such as the disproportionate distribution of workload between the various components of the curriculum and content overload in food chemistry composition to the detriment of culinary practices in its expanded conception.

Some faculty members justified that the practical class in CNT has its own characteristics (use of sharp material, high temperature in the environment, and flame manipulation), and the laboratory structure can influence the quality of teaching and learning. Thus, a reduction in physical space can affect student mobility, thereby increasing the risk of accidents. The absence of free time while organizing various curriculum units during the week could prevent a greater subdivision of classes during practical sessions. Moreover, limited physical space may not be conducive to learning; this may lead to overcrowding, which restricts the dynamics of the class, thus impairing CNT.

An inadequate laboratory layout can also impair the dynamics and orderly flow for safe practical sessions in food production, thereby impacting the quality of CNT. The study of architectural design considerations while planning the space available for food service labs, and the implementation of schedules that avoid obstructing tasks and movement in activities during practical classes facilitate work, optimize time, and effectively organize the progress of experiments in the teaching of CS.⁵⁵

Compliance with the principle of integrality in the teaching of CS requires that the layout be considered in terms of the physical and organizational ergonomics and can also be used for other disciplines, such as those responsible for food service, food control, and good manufacturing practices. The incorporation of

effective practices and systematization of routines contribute toward efficacy in the various activities developed in food service labs, favoring varied teaching methodologies and degrees of complexity in practical classes.⁵⁵

Research participants reported problems arising from the fact that the university's senior administration did not respond to the request for a greater number of technical staff to support the laboratories and did not provide financial resources to purchase food needed for practical classes.

The cost of ingredients is one of the main budget components for practical classes. The adequate dimensioning and qualification of human resources to assist in supervision during the execution of experiments in practical classes guarantees better quality in teaching CS.^{39,48}

The diversity of ingredients is one of the most important aspects in healthy food promotion and stimulating the feeling that cooking is pleasurable. Thus, it contributes to expanding the food repertoire of graduates.

Academia perceived culinary nutrition as “a curricular unit that allows the instructor to adopt teaching and assessment methodologies based on the inseparability of research and extension in the interface of teaching CS,” and which demands the use of “active methodologies to allow students to reach the competence of a transforming act in the world of work.”

Currently, the teaching of CS plays a relevant role in central issues that polarize food quality concerns, such as the indiscriminate use of pesticides versus regenerative food production, or the contribution of agroecological products versus the use of transgenic foods; CNT provides an opportunity to address these and other issues, with clear implications for human health and the environment. From the perspective of teaching based on citizen science, practical activities in CNT must consider the agendas of organizations, movements, and social groups, and can be characterized by a systemic approach between academic knowledge, political reflection, and actions to overcome weaknesses that compromise food and nutrition security.⁴⁸

When the purpose of the active methodology is clearly defined, it allows students to construct their own learning through reflective and critical action and contribute to developing autonomy and creativity.

The use of remote communication technologies to access and communicate with the respondents benefitted this research by allowing for the inclusion of all public universities from the five Brazilian regions, along with a significant response rate (94%) of experienced Nutrition professors, particularly culinary nutrition professors. It also eliminated the potential for one research participant's dominance over the others, primarily due to a lack of interaction among the respondents. Another significant point was the low polarization in responses, with perceptions concentrated on points 3 and 4 of the Likert scale, indicating that a high level of consensus positively impacted the other criteria adopted for building consensus, which showed low variability.

However, a limitation of this study is that the study sample exclusively comprised professors from public universities. In addition, the perception measurement reflects the phenomenon in a given temporal context. An eventual new version of a study with the same purpose, by this research group or other researchers, will certainly require adjustments in phraseology or construction and number of assertions to incorporate the historical evolution of the teaching of Culinary Skills, as well as the course of pedagogical projects.

CONCLUSION

Considering the satisfactory consistency and level of reliability achieved by the data collection instrument, it is possible to affirm that after two trials of research, the 24 elements addressed in the items enabled the formation of consensus on the teaching of CS in undergraduate Nutrition courses.

In this study, the evaluation of the instrument was limited to the analysis of internal consistency and reliability to support data collection; we also understand that complete validation could have given more robustness to the work; this did not aim, however, to investigate this scope, suitable for epidemiological studies. Therefore, future studies may implement new data collections incorporating other psychometric tests to expand the evaluation of the instrument used in this research.

Two thematic categories emerged from the respondents: 1) culinary skills as a tool for promoting sustainability and individual and collective autonomy in health; and 2) infrastructure and pedagogical methodology in teaching CS. The data show that CNT still faces challenges in strengthening CS practices with safe, sustainable, and health-promoting menus.

Despite the evident appreciation of cooking as an emancipatory practice for groups and a way to promote individual autonomy, there was consensus that the cost of ingredients from an agroecological production can compromise the approach to this topic in practical classes. The promotion of autonomy in CS should be addressed by CNT and by other curricular units during the Nutrition course, as an interdisciplinary approach.

The use of CH as an active educational methodology should allow the manifestation of the multidimensional and complex relationships between the individual, society, and food, thus contributing to the promotion of the expanded concept of health among Nutrition students.

In summary, since the domain of contemporary CS is complex and comprises a human component, neither is it exact nor can it be reduced to a limited set of conditioning factors; it is a dynamic action that must be constantly reassessed. This consensus can, expectedly, contribute to CNT in undergraduate courses in Nutrition, expanding the scope of debates and supporting teaching practices for occasional structural changes in curricular units.

Considering that professional training is a social process that involves conjunctural dimensions and institutional relationships, which are often conflicting, CNT must be redefined as a pleasurable experience and as society's identity resistance, revaluing the expertise of communication and interactions. CNT also help reduce the impact of food systems on the environment and promote the health of present and future generations.

Based on this perspective, future studies should investigate the perceptions of students, technicians, graduates, managers, and RDN from health services regarding the teaching of CS, focusing on dietary practices and the various tensions and conflicts concerning CS in the Nutrition field.

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Contributors

Bezerra ACD conceived the research idea, collected and analyzed the data, interpreted the results and drafted the manuscript; Domene SMA conceived the research idea, conducted a critical review of the manuscript and supervised the postdoctoral research for the development of the study.

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