Pedagogical experiences for the construction of interdisciplinary in public health

Experiências pedagógicas para a construção da interdisciplinaridade em saúde coletiva

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ABSTRACT This article narrates the experience of an interdisciplinary practice of research, teaching and cooperation for the intersection between health, environment, production and work from the constitution of the Laboratory of Health, Environment and Work (LASAT) and contribution to the Postgraduate Program in Public Health at the Aggeu Magalhães Institute/Oswaldo Cruz Fundation (PPGSP/IAM/FIOCRUZ). LASAT was instituted in 1997, one year after the creation of the PPGSP. Its group of researchers recognized the complexity of its research object and sought new epistemic frameworks and adequate methods following a systemic and interdisciplinary perspective. The objective of this article is to present the main operational concepts adopted and academic products obtained. The method was the analysis of the reports of the experiences of the LASAT researchers regarding the course of formation of the own team; research projects carried out; compulsory and optional subjects offered; and significant cooperation activities. In all activities, it was sought to illustrate how interdisciplinarity was implemented. It presents as results the set of concepts adopted and some effective academic products, concluding with the challenges of consolidating the new area of concentration, expand the technical-scientific cooperation network and constitute an interdisciplinary support network for the PPGSP.

KEYWORDS Interdisciplinary placement. Public health. Environmental health. Teaching.

RESUMO *Este artigo narra a experiência de uma prática interdisciplinar de pesquisa, ensino e cooperação para a interseção entre saúde, ambiente, produção e trabalho, a partir da constituição do Laboratório de Saúde, Ambiente e Trabalho (Lasat) e sua contribuição para o Programa de Pós-Graduação em Saúde Pública do Instituto Aggeu Magalhães/Fundação Oswaldo Cruz (PPGSP/IAM/Fiocruz). O Lasat foi instituído em 1997, um ano após a criação do PPGSP. Seu grupo de pesquisadores reconheceu a complexidade dos objetos de pesquisa e buscou novos marcos epistêmicos e métodos adequados seguindo a perspectiva sistêmica e interdisciplinar. O objetivo deste artigo é apresentar os principais conceitos operativos adotados e os produtos acadêmicos obtidos. O método foi a análise dos relatos das experiências dos pesquisadores do Lasat quanto ao percurso de formação da equipe; projetos de pesquisa realizados; disciplinas obrigatórias e opcionais regulares; e atividades de cooperação significantes. Em todas as atividades, buscou-se ilustrar como a interdisciplinaridade foi aplicada. Apresentam-se como resultados o conjunto de conceitos adotados e alguns produtos acadêmicos efetivados, concluindo com os desafios de consolidar a nova área de concentração, ampliar a rede de cooperação técnico-científica e constituir uma rede interdisciplinar de suporte para a PPGSP.*

PALAVRAS-CHAVE *Práticas interdisciplinares. Saúde coletiva. Saúde ambiental. Ensino.*

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Introduction

Given the complexity of the problems where health issues are articulated, production, work and ambient, part of the researchers of the Post-graduation Program in Public Health, implemented in the Aggeu Magalhães Institute, of Fundação Oswaldo Cruz of Pernambuco, in 1997, had to create a research nucleus named Laboratório de Saúde, Ambiente e Trabalho (LASAT)

To meet the complexity of research problems that arose in the territories, we sought for adequate epistemic and methodological approaches. Were necessary dialogues with different fields of knowledge. To that end, besides the researchers and teachers with expertise in the area, it was required the participation of external scientists and philosophers, that reflected on the same issues.

Academic guests responded to our requests, and we will mention some in order to illustrate. In 1997, we received support from Dr. Guy Duval, Professor of the Universidade Nacional Autônoma do México, member of the team of the epistemologist Rolando Garcia, Argentine, collaborator of Jean Piaget, Switish, of the Centro Internacional de Epistemologia Genética (CIEG), in Geneva, that emigrated to Mexico. Garcia created there a center for interdisciplinarity and complexity issues applied to territorial problems related to the drought and to the production of food[1,2].

From 1998 to 2004, the epistemologist Juan Samaja, Argentine, Professor of Methodology and Science of the University of Buenos Aires, offered us courses of semiotics and dialectics to comprehend the process of construction of data applied to the studies in health. The scientific method to approach the complexity of health was discussed by him, from the concept of social reproduction, as analysis category of the process that determines it[3].

We learn how the dialectics modeling can be built aiming to overcome the data fragmentation, that prevent the articulation of the problems that challenge the public health field[4-6]. Curiously, during this period, Juan Samaja had the chance to know the work of Milton Santos, emerging, then, among us, the idea of organizing a course titled 'Methods for a Miltonian epistemology', that, later, resulted in an article published[7] by him. Also, the dialogues with the epidemiology were deepened, with a critical approach from Samaja, for instance the randomized sampling procedure, classicaly used, but not adequate to the complexity of the problems that we highlighted[8].

Other researchers made important contributions to this path. Renato Lieber, specialist in production processes and worker's health, of the Universidade Estadual Paulista (Unesp) – Campus de Guaratinguetá-SP, contributed with the critics of the risk concept applied to the causality topic in health[12]; Jaime Breilh, Ecuadorian epidemiologist, builder of the critics epidemiology, developed the operational modeling treat the social determination of health, that support many of th researches in the LASAT[9]; Pedro Luiz Castellanos, epidemiologist from the Dominican Republic, that work in collaboration with Samaja, introduced in his systemic modeling of causality in health three hierarchic analysis levels: singular, particular and general[10], quite useful to treat the data of the populations and their territories; Anamaria Tambellini, Brazilian researcher that, since 1970s, studies relations between health, ambient, production and work and that introduced the ecological- social- sanitary concept to treat research objects in those articulations[11].

The developing of health surveillance of the worker and environmental, with conceptual and methodological innovations, was carried out by the Brazilian researcher Lia Giraldo da Silva Augusto, initially, in the region of the Baixada Santista/SP, and, afterward, as a LASAT researcher, providing fundamental dialogues to the praxis in the health care services[12].

With these and other theoretical-methodological resources, the LASAT adopted the interdisciplinary perspective to act in research,

academic formation and technical cooperation, in meeting the demands of public policies and social movements.

Integrated studies for complex problems, where the functioning of all the system is at steak, depend on the collective work rooted in shared conceptual, methodological and epistemic marks[1].

The target of this paper is to present some of the academic products of the LASAT that illustrate its interdisciplinary practice (key-concepts, research, education and technical cooperation) and the support to the activities of the PPGSP/IAM.

Methodological procedures

It is an hermeneutic study. The information for the analysis was collected considering the period from January 1997 and June 2021, having as a mark the year of the implementation of the LASAT. Initially, we sought to describe the experience of the formation of the team. The five researchers that at present compose the Laboratory participated in this narrative. The narrations were systematized from the analytical categories containing significant aspects to illustrate the interdisciplinary approaches of the research, in education and in technical cooperation.

To broaden the comprehension of the contribution of the LASAT in the ambit of PPGSP/IAM, relating to the interdisciplinarity, were included secondary data sources, such as the research group of the Saúde Ambiental do Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), the investigation lines and the discipline menus offered by the group of the researchers of the LASAT.

The hermeneutic analysis of the critical-reflexive type highlighted the main key operational concepts common to all researchers of the LASAT in their academic activities.

The results were presented in order. Firstly, the group of those concepts, and, next, the highlighted activities that best illustrate the interdisciplinary approach. As final considerations, are presented the challenges for the LASAT as a proactive group implied in the development of the PPGSP/IAM and of the collective health.

Results and discussion

Thereafter, it is presented the synthesis of the main concepts adopted that guide the research and the coordinated disciplines by the group of researchers of the LASAT in PPGSP. Those derive from a series of important theoretical-methodological for the academic acting related to the social determination of health where are implied the worker´s health, the health vulnerability processes and environmental damages. There is a permanent critical reflection for the health disciplinary fields, such as clinics, epidemiology, toxicology, social communication, geography, sociology, economics, pedagogy, among others. The referenced authors were selected by the protagonism they had in the formation of the research group of the LASAT, however there are many others that compose the significant acquis for Collective Health.

Health concepts

It is taken as a conceptual reference Georges Canguilhem, for whom health is understood as the capacity to respond to physical and mental processes. According to this author, all those vicissitudes form constitutive part of the history of the individuals. Health shall, then, be thought as the capacity to face them[13].

This author highlighted the concept of vital normativeness and its relation with the ways to go through life[13]. Following this line, Sérgio Arouca, in his doctoral thesis, leads to a critical understanding the values behind a certain group of propositions contained in the prevention discourse[14]. Ricardo Ayres[15(143-144)] agrees and supports Arouca's analysis, that discusses the "weaknesses perceived in the prevention practices", questioning the

normative effectiveness of the conservative discourses[15]. Everardo Nunes[16] presented a complementary understanding that health is a result of an organic process caused by the representations and by the demands of the social structure historically defined, that go far beyond the simple biological expression of the organism.

Social reproduction

Samaja presented an operating mode for study of the phenomena that define health-illness-care, that shall be comprehended from the interdependence of the systems that constitute them, in their hierarchical that involve the social reproduction and its reproductive dimensions: biocommunal, of self-conscience and of the technical-economic conduct of the eco-politics[5,17] There is a hierarchy in the determination of these phenomena according to their complexity, in compliance with a dialectics of overcoming, suppression and conservation. The processes go from micro to macro levels in a structuring manner, and in the opposite sense, in a normatization/re-signification manner.

Almeida Filho[18], when reflecting about the COVID-19 issue, illustrates Samaja's thought, demonstrating the emerging levels of the phenomena existing in this pandemic: micro-structural (molecular or cellular), micro-systemic (metabolism or tissue); sub-individual (organ or systems with their pathophysiological processes); clinical (individual cases; with its singularities); epidemiological (vulnerable population, iniquities); eco-system (interactions with the ambient, the production, the economy);and symbolic (semiotic, linguistic, cultural,scientific, and technological), demonstrating the power of this vision.

Complexity

To operate the expanded concept of health, it is fundamental the Theory of the Systems and of the Complexity. Based on this model, order and disorder are inserted in interaction networks that form a tetra grammar matrix, in the qualum of the terms acts and retroacts on the others, in a probabilistic, flexible, dialogic, generative manner, opened in a permanent organization and reorganization perspective[19]. Mario Tarride[20], professor of the University of Santiago/Chile, starts from the assumption that public health has an announced complexity, however, not considered, what is one of the roots of its crisis, and proposes a new public health. The confrontation of this crisis, for this author, requires the understanding of health in its socioproductive-environmental- cultural interactions and interdependencies.

Autopoiesis

Humberto Maturana and Francisco Varela are two Chilean authors that studied the living beings and developed the autopoiesis concept, for the processes that support them in their evolution, with relative stability, through the necessary structural coupling that allows the exchanges with the environment and the adaptation processes. Those authors also gave other contributions coming from Piaget's constructivism, demonstrating how the observed and the observer are interdependent and bringing the ethical dimension of making science with conscience. it is an important concept to think ecology beyond biology[21].

Territory

Having the geographer Milton Santos as guiding author, it was adopted the concept of territory as life scenario, constituted by symbolic, structure and power relations, that guarantee its existence and dynamics[22]. This introduced concept was fundamental to be operated by other disciplinary fields, such as the social sciences' and the public policies'. It embraces two dynamic and explanatory movements: one based on the idea of corporeality

produced in the relations of social class and of life reproduction, and other as contradiction that expresses a form of complementarity, that ends in the institutional space of governance.

the territory and its territorialities have as a basis the work developed, of the residence, of the shelter and habitat and the material and spiritual exchanges of life, of social relationships and of health care practices which they affect. The experienced territory presents a dialectic relation between the fact and the belonging feeling of the subjects[23].

Interdisciplinarity

For Garcia[1], the complexity of a system is not determined only by the heterogeneity of the elements or subsystems that compose it, and whose comprehension is, in general, dominating diverse branches of the sciences and of the technologies. Besides the heterogeneity, there is the inter-definability and interdependence of the functions that this subsystems (elements) perform in the inside of the total system. For that reason, this characteristic prevents that the system is known only by the sum of disciplinary or sectoral studies. There is a dialectic movement of double directionality in the processes that modify the subsystems and the system in its totality.

Garcia does not stem from a definition of interdisciplinarity in an abstract manner. The necessity of the interdisciplinarity comes from the definition 'objects of study' and, later, of the methodological path for studying it. The integrating character of the method can only be performed by a team with common epistemic landmarks and conductive question The author warns that the interdisciplinary studies do not exclude in any way the specialized studies, however, in the case of complex problems, the process of disciplinary differentiation shall stem from the common question and, after a in-depth study by a given discipline, shall be integrated in the comprehension of the totality of the problem, and not to remain in the partiality.

Eco-social-sanitary model

Tambellini[11] formulated an understanding named eco-social-sanitary. It analyses the limits of the models adopted by Public Health and presents a new conception that makes possible to integrate the ambient, the ecology, the production and the work in the studies of the populations' health.

It criticizes a previous model, in which the ambient is seen as exterior to the aggressor and to the harmed man. This is founded in the unidisciplinary biological model. Has as characteristics the fragmentation and its anthropocentric hallmark. The epidemiological model adopted is the one of the infectious and parasitic diseases. The human is seen as a susceptible host, non adapted before the aggressive agents (bacteria, viruses, protozoa, helminths) The ambient is placed in a generic manner as a group of conditions treated as factors. This causality model is linear, and the consequences are measured as positive or negative.

It also criticizes a second model of reduced ecologic vision that does not support the comprehension of the health-disease process in its complexity. The social aspect was suppressed. The human being was comprehended only as one more species, and the disease is resulting from its introduction in niches of pathogenic species that promote their adaptive failure (parasitism). The model to think the eco-social-sanitary perspective introduces the ambient as a system[11].

Emancipatory pedagogy

The movement for changes in the education of the health care professionals, driven by the guidelines of the Unified Health System, places as prerogative the existence of institutions capable of quality formative processes, connected to the health care necessities. In order to achieve this, it is necessary to update the education practice to a model centered in the student, using autonomy promotion

strategies, for the production of knowledge as social transformation mechanism.

The patron of Brazilian education, defended the theory called critical pedagogy and of the affection, that constitutes an opened dialogue, exchange of knowledges and empathy. The focus of the process education-learning shall be sensitive to the students' life story, recognizing, also, non -academic knowledges, through collective construction, resulting in a freeing practice[24,25].

As a piagetian constructivist, Freire develops his pedagogy, where the educator is no longer the protagonist in the education process and in the teaching of finished contents, fomenting the apprenticeship through thinking and through the problematization, from each subjects´repertoire, contributing to the formation of critical and autonomous citizens.

Data matrices

Samaja[4(161)] characterize the scientific data as a complex construction that has an internal construction that embraces four dimensions: unit of analysis, variable, value of the variable and indicator. The unit of analysis consists in what one wants to describe or analyze: people, a service, a municipality; the variable is a descriptor (age, sex, gender, weight); the value of the variable is the name or number that it assumes; the indicator is the synthesis that condenses the data produced. There should not be only one data matrix, but one system of data matrices, that have a structural complexity All investigation shall have at least three matrices: in the ambit of the anchoring of the object of study; of the context; and of the subtext. Thus, it is obtained a hierarchic structure of the object, expanding possibilities of systemic apprehension[5].

Social determination of health

Breilh[26] brings the social determination of health as an operating concept for Collective Health and revolutionizes the discipline of epidemiology with the perspective of a Critical Epidemiology. For him, the determination of health, first, goes through certain macro phenomena of the society. It is the economic model as ontological element of this determination. It proposes a model in which the capitalism is presented as a mechanism of exploitation and domination, that pressures nature, workers, life in general, imposing unsustainable hazard conditions. This process of acceleration is made based on pillaging, taking possession on the land, the water, the vital resources of a people. For this reason, Breilh is a fundamental author that helps in the comprehension of the process health-disease in the transforming action together with the social movements.

Examples of the application of interdisciplinarity, intersectorility and of the complex though in LASAT

To illustrate, we begin with one of the experiences of LASAT in the path of a sanitary event occurred in 1996. It is the tragedy of the deaths of the haemodialysis patients in Caruru-PE. Investigations were made, and, based on classical epidemiology, hypothesis were made that did not lead to any comprehension of the problem. This question was evaluated in a doctorate thesis, broadening and complexifying the study. The management of hydric resources and the sanitation conditions were evidenced, and the analysis of the responsabilization of the public and private sectors allowed to move away the simplistic imputation of causality reduced to the contamination of the water by algae cianoficea toxins.[27].

As a result of our complex reflection on this problem, we received an invitation to participate in the Conselho de Meio Ambiente (CONDEMA) of Pernambuco, where we suggested the creation of a technical group about the pesticides topic, that originated, in the beginning of the year 2000, the articulation of a space to address the pesticides damages,

the Fórum Pernambucano de Combate aos Impactos dos Agrotóxicos e Trabalho[28].

The first books published by the LASAT group, related to the results of the researches, brought to evidence the theoretical and methodological support used as testing of the systemic approaches used in the area of health care, work and ambient[29-33].

The study of the territorial complications of oil refinery and of the productive activities implemented in the Suape pole collaborated to the strengthening of the local social organization in the perspective of the popular surveillance in health[34,35]. The documentary 'Suape, desenvolvimento para quem?' and its diffusion in the format of cine-debates made possible an innovative manner of taking the researches results to the affected territories[36-38].

In the topic of pesticides, the interdisciplinar perspective allowed the gathering of different disciplines in a critical perspective. It is worth highlighting an activity carried out between the years 2009-2012, along with Agência Nacional de Vigilância Sanitária (ANVISA), turned to the toxicological reevaluation of 11 Active Ingredients (IA) of pesticides.

Those critical approaches gave materiality to the production of thesis[39], and also books, dossiers[40,41] and technical documents organized in partnerships with other entities. Other innovative production was the development of social media channels, such as the platform and the Instagram Beiras d'Água; the Youtube Zika channel and education in health for the publication of mini-videos. We highlight the documentary 'Invisíveis', produced on the vulnerability originated by the transposition of the São Francisco river.

In August 2019, when there was the oil spill on the Brazilian coast, that affected all the northeastern coast, the LASAT team organized a situational observatory and promoted interdisciplinary, intersectoral and paticipatory meetings for the analysis and the discussions about the decision-making facing the tragedy.

Laboratório de Pesquisa Interdisciplinar e Desenvolvimento Humano (LAPIDEH)

In 2002, the LASAT researchers highlight the comprehension of how the interdisciplinarity topic was being understood by the Conselho Nacional de Pós-Graduação (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Capes). It was clear that it was missing an adequate conceptualization in order to characterize the problems typified in this categories. To that end, it was conducted an articulation with professors of The Federal Universities of Pernambuco and Alagoas (UFPE e UFAL), The Pontifical Catholic University of São Paulo (PUC/SP) and of the National Institute for the Quality and Service control of Fiocruz, named LAPIDEH. Considering these reflections, it was proposed an interprograms discipline necessary to develop topics that articulate health, ambient and human development. Following, we displayed disciplines of the PPGSP/IAM that illustrate that the concepts already pointed out are internalized.

Disciplines consolidated by the LASAT in the PGSP/IAM

DISCIPLINE 'INTERDISCIPLINARITY, ENVIRONMENT AND HUMAN DEVELOPMENT'

After the pedagogical experiences of the LAPIDEH, were formalized in the PPGSP/IAM an elective and a mandatory discipline, that still exist, with visiting professors coming from the institutional articulations.

In the elective discipline Interdisciplinarity, Environment and Human Development, in its

first versions, all the teaching staff watched the class of one of the colleagues in the morning time, and in the afternoon performed a critical analysis of the contents presented and of the didactic employed. Simultaneously, the students studied the bibliographic material to be used in the following class. Divided in groups, the students chose metathemes, recovering and applying critically the concept learned. This discipline continues to be actual and is still offered for the *stricto sensu* courses, being a central discipline for the concentration area of Health, Environment and Work (SAT).

ADVANCED RESEARCH SEMINARS

It is a mandatory discipline that brings a bold articulation on the system theory, the complexity, the interdisciplinarity and the social determination of health. Articulation that emerged in the Lapideh debates and that received contributions from the Professor Aparecida Nogueira, of the Laboratory of the Imaginary of the Anthropology Department of the UFPE, and of the Professor Edgar de Assis Carvalho, of the Complexity Nucleus of PUC/SP.

The discipline had in its path varied pedagogical experiences beyond the specific content, among them, the experience of working on the theme of life stories and ideas of the researchers and doctorate students. In this activity, the students interviewed researchers of different areas of research, generations and genders of the IAM, in order to understand the academic path considering their life stories. They also exercised the elaboration of memorials and of final seminars, opened to the community.

This discipline was articulated during 18 years with another mandatory discipline delivered by the Professor and Philosopher Fermin Roland Schramm, of the Escola Nacional de Saúde Pública Sergio Arouca (Ensp), a cooperation with the philosophy of science and bioethical, centered in the main philosophers of constructivism.

DEVELOPMENT OF THE DISCIPLINE POLITICAL ECOLOGY, ENVIRONMENTAL JUSTICE AND HEALTH

The discipline Political Ecology, Environmental Justice and Health was inaugurated in 2015 and emerged from the importance of understanding the harmfulness processes that settle in the territories, resulting from large enterprises. The communitarian integral reparation was incorporated as an axis of the discipline, inasmuch as environment and communities are made vulnerable. To that end, we conducted two versions of the International Course, inviting the researcher Adolfo Maldonado, of the NGO Acción Ecológica, from Ecuador.

DEVELOPMENT OF THE DISCIPLINE DECOLONIALITY AND KNOWLEDGE DIALOGUES IN THE TERRITORY

Recently created, this discipline started to be offered in 2018, in articulation with visiting professors of Geography of the UFPE and of the Sociology of the Federal Rural University of Pernambuco (UFRPE). Many views, coming from the 'decolonial' approaches, are applied in comprehension of the power relations since remote times from colonialism to coloniality of the actual power, of the contemporary being and knowledge. Emancipatory themes and of the anti-segregationist fights are deepened during the discipline.

The present article, modality experience report, did not make possible to explore deeply the epistemic and pedagogical aspects involved, being this its main limitation. In a future and broader article, it will be possible to explore the epistemic framework of the disciplines of the area of concentration of the SAT and to verify the repercutions for the PPGSP/IAM.

The interdisciplinar perspective, that seeks for the critical thinking and the study of the determination processes, in the experience reported here, finds resistances through the crystallized knowledge fields by methods of

the causal sciences, being this another limitation that challenges us.

Conclusions

After 25 years of academic action, the LASAT has a successful consolidation of the interdisciplinarity to orient the research making in complex themes, especially in problems that affect the human collectivities in the life and work territories that are being studied in their concentration area of the PPGSP/IAM.

The long process of maturation and of research foundation of complex objects was the conductor of the interdisciplinarity. It is clear that it is a dialogic process, that makes the scientific acting closer to the socioenvironmental phenomena and of the demands of the territories. An apprenticeship full of gratitude for the masters that announce us what to do.

The LASAT and its group of teachers and students are implied in the development of the PPGSP/IAM and of collective health, and identify the following challenges to be worked on: to consolidate the areas of concentration of the SAT in the PPGSP/IAM, broadening the offer of new disciplines; to expand the dialogue with other Higher Education Institutions (IES) interested in the perspective of the interdisciplinarity; to restructure the exchanging network with egresses of the area of concentration Health, Environment and Work; to broaden the dialogue with social groups in the territory in order to deepen the research participative methods; to expand the teacher formation in the complexity and interdisciplinarity topic, starting from summer courses, inviting researches of recognized academic expertise.

Collaborators

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