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Challenges in the education of health professionals:

an interdisciplinary and interprofessional approach

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This article presents a set of strategies and methods used in health professional education in the context of the Brazilian National Health System (SUS). The investigative emphasis was placed on interdisciplinary education and interprofessional work. The background to this research is the experience of 11 postgraduate educational initiatives developed between 2009 and 2017. A documentary analysis of the pedagogical projects of the specialization courses was carried out, considering the concepts of interdisciplinarity and interprofessional work. Fleckian and dialogic methodological references were used to analyze teaching and learning strategies and methods. Results show that overcoming the juxtaposition of disciplinary approaches and also of perspectives of different professions requires the dissemination of educational and work experiences that enable interactions among different thought collectives in order to allow the emergence of an interprofessional thought style and collaborative practices.

Keywords: Health System. Education. Interdisciplinary practices. Health professionals. Multiprofessional team.

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In the field of healthcare, the orientation to provide comprehensive care and the articulation between actions and services[1] in care networks of Brazilian National Health System (SUS) have been requiring new capacities of professionals for a collaborative action in multiprofessional teams[2,3]. In this scenario, we face obstacles deriving from fragmented practices both in professional education and in health work[4].

This article analyzes a combination of teaching-learning strategies and methods used in the postgraduate education of health professionals in the context of the SUS, aiming to identify to what extent they favor an interdisciplinary and interprofessional approach. In this investigation, teaching-learning is understood as process and product emerging from the interaction between the subject who learns and the object to be known[5,6]. Under this perspective, "man is constituted as such [by means of] their interactions and, therefore, is seen as someone who transforms and is transformed in the relationships produced in a given culture"[7] (p. 93).

Interdisciplinary and interprofessional education

Generally speaking, the interdisciplinary approach can be considered relatively recent[8,9]. According to Silva[10] - who reviewed the model proposed by Jantsch and Bianchetti[11] -, the distinction between uni, pluri, multi, inter and transdisciplinary can be recognized both in the interaction between subject and object and in the production of practices.

Thus, the unidisciplinary perspective - which complies with the analytical principle of separating the parts to better know a phenomenon - is defined by the knowledge and practices of one single discipline; the multidisciplinary, still in an analytical perspective, is defined by the juxtaposition of the knowledge of different disciplines; the interdisciplinary, focusing on synthesis, promotes integration between disciplines in order to construct common concepts; and, finally, the transdisciplinary perspective overcomes the frontiers between disciplines[12].

Concerning differences between the uni, multi and interdisciplinary perspectives, Silva[10] questions the view according to which the interdisciplinary approach is the construction of a collective subject and highlights the myth of an a-historical interdisciplinarity, presented as a redeeming rescue capable of undoing the mistakes of knowledge fragmentation.

Concerning interprofessional education, Barr[13] states it is broadly accepted that the term's origin can be attributed to the World Health Organization, having been included in the 1978 Alma-Ata Conference as one of the strategies to promote "Health for all in the year 2000". In a systematic review, Reeves et al.[14] surprisingly found that the effectiveness of interprofessional education remains unclear due to methodological limitations of the analyzed publications. Regarding the educational initiatives developed in recent decades in Brazil as an answer to the public policies that induce changes in health education, Peduzzi et al.[15] state that "[...] the initiatives to change professional education and practice emphasize the interdisciplinary approach and multiprofessional work" (p. 982), and it is necessary to conduct further research to correlate interprofessional education and improvement in care.

Considering the objective of the present work, relevant issues presented in the review carried out by Peduzzi et al.[15] can be summarized as: (a) existence of specificities in professional education side by side with collaboration between different professions; (b) insufficiency of teaching practices to promote integrated teamwork; and (c) low effectiveness of the interdisciplinary approach to promote interprofessional practices. In short, they show that interdisciplinarity and interprofessional education are not equivalent concepts, as the former is related to the sphere of disciplines and knowledge areas, and the latter, to the sphere of collaborative professional practices in the health team.

Main challenges of interprofessional work in the context of health education

In relation to health professionals' education, the approach by disciplines continues to be hegemonic in the sphere of undergraduate and postgraduate programs. Regarding interprofessional work, the articulation between different careers targeted at collaborative practices can be considered even more challenging, although a significant set of public policies in Brazil presents guidelines that

support it, even though some of them do not name it. This is the case of the humanization and permanent education policies; another example is the constitution of healthcare-school systems, which articulate teaching and services. We agree with Barreto et al.[16] that this synergy gives a strategic character to interprofessional education and work.

However, in the sphere of primary and specialized care practices, work in health teams continues to face the challenges of (i) overcoming the compartmentalization of knowledge and perspectives[17]; (ii) amplifying the biomedical approach[18,19]; and (iii) overriding the fragmentation of healthcare that derives from hierarchized systems, with low co-accountability, irregular quality, and increasing costs[20-22].

In relation to knowledge compartmentalization, Morin[17] argues that our way of producing knowledge and teaching has led us to "[...] separate objects from their environments, disciplines from each other, and to fail in joining what is part of the same tissue", understanding the world as "[...] disjointed fragments" (p. 14). Educational activities for health professionals are still predominantly organized according to this disciplinary logic or to the perspective of specialists or professional categories. According to Campos[1]:

> interdisciplinary work also depends on a certain subjective predisposition to deal with uncertainty, to receive and make criticisms, and to make decisions in a shared way, [and this is not] the dominant subjectivity pattern in environments of exacerbated competition, the predominant way of functioning of contemporary institutions" (p. 404).

In the sphere of health professionals' education, the educational processes contribute to the production of a subjectivity pattern marked by little cooperation and collaboration. To Morin[23], when we build initiatives according to an interdisciplinary approach, we reconnect the knowledge of different disciplines and organize learning by developing the problematizing and contextualizing capacities, in order to intervene in the world. To achieve this, we must recognize the legitimacy of the other in the social construction of knowledge, even if we have distinct sets of knowledge, values, interests and desires[24]. Besides this predisposition, overcoming the limits imposed by biomedical rationality enhances the challenges to the construction of an amplified approach to healthcare. According to Campos et al.[25], the re-signification of biomedical rationality implies the incorporation of

> subjective frailties and social networks beyond biological risks; [...] of work objectives [beyond] curing, rehabilitating and preventing damages in ill people, [supporting] the development of subjects' higher degrees of autonomy and self-care, of their capacity to think, act and create new ways of life for themselves and new forms of positioning themselves in relation to their health and context; and [the reformulation of] the clinical relationship and education processes. (p. 990)

Biomedical rationality explains health-disease phenomena according to a logic structured by the sciences of the biology field[18]. The notion of the human body as a machine, the cause and effect relationship, the centrality on the objectification of diseases and lesions, and the centrality on medical work and hospital care have strongly contributed to the construction of a rationality that has practically excluded the subjective and social dimensions from the health-disease process.

In relation to the fragmentation of healthcare despite people's and populations' care needs, Mendes[21] explores health work management, showing that the hierarchization logic of the services has roots in care centered on professionals, with predominance of the medical perspective. To this author, the organization of systems as a "[...] set of isolated healthcare points without communication between one another, [...] incapable of providing continuous care to the population" (p. 2299), reflects a fragmented and pyramidal modeling, and this type of response is insufficient to meet the health needs of the 21st century.

Cecílio[20], analyzing the logic of the pyramidal organization of health systems, questions

> the idea of a 'top', the topographic expression of a certain 'technological hierarchy' that would have the hospital on its vertex [despite the fact that] the health system needs to be organized based on the logic of what is most important to each user, so as to offer the right technology in the right space and in the most adequate occasion. (p. 469)

Focusing on healthcare in contemporary Western societies, Camargo[18] discusses the increasing division of labor, which, associated with the action of economic interests and with the symbolic aspects present in professional rationalities, also contributes to the disarticulation of professionals and healthcare.

Finally, in relation to the irregular quality and the growing costs of healthcare, Scally and Donaldson[22] show that the fragmented organization of the services results in low satisfaction and trust on the part of users due to the increase in adverse events and to the loss of the human dimension of healthcare.

In light of the challenges mentioned here, this article analyzes to what extent a set of educational initiatives grounded on integrated curricula and active methodologies favors an interdisciplinary approach and collaborative practices in multiprofessional teams.

Methodological approach

Based on the demand of managers of the Brazilian National Health System, postgraduate educational initiatives for professionals inserted in healthcare networks[26-36] were constructed. In the format of specialization and professional improvement courses, these initiatives were offered in the five geographical regions of Brazil for approximately 34,000 health professionals of SUS from 2009 to 2017. These courses were actions of the Program of Support to the Development of SUS and were designed by the Ministry of Health, the National Council of Health Secretaries, the National Council of Municipal Health Departments, and by the Sírio Libanês Hospital[33].

Of the 55 initiatives, 33 had the specialization format (360 hours), 21 had the professional improvement format (180 hours) and one was a refresher course (less than 180 hours)[33]. The educational proposal and the curriculum of these initiatives were obtained from public documents, in the format of manuals that describe the pedagogical project, explaining the competence profile, the contents, and the educational strategies that are used[26-36].

Due to the higher number of hours, to the potential for in-depth discussions about theory and practice and to the use of active teaching-learning methodologies, the specialization courses were intentionally selected, and the eleven courses that were carried out in 2017 were prioritized. This inclusion criterion was grounded on the idea that the most recent versions of the courses would express the experience accumulated in the studied period.

The themes approached by the sample courses were technological innovations in healthcare areas, health management and health education, involving professionals from primary and specialized care, mainly from the careers of nursing, medicine, social work, dentistry, physiotherapy, nutrition, and psychology (Table 1).

The educational activities of the sample were performed in multiprofessional groups formed by seven to ten participants, with the greatest diversity of professions possible. The orientation, organization and use of teaching-learning methodologies were structured and developed in a similar way in all courses, both in didactic-pedagogical aspects and in the academic management[26-36].

Data analysis, focusing on the teaching-learning strategies and methods that translated an interdisciplinary and interprofessional approach, was supported by two methodological approaches. The first is based on the perspective of the Polish physician Fleck[37], who established an epistemological set of tools to access the complexity of knowledge production in society. Thus, the concepts of thought collective and thought style were used. These concepts form the Fleckian comparative theory of thought[38,39], as they ground knowledge production and circulation.

Table 1. Themes and number of professionals involved in the sample courses

Name of the Specialization Course	No. of professionals
Critical Patient Care[26]	100
Clinic Management in Health Regions[27]	960
Health Surveillance Management[28]	520
Emergency Management in Public Health[29]	440
Management of Evidence-Based Health Policies[30]	500
Medical Residency Preceptorship in SUS[31]	2,000
Preceptorship in SUS[32]	1,020
Educational Processes in Health[33]	451
Quality and Safety in Patient Care[34]	1,000
Health Regulation in SUS[35]	860
Health Surveillance[36]	1,060
Total	8,911

Source: Adapted from the courses' syllabuses[26-36]

According to Fleck[37], "the knowledge process represents the human activity that most depends on social conditions, [and] knowledge is [a] social product par excellence". (p. 85) This author defined thought collective as "a community of persons who exchange thoughts or are in a situation of reciprocal influence of thoughts" (p. 82). As for the way in which thought collective and thought style relate to each other, Condé[38] explains that "different groups, in different historical periods [as] thought collectives, construct their thought styles or knowledge based on their social activities and their interaction with nature" (p. 7).

It is important to mention here that thought style "is not an optional characteristic that can be voluntarily, consciously chosen, but rather an imposition made by the socialization process represented by inclusion in a thought collective"[18] (p. 1164). However, according to Fleck's approach, changes in the production of knowledge and practices occur in an evolutionary way when premises present in certain thought styles are questioned by other styles, thus originating explanatory elements that, as the history of societies unfolds, can be preserved or modified.

To analyze interactions between thought collectives, we associated the dialogic approach with the Fleckian perspective.

Dialog studies[23,39] value the relationships established between different points of view in the construction of a meta-point[23] of view, as a result of the interaction between people and between them and the world. When we think of and understand the world dialogically, we are able to identify different thought collectives as intrinsic elements of a unit or an organization. Ambiguities and dualities between different collectives will always exist; movement and life result from the tension produced to preserve or transform the patterns of a system[23,39].

Thus, the dialogic approach shifts meaning from a contradiction between logics to a dialog between differences. In the dialogic approach, the submission of one element to another does not occur, nor the submission of one logic to another. The articulation between different points of view or thought collectives expresses the recursive and complementary relation between, for example: discipline-interdisciplinarity; education-work; professionalA-professionalB[23].

The results of the documentary analysis that we performed are presented according to curricular structure, orientation and organization, and to the educational strategies and methods that we identified.

Curricular structure

The curricular structure used in the analyzed courses was grounded on the conception of integrated curricula[40], which is based on the articulation between theory-practice, education-work, and disciplines. In integrated curricula, the theory-practice articulation implies such a strong interconnection that these two dimensions are mutually transformed by means of the established interactions and dialogs[40]. In the analyzed curricula, the articulation among disciplinary knowledge, processes, professional practices, teaching, learning, and work was expressed by means of a curricular matrix instead of a grid of juxtaposed disciplines.

Although in the analyzed syllabuses this curricular matrix was presented according to two axes, the documentary analysis confirmed the existence of four curricular axes. These four axes were also mentioned in a theoretical formulation published by some of the authors of the analyzed courses[41]. Thus, two "guiding" axes and two "organizing" axes were identified (Figure 1).

Figure 1. Schematic representation of the guiding and organizing elements of the curricular matrix, adapted from the courses' syllabuses[26-36]

Curricular orientation: guiding axes

The guiding axes, defined by the "professional competence profile" and by the "macro-problems of professional practice", were used for selection of contents and for the combination of strategies, methods, activities, and assessment processes. Still according to information found in the syllabuses of the analyzed courses, the competence profiles were constructed in light of the holistic conception and of the dialogic approach to competence[26-36].

The holistic conception articulates the constitutive elements of competence: capacities, actions, context, and excellence criteria[42]. The dialogic approach guides the construction of profiles by articulating the practices of professionals considered competent by different social actors related to a given profession[43].

The profiles were systematized in competence areas and these, in turn, were characterized by actions that socially legitimate professional exercise. The actions that compose the areas of "healthcare", "health management" and "health education" were configured by a combination of cognitive, affective and psychomotor capacities. The capacities and excellence criteria were founded on the knowledge and practices that ground professional exercise[26-36].

In an articulated way with the competence profiles, the occurrence and prevalence of events related to health-disease processes and care processes were also considered in the selection of contents, strategies and teaching-learning methods. These events were grouped according to professional macro-problems or challenges to be faced in the context of SUS[26-36].

Curricular organization: organizing axes

The organizing axes of the analyzed educational initiatives were structured in curricular units called "simulation of professional practice" and "professional practice in real scenarios"[26-36].

This type of curricular organization expresses an interdisciplinary structure, as the educational activities are based on problems presented in a simulated way or as reports of real experiences from practice.

In the organizing axis "simulation of professional practice", although the problem situations are based on real events, they were constructed by the authors of the investigated courses, considering the competence profile and the macro-problems of the professional field. The situations processed by the multiprofessional groups included problems or challenges presented in writing or by means of simulations with actors, dummies or among peers, and, also, through filmed performances. This set of triggers was contextualized in a fictitious city called "Polis"[44].

In the organizing axis "professional practice in real scenarios", the professional problems and challenges experienced by students in the context of SUS were processed by the multiprofessional groups through reflective narratives. According to the courses' syllabuses, narratives are reports written by students about a professional experience that, independently of the outcome, was challenging and mobilized reflections[26-36]. Still in this axis, the work process of multiprofessional teams was problematized: challenges were identified and intervention plans aiming to transform practices in SUS were constructed.

Teaching-learning strategies and methods

The main teaching-learning strategies identified in the analyzed courses were (i) the processing of problems to articulate disciplinary contents; (ii) integration between simulated and real problems, and (iii) construction of intervention projects by multiprofessional groups or teams.

Concerning the processing of problems, Bransford et al.[45] argue that, differently from approaching abstract themes, dealing with contextualized problems favors the construction of meanings.

By articulating contextualization and the development of complex thought, Morin[23] highlights the insufficiency of linear thought, which presents a simplifying and unidimensional view of causality by abstracting the subject from their context and disregarding the values and relations that singularize situations.

The utilization of problems from practice as triggers of the teaching-learning process questions the logic according to which theory precedes practice and practice is subordinated to theory. The inversion in the theory-practice relationship demands a deeper review of the conceptions we have about "practice". This reflection is situated in a fertile line of theoretical discussions that place learning in the workplace at the center of the discussions.

Reich and Hager[46] mention four relevant dimensions to amplify our conception of "practice". The first dimension is related to the technical-scientific rationality; the second, to the socio-materiality of practices; the third, to the body-mind articulation; and the fourth, to a relational perspective. Regarding the first dimension, these authors state that practice is more than a locus for the application of theory; it is a "collective, contextualized process that combines knowing, working, organizing,

learning and innovating"[46] (p. 114). The second dimension represents the materiality of socially constructed objects and artifacts, which are inextricably associated with practices. The third breaks the "mind-body dichotomy, as it is considered that practice is 'em-bodi-ed', as we work with our bodies"[46] (p. 114). Finally, the relational dimension involves different interactions between subjects and between them and objects.

To exemplify this, Reich and Hager[46] provide results from their research with orchestra musicians, showing the relationships between professionals and groups of instruments and between produced sound, acoustics and type of audience. The image of musicians with their different types of expertise in playing instruments can be associated both with the construction of knowledge and practices by the multiprofessional groups in the analyzed courses and with the interactions produced by healthcare teams in the context of SUS. As for the methods used to explore problems - simulated or real -, active teaching-learning methodologies were employed, developed in small multiprofessional groups. These groups were formed by participants with diverse professions, monitored by a teacher playing the role of facilitator of the produced interactions[26-36].

The active methodologies used were problem-based learning[47], problematization[48,49], and team-based learning[50]. As common characteristics, these methodologies require that students have an active participation in the teaching-learning process, establishing educational objectives, planning and constructing intervention projects. Teachers are responsible for supporting the enhancement of capacities to understand and transform reality[45].

By stimulating participants' engagement in the learning process, promoting the identification of previous capacities, considering different explanations for the processed problems, and supporting the search for better evidences to amplify their explanatory capacity, the active methodologies favor the identification of connections and bridges between the simulated and real practice axes and between the perspectives of different professions, enabling the construction of new knowledge and practices[47-50].

Even though learning is necessarily individual and singular to each subject involved, the collective and multiprofessional nature of the knowledge construction process imposes the recognition of the interaction among different thought collectives and styles.

Concerning the interactions produced in the encounter among professionals and between them and people receiving care, Feuerwerker[51] mentions the presence of subjectivation processes, which are connected with the particular rationalities of each career. According to the author, in these encounters, knowledge, intentions, values and conceptions are mobilized beyond the mastery of knowledge and techniques that ground the practice of each profession.

Thus, when we explore problems of the labor world and consider professional practices as triggers of learning processes, we allow the emergence of the rationalities that explain them, as well as the thought styles constructed from different thought collectives.

According to Fleck's approach, each thought collective, defined by a social unit of the community of specialists, establishes the presuppositions on which knowledge and practices related to the respective discipline or profession must be produced. Even the specialists' scientific productions are crossed by complex knowledge connections that involve the two areas or circles represented in Fleck's approach[37]. The inner circles encompass professionals who produce scientific knowledge and are considered the main epistemological authorities in a given knowledge field, and the external circle is formed by "enlightened laypeople" who disseminate information from this field in popular media (Figure 2). The courses' students can be considered generalists, belonging to the esoteric circle.

To Fleck[37], knowledge and practices produced in the esoteric and exoteric circles are reciprocally influenced, being constructed in the social interactions determined by the history of societies, including the very production of scientific facts.

Camargo[18] explores the construction of the biomedical thought style according to Fleck's approach, explaining that this rationality, although with specificities, is present in the thought collective of many health professions. The creation of an interprofessional thought style necessarily requires the amplification of the biomedical rationality.

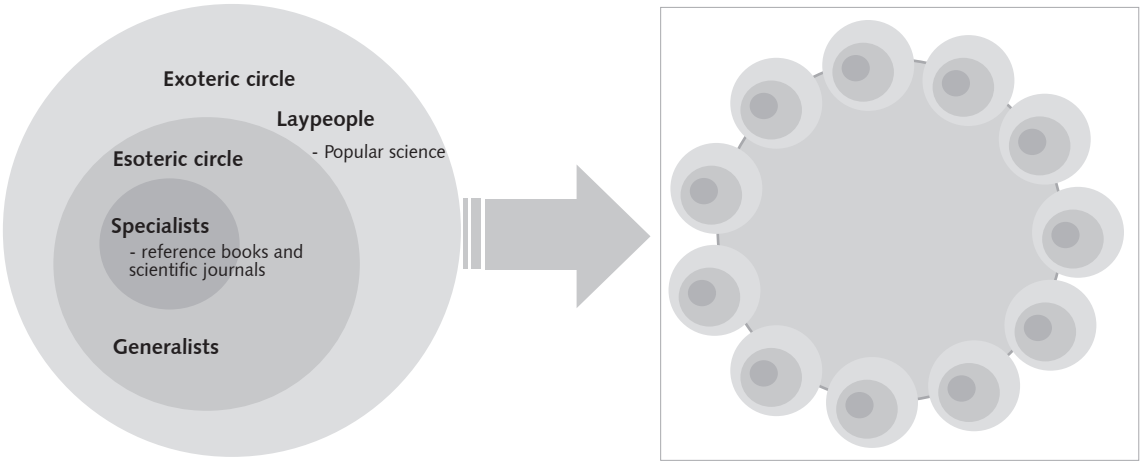

Figure 2. Thought collective [37] adapted from Camargo[18] and interaction of different collectives in a multiprofessional group

Achievements and new challenges in interprofessional education

One of the achievements is that processing problems of professional practice, either simulated or real, according to active methodologies and in multiprofessional groups tends to favor the interdisciplinary and interprofessional approaches by means of the interaction among thought collectives and the dialog between different rationalities, enabling the construction of a thought style based on collaborative practices.

D'amour et al.[52] believe that the socialization process of values, beliefs, and attitudes socially constructed by different professions is relevant. This process plays a critical role in the construction of capacities for an effective collaboration among professionals. Rossit et al.[53] have confirmed this idea in a study with graduates from courses with a multiprofessional approach, highlighting that the recognition of the singularity of different professions strengthens professional identity in collaborative work.

Organizing educational activities targeted at the collaborative construction of intervention projects by multiprofessional teams, in turn, promotes the engagement of professionals and the production of better care practices. In this sense, although Zwarenstein et al.[54] show there is sufficient evidence that collaborative practices have a positive impact on care delivered to specific groups, D'amour et al.[52] emphasize the lack of evidence to correlate multiprofessional educational initiatives with improvement in the system's results without other determinants of the health system's organization being simultaneously addressed.

Regarding the professionals' opinion about collaborative practice, a study carried out by Casanova et al.[55] investigated the perception of residents from thirteen multiprofessional programs and found that the students were satisfied with teamwork. This study reinforces the pertinence of this strategy, as it found that the programs emphasized the team's accountability for clinical cases and care plans, the centrality of patients' needs, and teaching-service articulation. On the other hand, the investigation conducted by Matuda et al.[56] about Family Health professionals' perception of collaborative work reveals tensions deriving from oppositions between practices centered on procedures and practices targeted at users' needs, pointing to disputes between thought styles and models of health services organization.

Last but not least, the strategy of establishing bridges between teaching-work and between simulation-reality represents a challenge in interprofessional education due to technological innovation in the context of traditional curricula. In the area of health, this articulation requires the inclusion of education in the context of SUS, aiming at the production of collaborative practices that promote an interprofessional thought style. According to Davini[57], the incorporation of teaching and learning in the daily routine of organizations

> substantially modifies educational strategies, based on practice as the source of knowledge and problems, problematizing the very act of doing; places people as reflective actors of practice and builders of knowledge and action alternatives, instead of receptors; involves the team or the workgroup in an interactive process that aims at the exchange of multiprofessional experiences and interdisciplinary perspectives; amplifies educational spaces outside the classroom and inside organizations, in clubs, associations and in the community. (p. 44)

Final remarks

The image of a quadrangle proposed by Ceccim and Feuerwerker[19] to present the intertwined articulation between education, management, healthcare and social control practices translates the complexity of the challenges for health education and healthcare according to an interdisciplinary and interprofessional approach.

The creation of an interdisciplinary and interprofessional thought style in the area of health will only be consolidated if we amplify, disseminate and potentialize educational and work experiences that produce interactions among different thought collectives and investigate the impact of these actions. Considering this context, the strategies employed in the educational initiatives analyzed here proved to be alternatives that are coherent with this objective because they favor relationships marked by solidarity and collaboration, which imply inclusion, acceptance and respect, potentializing the production of new meanings about healthcare oriented to health needs and grounded on interprofessionality.

When we weave cooperative and collaborative relationships in diversity, we open ourselves to the recognition of distinct thought collectives and we investigate and problematize the rationalities and values present in our discourses and practices. Understanding that thought styles are socially constructed amplifies our possibility of becoming more conscious of our role in this construction and potentializes our capacity for redefining our healthcare practices.

Authors' contributions

Valéria Vernaschi Lima and Eliana Claudia de Otero Ribeiro participated in all the stages of the development of the manuscript. Roberto de Queiroz Padilha and Carlos Alberto Mourthé Júnior participated in the design of the methodology, in the discussion of results, and in the review and approval of the final version of the manuscript.

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