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Design and development of the competency-based curriculum for the Nutrition Program at the Pontifícia Universidade Católica do Paraná

Concepção e construção do Currículo Baseado em Competências do Curso de Nutrição da Pontifícia Universidade Católica do Paraná

Abstract

Introduction: According to Gérard Scallon, competence is a “knowing-how-to-act” based on the “effective mobilization and use” of an internalized, integrated set of resources to address an interwoven set of situations. The Pontifical Catholic University of Paraná has implemented this concept to guide the development of competency-based curricula for its programs, including the undergraduate program in Nutrition. **Objective:** To report on the experience of developing this curriculum, implemented for students who enrolled in the Nutrition undergraduate program in 2019. **Methods:** The conception of this project began in 2016 and is explained in detail, starting with its theoretical foundations. To this end, the university's guidelines, the training carried out with and by professors, the methods used to approach the market, and the multiple stages of methodological construction of the Competency Matrix are addressed. This ensures that professional training in health, specifically in food and nutrition, is effectively delivered. **Results:** The University's Institutional Development Plan for 2019-2023, the National Curriculum Guidelines, and surveys conducted among graduate students and local companies were used as references. The University's concepts for each stage of competency-based curriculum planning were also incorporated into the Pedagogical Project for the Undergraduate Nutrition Program. This approach enabled constructive, integrated alignment, leading to the development of competencies that highlight the potential of Nutrition Science to promote human well-being while considering its interdependence with a healthy, sustainable natural environment. **Conclusion:** The experience and social and technical activism of the faculty, along with the support of university structure that guided, on a conceptual basis, all stages of the competency-based curriculum, were decisive in ensuring that its development occurred in an organized manner.

Keywords: Higher Education. Competency-Based Education. Nutritional Science.

Resumo

Introdução: Para Gérard Scallon, competência é um “saber-agir” baseado na “mobilização e utilização eficazes” e interiorizadas de um conjunto integrado de recursos, tendo em vista resolver um entrelaçamento de situações. Este conceito foi adotado pela Pontifícia Universidade Católica do Paraná para direcionar a elaboração dos currículos por competência dos cursos, incluindo o Curso de Graduação em Nutrição. **Objetivo:** Relatar a experiência de elaboração desse currículo, implementado para estudantes que ingressaram na graduação em Nutrição em 2019. **Métodos:** Detalha-se sua concepção, iniciada em 2016, desde seus referenciais teóricos. Para tanto, são abordados os direcionamentos da universidade, as formações realizadas com e por docentes, os métodos utilizados para aproximação com o mercado e as múltiplas etapas de construção metodológica da Matriz por Competência, para que se cumpra a formação profissional da saúde no âmbito da alimentação e nutrição. **Resultados:** Tomaram-se como referência o Plano de Desenvolvimento Institucional da universidade para 2019-2023, as Diretrizes Curriculares Nacionais e pesquisas com egressos(as) e empresas da região. Os conceitos adotados pela Universidade para cada etapa de planejamento do currículo por competências foram também utilizados no Projeto Pedagógico do Curso de Graduação em Nutrição, o que permitiu alinhamentos construtivos e integrados, que resultaram na construção de competências que valorizam o potencial da Ciência da Nutrição para o alcance do bem-estar da Humanidade, considerando-se sua interdependência com o ambiente natural saudável e sustentável. **Conclusão:** A experiência e o ativismo social e técnico de seu corpo docente, somados ao apoio de uma estrutura específica da universidade que orientou, a partir de uma base conceitual, todas as etapas de construção do currículo por competências, foram decisivos para que sua elaboração se desse de maneira organizada.

Palavras-chave: Ensino superior. Educação Baseada em Competências. Ciência da Nutrição.

INTRODUCTION

In Brazil, the Organic Health Law (Law 8080/1990)¹ establishes the conditions for health promotion, protection, and recovery, including food in Article 3 as a determinant condition of health. To implement this triad - promotion, protection, and recovery - the Ministry of Health² considers the training of health workers to be a fundamental component of educational processes in the field.

Furthermore, the National Health Foundation reaffirms education as “a system based on the participation of people aiming to change (transform) a given situation, breaking with the paradigm of the static conception of education as the transfer of knowledge, skills, and abilities.”³ In the same publication, Flores⁴ emphasizes that educational practice in health is expanding, as it goes beyond a mere didactic, asymmetrical teaching/learning relationship and beyond the cultivation of habits and the Health Education Guidelines. The author emphasizes that this education “implies a dialogical relationship based on horizontality between its subjects,” and that it is “the responsibility of every health worker.”

The National Curriculum Guidelines (NCDs) for Undergraduate Programs in the Health Field establish principles, competencies, skills, and attitudes aligned with the prerogatives of training professionals to engage with human projects and life trajectories in all their forms of expression, with full guarantees of rights. These guidelines are grounded in interprofessional team-based work and informed by multi-, inter-, and transdisciplinary actions, anchored in the principles of the Brazilian Unified Health System (SUS),¹ with an emphasis on comprehensive care and universal access. Specifically in relation to the training of nutritionists, the NCDs for undergraduate programs in Nutrition⁴ define that, as health professionals, their general competencies must include “the ability to develop actions for prevention, promotion, protection, and rehabilitation of health, both at the individual and collective levels.” To this end, “each professional must ensure that their practice is carried out in an integrated and continuous manner with the other instances of the health system [...] within the highest standards of quality and the principles of ethics/bioethics.” After all, the responsibility for health care does not end with the technical act, but rather with the resolution of the health problem”.⁵

In view of the above, it is understood that universities are responsible for training technically competent and ethically committed professionals who work in health education and health care. The Pontifical Catholic University of Paraná (PUCPR), guided by ethical, Christian, and Marist principles, has the mission of developing and disseminating knowledge and culture and promoting the comprehensive and ongoing training of citizens and professionals committed to life and the progress of society.⁶ Therefore, to ensure comprehensive training that meets all the requirements for knowledge and practice in healthcare, based on proven skills for professional practice, five basic principles of PUCPR's undergraduate program guide the development of professionals, namely: autonomy, cooperation, dedication, honesty, and critical thinking.^{7,8}

The PUCPR Nutrition Undergraduate Program curriculum reformulation was conducted by the Program Structuring Faculty Committee (NDE) and implemented in 2019. Its development considered the National Curriculum Guidelines (NCDs) in force at the time, PUCPR's Institutional Development Plan (PDI) for the 2019-2023 period,⁹ the guidelines of the Professional Council of Nutritionists, contributions from graduate students, and the analysis of curriculum matrices from Nutrition programs at national and international universities.

It is important to note that, at the time the matrix was developed, the new National Curriculum Guidelines for Nutrition programs, which began their revision process in 2020, were not yet in effect. The updated text was approved by the National Health Council in 2022 and by the National Education Council in 2024, and is currently awaiting approval by the Ministry of Education (MEC).¹⁰

This article, therefore, reveals the design process, the strategies adopted, and the steps taken in the curricular reformulation of the Undergraduate Nutrition Program, anchored in the pedagogical approach of the "Competency-Based Curriculum," and reports on the experience of developing the new matrix, implemented for incoming students starting in 2019.

METHODS

In 2017, PUCPR began a project to restructure its undergraduate programs portfolio in line with new social demands. At the same time, the NDE defined strategies for developing a curriculum reformulation to address emerging needs in the training of excellent nutrition professionals. In this context, a comparative study of undergraduate Nutrition curricula at nationally and internationally renowned universities was conducted to identify and incorporate best practices adopted by these institutions. In addition, the current National Curriculum Guidelines (NCDs) for the Nutrition Undergraduate Program were consulted and taken into consideration. To align with market requirements for nutrition professionals, surveys were also conducted with graduates and companies in the region to identify training needs and areas for learning improvement. This market research revealed the need to increase the number of hours devoted to practical activities in the three main areas of practice, as well as to include topics such as sustainability, the environment, aesthetics, entrepreneurship, nutritional genomics, integrated practices, evidence-based nutrition, food and nutrition surveillance, eating disorders, public policies, and collective health management.

In addition, institutional guidelines were taken into account in the design of the undergraduate Nutrition program, namely: a) Comprehensive training guided by the institutional mission and values, covering technical-scientific, humanistic, social, ethical, cultural, and political dimensions; b) Development of a systemic view of knowledge; c) High performance standards for faculty and students in pursuit of excellence in the teaching-learning process; d) Outstanding academic reputation; e) Dissemination of research as an experience and as a teaching and learning methodology in undergraduate programs; and f) Ability to identify opportunities and engage in processes of innovation and creation of sustainable enterprises that lead to the development of individuals and society.⁹

This entire process resulted in the drafting of the graduate profile and competencies by area. Based on the competency elements designated as stages for developing knowledge to integrate each competency and study topic, the Learning Outcomes (LOs) for each course were defined. The LOs statements, from the student's perspective, are indicators of the cognitive and performance levels students are expected to achieve through their engagement in the teaching-learning experience.¹¹ Unique to each course, LOs are written using an infinitive verb, and they should be clear, concise, measurable, and observable. Furthermore, they should be appropriate to the course's role in the program and consistent with the available resources and workload.

The development of LOs in each course aims to ensure the development of skills throughout the curriculum.⁹

All program competencies were systematically mapped in relation to the courses in the curriculum matrix. When assigning competency elements to each course, it was ensured that each contributed to the comprehensive development of graduates' competencies. Furthermore, through the development of the Learning Outcomes (LOs), the aim was to promote meaningful and lasting learning by ensuring coherence between the LOs and the topics addressed.

This structure was fundamental to the entire arrangement of learning outcomes and the classification of courses within the curriculum matrix, from the perspective of internalizing and mobilizing the knowledge produced throughout the undergraduate program. With the consolidation of this design, the reflections achieved regarding the pedagogical process gained significant momentum, culminating in the delineation of the primary references for certifying the competencies targeted by the program, in alignment with the desired graduate profile. The mapping of each competency was carried out by specifying the competency and its elements, and by distinguishing courses using color codes to generate a clear visualization of their roles in the development of each competency. Courses focused on internalization were marked in yellow; those aimed at mobilization, in orange; and those responsible for certification, in green, thereby facilitating visualization of the curricular organization.

After developing these competency paths, the entire scope was presented to the Course Council, composed of all the faculty members who taught classes that semester, in order to support the implementation of the necessary adjustments. The next step was to draw up the Course Plans.

The Teaching Plan of each course began to include the following elements: course description, relationship with prerequisite and subsequent courses, study topics, mind map, learning outcomes (LOs), methodology and assessment, schedule, and bibliographic references. The teaching plan model was based on the studies by Saroyan et al.¹² and was developed collaboratively with all faculty members, ensuring consistency with the proposal and with the model established by Spricigo, Manffra, and Saroyan.¹³ This model specifies that the course description should be presented as a concise and objective text, including the target audience of the course and the knowledge to be addressed, followed by the means used for instruction, and concluding with the expected student learning.

Next, each professor was assigned the responsibility of structuring the constructive alignment framework, which outlines the performance indicators for evaluating each LO, along with the teaching activities and both formative and summative assessments planned for the course's development, tailored to each LO, using the backward design methodology.¹⁴

The backward design process followed three fundamental stages: (1) identifying the expected learning outcomes; (2) determining acceptable evidence that these outcomes have been achieved (such as assessments and evaluative activities); and (3) planning the most effective teaching and instructional experiences to support students in constructing knowledge. By applying this methodology, it was possible to propose shifting the focus of traditional planning, which generally begins with content, toward a more intentional focus on student learning. This change fostered greater coherence among objectives, assessment, and pedagogical strategies.

RESULTS AND DISCUSSION

The undergraduate program in Nutrition, created by the Higher University Council (CONSUN) of PUCPR through Resolution No. 58/2000, began in 1999; curricular reforms occurred in 2003, 2005, 2010, and 2011. The on-campus bachelor's degree program in Nutrition consists of 3,200 hours, with a minimum completion period of 8 semesters and a maximum of 12 semesters, with morning classes.

Between 2016 and 2019, PUCPR invested heavily in professor training through public funding for science, technology, and innovation aimed at universities, promoted by the Brazilian Innovation Agency (FINEP). This project selected 60 professors who participated in three training classes to introduce pedagogical innovations based on Active Methodologies, focusing on achieving learning outcomes and

students' self-regulation of performance, which were then incorporated into the design of the curriculum courses.

A total of 55% of the faculty members in the undergraduate Nutrition program took part in this process. This training represented an appreciation of human capital at a strategic moment in preparation for the institutional pedagogical transition proposed in the guidelines for the construction of Competency-Based Curriculum Matrices.

Based on the knowledge acquired in this qualification, the program professors began to incorporate various active methodologies into their courses. They aimed to go beyond mere content delivery by placing greater emphasis on students' learning, making them active participants in the teaching and learning process. The primary outcomes included the process of professor development, as they reorganized their approach to curriculum courses through shared meetings in which each professor presented their courses and faculty members suggested improvements in their structure, alignment, workloads, and positioning within the curriculum matrix.

Another noteworthy aspect that helped broaden the vision during the construction of the new Competency Matrix concerns the representation of the extramural undergraduate Nutrition program. This applies both to the guidance and standardization of professional practice and to participation and social control in the public policy arena, and in internal instances at PUCPR, in the performance of *Lato sensu* and *Stricto sensu* graduate courses, in specific committees of the institution, such as the Center for Pedagogical Excellence, the Committee on Ethics in Research with Human Beings, among other spaces for sharing experiences. The faculty's expertise has enabled different areas of knowledge to be integrated and addressed in a disruptive, up-to-date manner.

The challenge of developing a Pedagogical Course Project (PCP), from the perspective of participatory planning, involved from the outset the Structuring of Teaching Groups and coordinators of 13 programs in the Health and Nature Area that made up the School of Life Sciences, in which the undergraduate program in Nutrition was included at the time, totaling 80 professors.

The main objective of the current PCP for the undergraduate Nutrition program at PUCPR was to organize the curriculum by competencies and update the learning process to meet the demands of society in the context of regional, national, and international Food and Nutrition. The concept of competency has become a significant focus of reflection on university curricula in recent years, prompting PUCPR to align with this approach.¹¹ For this first competency matrix, PUCPR adopted Gérard Scallon's concept,¹⁵ since it translates competency as "knowing how to act" based on the "effective mobilization and use" and internalization of an integrated set of resources, with a view to resolving a series of intertwined situations.

This "knowing how to act" in resolving different problem situations, based on the mobilization and use of an integrated set of previously internalized resources,¹⁵ guided the entire process of constructing the current curriculum matrix for the Nutrition Program. In turn, this matrix influenced the development of the Nutrition Undergraduate Program Plan (PCP), and taking the PDI-PUCPR 2019-2023 as a reference,⁹ several concepts adopted by the university for each stage of competency-based curriculum planning were also incorporated into this PCP.

All courses in the undergraduate Nutrition program were developed using a backward design approach: the curriculum components were structured based on the desired learning outcomes. Buehl¹⁶ found, in his comparative study of curriculum development practices among professors who used backward design and those who did not, that this methodology was quite effective. This result corroborates the findings of Wiggins and McTighe,¹⁷ which describe the fundamentals and practical elements for constructing a

learning project, reinforcing the importance of this methodology for planning and constructing knowledge. The adoption of this model reinforces the centrality of the student in the learning process. It contributes to the structuring of more meaningful curricula by intentionally and purposefully articulating theory and practice.

Based on the learning framework described, graduate students of the Nutrition program at PUCPR are aligned with the needs of society and the labor market at local and regional levels, in accordance with the current National Curriculum Guidelines and within the scope of public food and nutrition policies. Their training is grounded in the principles of food and nutrition security and the human right to adequate and healthy food. Graduates receive a generalist, humanistic, critical, ethical, and socially responsible education, understanding the relationship between the individual in their entirety, the environment, and food. This enables them to work in the following areas: nutritional care and diet therapy for sports and physical performance; health recovery; prevention and reduction of health conditions in individuals or population groups; food and meal production and commercialization; nutritional care and management within primary care, health surveillance, and institutional policies and programs; and the development of new products and services.

The graduate student profile and the competencies listed in Table 1 demonstrate the synergies between the curriculum and the expectations for graduates, as constructed collectively. Product development expertise, certified by the Research and Development course: Food Products, with a focus on developing commercially viable food products aimed at addressing community health problems, was an innovation beyond the expertise of the three traditional areas of nutrition.

Table 1. Competencies and specific competency elements of the Undergraduate Nutrition Program at the Pontifical Catholic University of Paraná.

Competencies	Corresponding Competency Elements (CE)
Competency A – Develop food products by considering foods and their components, their selection, properties, transformations, processing techniques, safety, and quality, with social responsibility, strategic vision, and an entrepreneurial mindset.	CE A1 – Integrate knowledge on food selection, composition, properties, and transformation, considering their nutrient content.
	CE A2 – Perform food quality control based on identity and quality standards as well as legal frameworks.
	CE A3 – Develop food formulas or products and their labeling, using culinary techniques, for application in the different areas of human nutrition, with social responsibility and a strategic and entrepreneurial outlook.
Competency D – Manage people, resources, and systems by integrating interprofessional teams, aiming at the quality of products, processes, and services, collaboratively and sustainably, with ethics and responsibility.	CE D1 - Analyze the organizational context (people, structure, finances, inputs).
	CE D2 - Plan interprofessional actions using resources sustainably.
	CE D3 - Cooperate in interprofessional teams.
	CE D4 - Exhibit a proactive entrepreneurial mindset.

Table 1. Competencies and specific competency elements of the Undergraduate Nutrition Program at the Pontifical Catholic University of Paraná.(Continues)

Competencies	Corresponding Competency Elements (CE)
Competency E - Provide dietary and diet therapy care to individuals and groups in medium- and high-complexity healthcare settings, based on clinical and socio-environmental conditions, in an integrated, decisive, and humanized manner within interprofessional teams.	CE E1 - Systematically analyze the functioning of the human body, considering situations of homeostasis and imbalance.
	CE E2 - Integrate biological, social, environmental, cultural, and technological knowledge.
	CE E3 - Conduct nutritional assessments of individuals and populations at various stages of life, across health and disease conditions and sociocultural levels, within the context of food and nutrition surveillance systems.
	CE E4 - Prescribe appropriate food and nutritional therapy for nutritional and pathophysiological needs, allowing for adjustments in behavior.
Competency F - Manage food and nutrition security policies, programs, and actions in the context of primary care, from the perspective of the social determinants of the health-disease-care process, observing criteria of risk and vulnerability of individuals and populations, in light of the human right to adequate food and food sovereignty, with ethics, critical thinking, and in an integrative, decisive, and humanized manner.	CE F1 - Analyze the social determinants of the health-disease-care process of nutritional health conditions in different territories and populations, considering the correlation with agri-food systems and the environment.
	CE F2 - Make decisions that promote food and nutritional security through actions focused on food and nutrition, while considering cultural and ethnic-racial singularities, in accordance with the principles of the human right to adequate food, food sovereignty, and bioethics.
	CE F3 -Carry out educational activities in Life Sciences, promoting community autonomy, considering demands and context. This approach is rooted in social responsibility, fosters critical thinking, and upholds ethical standards.
	CE F4 - Plan intersectoral food and nutrition actions in the context of public health and food and nutrition security systems and policies applicable to major public health problems, considering their management from an impact assessment perspective.
	CE F5 - Plan academic, professional, and personal development, aiming for quality of life and analyzing social, economic, geopolitical, and environmental contexts.

Source: Created by the authors, 2024

Furthermore, compliance with the NCDs for the undergraduate Nutrition program⁵ is demonstrated in the study, in which the competencies generated were compared with those determined by the NCDs. Table 2 shows these correlations.

Table 2. Correspondence between the competencies and skills (general and specific) recommended by the NCDs for the undergraduate Nutrition program and the competencies established for the Undergraduate Nutrition Program at the Pontifical Catholic University of Paraná.

Competencies and skills (general and specific) recommended by the NCDs for the undergraduate Nutrition program	Competencies of the Undergraduate Program in Nutrition at PUCPR
Apply knowledge about the composition, properties, and transformations of food and its use by the human body in dietary care.	Competency A
Plan, manage, and evaluate food and nutrition units, aiming to maintain and improve the health conditions of healthy and sick communities.	Competency D
Contribute to promoting, maintaining, and restoring the nutritional status of individuals and population groups.	Competency E
Assess, diagnose, and monitor nutritional status; plan, prescribe, analyze, supervise, and evaluate diets and dietary supplements for healthy and sick individuals.	
Work in multidisciplinary health and nutritional therapy teams.	
Work on the formulation and implementation of nutritional education programs; nutritional, food, and health surveillance.	Competency F
Work on policies and programs for education, safety, nutrition, food, and health surveillance aimed at promoting health at the local, regional, and national levels.	

Source: prepared by the authors, 2024.

Caption: Competencies designated by letters as presented in Table 1.

Table 3 presents a comparison of the Nutrition Undergraduate Program curriculum at PUCPR before and after the curriculum reform, highlighting the main changes implemented, including the adoption of competency-based training and the inclusion of extension, in accordance with the Guidelines for Extension in Brazilian Higher Education.

Table 3. Curriculum Comparative table before and after the reform process

	Matrix 2013	Matrix 2019
Course categories	Theoretical and practical courses, internships	Theoretical and practical courses focused on internalizing knowledge, mobilizing knowledge, and, ultimately, certifying competence.
Initial courses	Traditional courses such as Anatomy, Physiology, Cell Biology and Histology, Biochemistry, Genetics, and General Pathology	<ul style="list-style-type: none"> - Integration of organs and systems in the Human Body Systems course - Integration between cells and tissues in the Structural and Functional Aspects of the Human Body course - Genetics integrated into the Nutritional Genomics course. - General Pathology incorporated into the subjects of Gastroenterology and Nutrition, Evidence-Based Nutrition: from chronic diseases to critical patients. - Detailed biochemistry in two courses: Biomolecule Structures and Metabolism, and Metabolic Interrelationships and Dysfunctions

Table 3. CurriculumComparative table before and after the reform process (Continues)

	Matrix 2013	Matrix 2019
Sharing courses with other health programs	Non-existent	22 courses shared among various programs at the School of Health and Biosciences, including Entrepreneurial Attitude, Pharmacological Basis of Herbal Medicines, Psychology of Health Relations, Environment, Sustainability, and Health.
Career Plan-related training	Not specified	Building a career plan portfolio in the Professional Life Planning course (which takes place at the beginning of the program), revisited in the Clinical Nutrition Practices course (which takes place in the middle of the program), and certified in the supervised internship courses (which take place at the end of the program).
Research-related training	Applied Nutrition Research Courses and Nutrition Course Completion Project	An introductory course, Scientific Reasoning, is offered at the beginning of the program and shared among several programs.
Training applied to interprofessiona lity	Not specified	The application of courses aligned with various health and nature programs to carry out educational activities for the community. This concept is internalized in the Interprofessional Bioethics and Human Rights Project, mobilized in the LifeSolution Interprofessional Project, and certified at the end of the Interprofessional Well-Being Project.
Connections between courses	Carried out through Integrative Projects I, II, III, and IV, which involved case studies and the development of theoretical projects.	Conducted through courses called Integrated Practices in Collective Food Service (4th semester), Clinical Nutrition (5th semester), and Collective Health (6th semester), all carried out in the field (with technical visits, practical training in hospitals, nutrition clinics, schools, and other public or private institutions).

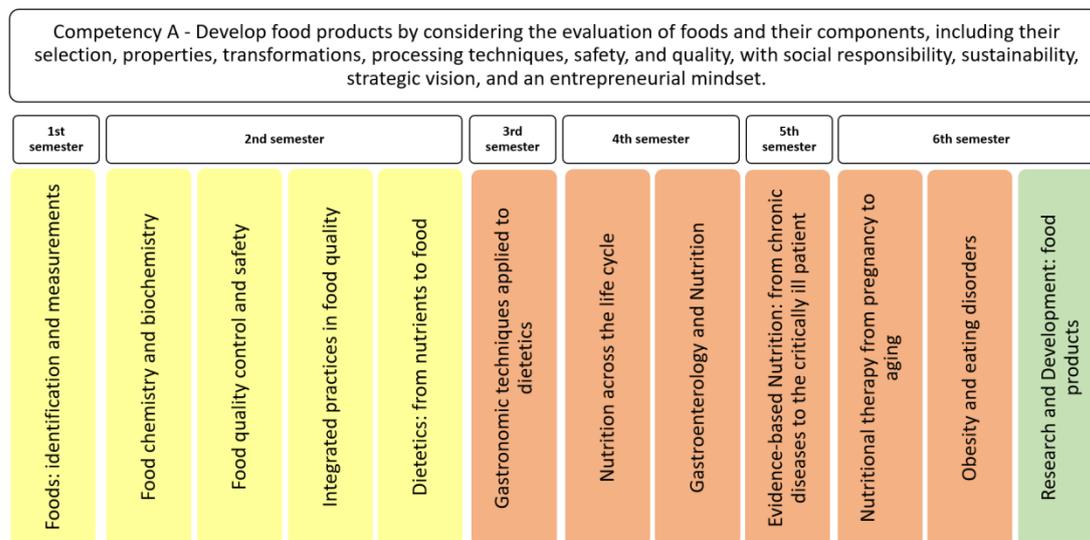
Source: prepared by the authors, 2024

The NDE for the Nutrition program recognized the need to visualize how each competency would be integrated throughout the semesters. Using a method frequently employed in design thinking, the courses were organized in an integrated manner across the semesters, so that the development of each competency would occur with a progressive increase in complexity.⁹ The course's NDE, with representatives from each of the three significant areas of Nutrition, contacted their peers, which facilitated the involvement of all course faculty members and nutritionists in the mapping process.

To provide practical experience throughout the training process, three courses were created to precede the mandatory internships: *Integrated Practice in Clinical Nutrition*, *Integrated Practice in Public Health*, and *Integrated Practice in Foodservice Management*. This proposal involved integrating knowledge across each central area through technical visits, project development, and direct patient contact at the bedside.

Figure 1 illustrates the trajectory of a competency, with “internalizing” courses represented in yellow, “mobilizing” courses in orange, and the “certifying” course in green. The changes introduced into the curriculum as a result of this realignment of pedagogical methodologies within the competency-based framework led to the removal, inclusion, consolidation, and splitting of courses.

Figure 1. An example of a representation of the integration of curricular components for the development of Competency A in the Undergraduate Nutrition Program at the Pontifical Catholic University of Paraná.



Source: Nutrition Program Structuring Faculty, PUCPR.

An example of a Course Teaching Plan is presented in Figure 2. To this end, the CrEARe (Teaching and Learning Center) provided support and guidance to faculty members. The NDE played an active role in developing these components together with professors who are specialists in the areas of knowledge, as the mapping of program competencies needed to be operationalized through the coordinated execution of each course. The curricular components were integrated throughout the semesters to foster competency development.

Table 4. Example of the development of a course syllabus, integrating the course description, competency, competency elements, learning outcomes, teaching topics, and performance indicators in the Undergraduate Nutrition Program at the Pontifical Catholic University of Paraná.

Course	Nutrition applied to sports and aesthetics		
Course Description	This specific course in the nutrition program, offered in the fifth semester, covers nutritional recommendations and sports and aesthetics supplements. In it, students relate the influence of nutrition on physical performance and aesthetic dysfunctions. At the end of the course, students can prescribe diets and nutritional supplements based on individual conditions, guidelines, and current legislation.		
Competency	Competency E - Provide dietary and diet therapy care to individuals and groups in medium- and high-complexity healthcare settings, based on clinical and socio-environmental conditions, in an integrated, decisive, and humanized manner within interprofessional teams.		
Competency Elements (CEs)	CE 1 - Analyze the functioning of the human body from a systemic perspective, considering states of homeostasis and imbalance.	CE 3 - Perform nutritional assessments of individuals and populations at different stages of life, across health and disease conditions and sociocultural levels, within the context of the food and nutrition surveillance system.	CE 4 - Prescribe food and nutritional therapy appropriate to nutritional and pathophysiological needs, providing readjustment.

Table 4. Example of the development of a course syllabus, integrating the course description, competency, competency elements, learning outcomes, teaching topics, and performance indicators in the Undergraduate Nutrition Program at the Pontifical Catholic University of Paraná.

Course	Nutrition applied to sports and aesthetics		
Learning Outcomes (LOs)	LO1 – Identify the physiological changes of sports training	LO2 – Issue nutrition diagnoses according to health criteria	LO3 – Prescribing diets and nutritional supplements for sports and aesthetic disorders
StudyTopics (STs)	ST1– Physiological changes during sports training	ST 2 – Body composition diagnostics for athletes	ST 3 – Recommendations and nutritional supplements applied to sports nutrition and aesthetic disorders
Performance indicators (PIs)	<p>PI 1.1 - Identifies the physiological changes of sports training.</p> <p>PI 1.2 - Recognizes differences in energy metabolism according to different types, duration, and intensity of exercise.</p>	<p>PI 2.1 - Interprets anthropometric parameters for nutritional diagnosis in athletes.</p> <p>PI 2.2 - Applies different formulas to determine the body composition of athletes.</p> <p>PI 2.3 -Issues nutrition reports based on anthropometric, biochemical, clinical, and dietary parameters</p>	<p>PI 3.1 - Recognize nutritional needs for different sports and times: before, during, and after training/competition.</p> <p>PI 3.2 - Recognizes nutritional needs for different aesthetic-related dysfunctions.</p> <p>PI 3.3 Prescribes diets and nutritional supplements for sports and aesthetic disorders in accordance with current legislation.</p> <p>PI 3.4 - Performs nutritional planning for athletes and individuals with aesthetic disorders in accordance with guidelines and legislation.</p>

Source: Nutrition Program Structuring Faculty, PUCPR.

Caption: Competency Elements (CEs); Learning Outcomes (LOs); Study Topics (STs); Performance indicators (PIs)

The performance indicators in the example of the teaching plan design (Table 4) illustrate situations in which instructors can observe students achieving the Learning Outcomes (LOs). These indicators function as checkpoints, facilitating the monitoring of learning by both instructors and students. Performance indicators should be observed while the student performs specific actions or tasks. They must specify the conditions under which they will be measured and include the expected level of performance, expressed through qualifiers; such indicators constitute the basis for the assessment rubrics of the learning outcomes.⁹

Additionally, during the implementation and evaluation of the Competency Matrices, PUCPR has applied Fink's and Bloom's taxonomies, as revised by Anderson,¹⁸ to support the writing of the LOs.

Assessment activities are now planned, considering the LOs and performance indicators, and require professors to submit an assessment plan that includes formative and summative assessments, as well as feedback planning.⁹

The learning pathways planning in the undergraduate Nutrition program was grounded in the backward design methodology, also known as “reverse planning.” This approach begins with a clear definition of the desired learning outcomes, that is, what students are expected to understand and be able to do upon

completing the program. Based on these final objectives, the curricular components, assessment criteria, and, ultimately, the most appropriate teaching–learning experiences were organized to achieve these goals.

When demonstrating competency, the student mobilizes and integrates their resources (which entails more than mere aggregation) and transfers them to a new situation. These resources include: knowing (knowledge), knowing-how-to-do, and knowing-how-to-be. The entire process, therefore, begins with defining the graduate's professional competencies. The formulation of each competency starts with the *knowing-to-act* component, which involves the *knowing-how-to-do* and must meet specific performance criteria. These criteria are described in the second part of the competency; in the final part, the *knowing-how-to-be* is detailed, also referred to as soft skills.^{9,12}

The paths and stages for developing competency knowledge are defined as “competency elements”; each competency element requires a set of knowledge. This knowledge is built from various study topics, with a set of related study topics comprising a course.⁹

In some courses, students learn and internalize a specific competency element. They must engage with the knowledge associated with each competency element on more than one occasion before they can mobilize it. Hence, several courses came to be designated as “internalizing” courses. At a subsequent level, there are situations in which students are required to mobilize prior learning in a new context - these constitute the “mobilizing” courses. In specific courses, students must demonstrate, through authentic situations that replicate professional practice, whether all elements of a competency have been developed - these are the so-called “certifying” courses. The graphical representation of courses in yellow (internalizing), orange (mobilizing), and green (certifying) facilitated visualization of the role each plays in consolidating the competency.

In the new competency-based curriculum, different types of courses were also added (required, elective, optional, and stand-alone courses).

Boundaries were transcended, and reflective and critical thinking were fostered, enabling an understanding of reality that supports transformative action. Disruptive thinking enabled the creation and re-creation, making possible the development of the competency-based curriculum in the Undergraduate Nutrition Program at PUCPR, which takes Food and Nutritional Security as both the guiding horizon and the synthesis of the complex issues faced by society at the local, regional, national, and international levels. The pedagogical approach to academic training is grounded in the understanding of health and food as fundamental human rights essential to dignity and quality of life.

Following the implementation of the new Competency Matrix, the NDE course has conducted ongoing assessments in coordination with faculty and students. The subjects considered for certification have been analyzed extensively to ensure that students acquire the intended competencies, thereby maintaining consistency with the training of excellent professionals in the health field.

CONCLUSION

The experience of the Nutrition Undergraduate Program at PUCPR in reformulating its curriculum highlights the institution's commitment to providing a unique professional education, guided by ethical and scientific principles and social responsibility. The adoption of a competency-based approach has aligned the educational project with the profession's contemporary demands, valuing the role of Nutrition Science in promoting health and environmental sustainability.

The implementation of the new curriculum matrix was supported by specific institutional bodies that provided consistent conceptual and methodological guidance, contributing to the coherence and organization of the development process. The innovative curriculum proposal is integrated into the course objectives, the graduate profile, the teaching-learning methodologies, the structuring of content, and the promotion of interdisciplinarity and contextualization.

In addition, the curriculum has enabled greater student autonomy and diversified training opportunities, expanding learning spaces beyond the classroom and the original course.

However, it is recognized that implementing a competency-based curriculum is a dynamic, continuous process that requires systematic, ongoing evaluation. Feedback from practice has been essential for refining the curriculum proposal and guiding the adjustments and improvements necessary to consolidate a responsive, high-quality education.

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Contributors

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