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ARTICLE

FROM THE PEDAGOGICAL PROJECT TO THE CLASSROOM: INTERDISCIPLINARITY IN THE CONTEXT OF THE BC&T COURSE

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ABSTRACT: This study aimed to characterize interdisciplinarity within the Bachelor of Interdisciplinary Studies in Science and Technology - BC&T degree at a federal university located in the state of Minas Gerais, based on the proposal of the 'Guiding References for Interdisciplinary Bachelor's and Similar'. We are grounded on the works of Lenoir (1998), Japiassu (1976), Coimbra (2000), Fazenda (2010), Fortunato and Confortin (2013), Tosta (2011), Almeida (2010) and Morin (2003). We aimed to check if the course, through its Pedagogical Project and the didactic-pedagogical actions, is in line with the guidelines and principles of the Bachelor of Interdisciplinary Studies - BIs regarding interdisciplinarity. For this, we carried out a qualitative and quantitative study with bibliographic and documental research, and a field study, using questionnaires applied to fifth and sixth-semester students and semi-structured interviews with professors. We found out that, in general, in the context of the course, the interdisciplinary methodology is not adopted as established in BIs' guidelines and principles. Based on data analysis and supported by the theoretical contribution of the consulted authors, we present some proposals to contribute to the dissemination of interdisciplinarity in the teaching and learning process of BIs. In addition, we aim to contribute to the scientific development of the theme enabling new discussions to ensure the effectiveness of interdisciplinary actions in educational institutions.

Keywords: interdisciplinarity, interdisciplinary baccalaureate, pedagogical project

DO PROJETO PEDAGÓGICO À SALA DE AULA: A INTERDISCIPLINARIDADE NO CONTEXTO DO CURSO BC&T[1]

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RESUMO: Este estudo objetivou caracterizar a interdisciplinaridade no âmbito do curso Bacharelado Interdisciplinar em Ciência e Tecnologia – BC&T – de uma universidade federal localizada no estado de Minas Gerais, com base no proposto pelos Referenciais Orientadores para os Bacharelados Interdisciplinares e Similares e respaldado em obras de autores como: Lenoir (1998), Japiassu (1976), Coimbra (2000), Fazenda(2010), Fortunato e Confortin (2013), Tosta (2011), Almeida (2010) e Morin (2003). Como questão de pesquisa, propôs verificar se o curso, através do seu Projeto Pedagógico e das ações didático-pedagógicas, se encontra em consonância com as diretrizes e os princípios norteadores dos Bacharelados Interdisciplinares – BIs – em relação à interdisciplinaridade. Para isso, foi desenvolvido um estudo de cunho qualitativo e quantitativo com a realização de pesquisa bibliográfica, pesquisa documental e estudo de campo, este último com a utilização de questionários aplicados a alunos do quinto e sexto períodos e realização de entrevistas semiestruturadas com professores. Em resposta à questão principal da pesquisa, foi verificado que, de um modo geral, no contexto do curso não é adotada uma metodologia interdisciplinar, conforme previsto nas diretrizes e princípios norteadores dos BIs. Com base na análise dos dados e apoiados no aporte teórico dos autores consultados, foram apresentadas propostas que visam contribuir para a difusão da interdisciplinaridade no processo de ensino e aprendizagem dos BIs. Além disso, previu contribuir para o desenvolvimento científico da temática de modo a possibilitar novas discussões que visem garantir a efetividade de ações interdisciplinares nas instituições educacionais.

Palavras-chave: interdisciplinaridade, bacharelado interdisciplinar, projeto pedagógico

FROM THE PEDAGOGICAL PROJECT TO THE CLASSROOM: INTERDISCIPLINARITY IN THE CONTEXT OF THE BC&T COURSE

DEL PROYECTO PEDAGÓGICO AL AULA: LA INTERDISCIPLINARIDAD EN EL CONTEXTO DEL CURSO BC&T

RESUMEN: Este estudio tuvo como objetivo caracterizar la interdisciplinaridad dentro del curso de Licenciatura Interdisciplinaria en Ciencias y Tecnología - BC&T en una universidad federal ubicada en el estado de Minas Gerais, con base en lo propuesto por las Referencias Orientadoras para Licenciaturas Interdisciplinarias y Similares respaldado por trabajos de autores como como: Lenoir (1998), Japiassu (1976), Coimbra (2000), Fazenda (2010), Fortunato y Confortin (2013), Tosta (2011), Almeida (2010) y Morin (2003). Para la investigación, propuso verificar si el curso, a través de su Proyecto Pedagógico y de las acciones didáctico-pedagógicas, está en consonancia con las directrices y principios rectores de los Bachilleratos Interdisciplinarios - BIs en relación a la interdisciplinaridad. Para ello se realizó un estudio cualitativo y cuantitativo con investigación bibliográfica, investigación documental y estudio de campo, este último con el uso de cuestionarios aplicados a estudiantes de quinto y sexto semestre y entrevistas semiestructuradas a docentes. En respuesta a la pregunta principal de investigación, se constató que, en general, en el contexto de la carrera, no se adopta la metodología interdisciplinaria previsto en las directrices y principios rectores de las IB. Basado en el análisis de los datos y sustentados en el aporte teórico de los autores consultados, fueron presentadas propuestas que pretenden contribuir a la difusión de la interdisciplinaridad en el proceso de enseñanza y aprendizaje de las IB. Además, preveía contribuir al desarrollo científico del tema con el fin de posibilitar nuevas discusiones encaminadas a garantizar la eficacia de las acciones interdisciplinarias en las instituciones educativas.

Palabras clave: interdisciplinaridad, titulación interdisciplinar, proyecto pedagógico

INTRODUCTION

This article introduces the results of a master's degree research[2] aimed at characterizing interdisciplinarity within the scope of the Bachelor of Interdisciplinary Studies in Science and Technology (BC&T) course at a federal university located in the state of Minas Gerais, based on what was proposed by the Guiding References for Interdisciplinary and Similar Bachelors and supported by works by authors who address the interdisciplinary theme, such as Lenoir (1998), Japiassu (1976), Coimbra (2000), Fazenda (2010), Fortunato and Confortin (2013), Tosta (2011), Almeida (2010) and Morin (2003). For this, a qualitative and quantitative study was developed through bibliographical research, documental research, and field study.

Interdisciplinarity discussed here refers to school interdisciplinarity[3], which aims to disseminate knowledge (LENOIR, 1998). It is understood as the insertion of cooperation methods between disciplines and other educational activities aimed at combating the fragmentation of knowledge, which may represent a possibility of bringing the university closer to the profile of the society in which it operates. In general, interdisciplinarity consists of "a theme, object or approach in which two or more disciplines intentionally establish connections and links with each other to achieve a more comprehensive knowledge, and at the same time diversified and unified." (COIMBRA, 2000, p. 58).

We intended to answer the following question: is the BC&T course, through its Pedagogical Project and its didactic-pedagogical practices, in line with the characteristics, guidelines, and guiding principles foreseen for Bachelor of Interdisciplinary Studies (BIS) concerning interdisciplinarity?

Initially, the study was concerned with considering BIS and interdisciplinarity in the process of reformulating Higher Education. We proceeded to approach the genesis of this graduation model in Brazil and the influences for its creation, its specificities, and its structure in the academic scope. In this context, interdisciplinarity was analyzed addressing its curricular, didactic, and pedagogical aspects.

For the characterization of interdisciplinarity, specifically in the documents and didactic-pedagogical actions of the course, a documentary research and field study were carried out, which consisted of the application of questionnaires to students in the fifth and sixth periods and semi-structured interviews with professors that make up its staff.

The analysis of the resulting information and results supported the elaboration of proposals and strategies aimed at the development of interdisciplinarity in the teaching and learning process of the course. In addition, the research intended to contribute to the scientific development of the theme to enable new discussions that aim to guarantee the effectiveness of interdisciplinary actions in the context of educational institutions.

BACHELOR OF INTERDISCIPLINARY TUDIES DEGREES AND INTERDISCIPLINARITY IN THE HIGHER EDUCATION REFORMULATION PROCESS

When one considers the current social scenario in which the production and transmission of information predominate at extraordinary speed, in a moment of globalization that is not only cultural but also economic and political (SEVERINO, 2000), it is possible to perceive the essential character of the formation of citizens and professionals whose profile refers to autonomy, flexibility, adaptability, effective interpersonal relationships, critical thinking, in addition to the ability to positively interfere in the face of increasingly polydisciplinary, transversal, multidimensional, transnational, global and planetary problems (MORIN, 2003).

The institution of higher education, more specifically the university, has the fundamental role of forming and managing actions that make this cultural and social growth possible. Educational action

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3 According to Lenoir (1998), considering the desired purposes, the angle of access to the real retained, and the choice of the objects treated, four fields of operationalization of interdisciplinarity are distinguished: scientific interdisciplinarity, school interdisciplinarity, professional interdisciplinarity, and practical interdisciplinarity.

in this context is understood as a complex network of interactions and represents a place where processes of knowledge production and interrelationships between political, cultural, institutional, and instructional dimensions are structured. A multiplicity of meanings and senses must be present in it, and the work dynamics must be permeated by two fundamental tensions: one between the singular and the plural, and the other between the particular and the universal (TOSTA, 2011).

However, according to Almeida (2010, p. 71), in activities carried out by universities, content, and information are often passed on to students without them being awakened to think about it. "The educational system becomes an information market and forms database-students. Even with a head full of information, they don't know how to articulate so much and so important data".

As one of the determining factors of this plastered transfer of information, the very structure of the disciplines that make up the undergraduate courses is mentioned. In this sense, Japiassu (1976) points out that knowledge has reached such a point of fragmentation that interdisciplinarity appears as a state of need, and everything leads to believe that this is the product of a shattered intelligence. "In this domain, it even seems that reason has lost its reason, unbalancing the human personality. We are facing a scientific alienation." (p. 30-31)

> Our current University forms, throughout the world, an excessively large proportion of specialists in predetermined disciplines, which are therefore artificially delimited, while a large part of social activities, such as the development of science, requires men capable of a much broader angle of vision and, at the same time, an in-depth approach to the problems, as well as new advances that transgress the historical boundaries of the disciplines. (LICHNEROWICZ apud MORIN, 2003, p. 13)

Thus, interdisciplinarity emerges as an indispensable requirement in the development of the educational process and is seen as a possibility of training subjects with the characteristics required by the profile of today's society. It is characterized by the intensity of exchanges between specialists and the degree of real integration of disciplines (JAPIASSU, 1976), which changes the didactic objective of the educational process and the reason for the attitudes of professors who develop this pedagogy (CARNEIRO, 2018).

According to Fazenda (2002a), in a social context of internationalization characterized by intense exchange between people, the importance of interdisciplinarity is notorious. In addition to the development of new knowledge, it guarantees education, favors new ways of approaching social reality and new readings of sociocultural dimensions. As exposed by Souza and Fazenda (2017), interdisciplinarity offers the opportunity to think about how knowledge is constructed and how it is articulated with other knowledge, with social reality, and with the subjects around it.

Based on the above and with a focus on the insertion of an interdisciplinary educational approach, the courses of Bachelor of Interdisciplinary Studies – BIS – were created in universities in Brazil to reorganize undergraduate courses and update teaching and learning methodologies and practices induced by one of the proposals of the Program for Restructuring and Expansion of Federal Universities – REUNI –, which provided for restructuring of the academic architecture of federal universities (BRASIL, 2007). According to Veras, Lemos, and Macedo (2015), this initiative was influenced by the depletion of the professional undergraduate model and its impacts, such as, for example, "the high rate of university dropouts and lags in pedagogical methodologies and strategies." (p. 631)

The BIS refer to training programs at the undergraduate level of a general nature that led to a diploma and that provide for an organization with large areas of knowledge. These areas encompass the fields of knowledge, practices, technologies, and knowledge in a broad and general way. Among them, there are Arts; Life Sciences; Science and Technology; Natural and Mathematical Sciences; Social Sciences; Humanities, and others (BRASIL, 2010). It is characterized by adding general humanistic, scientific, and artistic training, aiming at the development of skills and abilities that enable the acquisition of autonomy for lifelong learning and indispensable characteristics for a satisfactory social insertion (ALMEIDA FILHO et al., 2010).

The organization of the BIS was inspired by the Bologna Process and the North American model – the American Colleges –, which already envisaged higher education in cycles, with broad and

general training and the possibility of choosing, by the student, the academic path and the subjects to be studied. In addition, its creation was based on proposals presented by the educator Anísio Teixeira for the conception of the University of Brasília (UnB), in 1960 (BRASIL, 2010). Through these university model proposals, Anísio Teixeira presented an idea of how university teaching programs should be: based on cycles of general education, organized by major areas of knowledge (ALMEIDA FILHO, 2008).

This structuring of higher education in cycles is divided as follows: the BIS, or first cycle, represent the university education space that aims at developing an important set of competences, attitudes, and abilities, transversal to technical competences, added to a training general with conceptual, ethical and cultural bases; the second cycle, optional, dedicated to professional training in specific areas of knowledge; and the third cycle comprises the postgraduate course, which may include students who have graduated from BIS (BRASIL, 2010).

As principles of BIS there are training based on interdisciplinarity and dialogue between areas of knowledge and curricular components; formative trajectories in the perspective of high curricular flexibility; focus on the dynamics of scientific, technological, artistic, social, and cultural innovation, associated with the interdisciplinary character of the challenges and advances in knowledge; permanent review of educational practices, bearing in mind the dynamic and interdisciplinary nature of knowledge production; integrated practice of research and outreach articulated to the curriculum; stimulus to individual initiative, critical thinking ability, intellectual autonomy, inventive, innovative and entrepreneurial spirit; valuing teamwork, among others (BRASIL, 2010).

As for the profile of the egress, there are characteristics such as the ability to communicate and argue in its multiple forms; the ability to act in frontier areas and interfaces of different disciplines and fields of knowledge; investigative, prospecting, seeking, and producing knowledge; the ability to work in teams and networks; the ability to recognize regional or local specificities, contextualizing and relating to the global situation; ethical attitude in the professional, academic and interpersonal spheres; flexible and open attitude towards the world of work; the ability to make decisions in scenarios of inaccuracies and uncertainties; the ability to use new technologies that form the basis of professional activities; the capacity for entrepreneurship in the public, private and third sectors (BRASIL, 2010).

An academic architecture based on interdisciplinarity is intended for BIS, a characteristic that should permeate all course activities in the search for greater curricular flexibility, more possibility of dialogue between disciplines, and more freedom for students to choose their training itineraries (BRASIL, 2010).

In this context, reference is made to school interdisciplinarity as the object of analysis of this study, which, according to Lenoir (1998), is divided into curricular, didactic, and pedagogical interdisciplinarity. According to the author, pedagogical interdisciplinarity is the result of work that begins with curricular and didactic interdisciplinarity, and the three together result in the effectiveness of interdisciplinary work within the scope of school education.

Regarding curricular interdisciplinarity, according to Lenoir (1998), it consists of establishing links of interdependence, convergence, and complementarity between disciplines that make up the course and is based on parameters such as the place and function of different disciplines, their reason for being, its structure, its study and learning objectives, among others, to compose a curricular organization based on an interdisciplinary structure according to the integrative orientations.

According to Palmade (apud LENOIR, 1998, p. 57), curricular interdisciplinarity is based on the understanding that "the notion of interdisciplinarity cannot be […] approached in a sufficiently safe manner if the starting point from which it is constituted is not clear." For Thiesen (2013, p. 607), "the curricular organization as a prescription certainly implies and modifies the curricular practice as acts of production and reproduction of knowledge". However, it is not intended to state that a curriculum based on interdisciplinarity is the guarantee of interdisciplinarity in the didactic-pedagogical actions carried out by professors in the course. "We defend that the curriculum can indeed be a movement in favor of interdisciplinarity, but not interdisciplinarity itself." (p. 598).

Also, the creation of disciplines is not envisaged as a contribution to curricular interdisciplinarity. Fazenda (2013, p. 19) points out that "the option that has been adopted, the inclusion of new disciplines in the traditional curriculum, only increases the information and further atomizes

knowledge." According to the author, the addition of disciplines to the curriculum, which already translated disciplinary knowledge, tends towards an increasingly disciplined knowledge, in which the main rule would only be greater policing of the boundaries of disciplines.

According to Paviani (2007), the basic problem of university curricula is in the traditional conception of the discipline and in the way of elaborating and executing teaching programs. Traditionally, disciplines tend to reinforce their autonomy when, in fact, they should consider the need to promote the discovery of knowledge within their borders. "In the past, subjects were taught. Today, we try to teach how to solve problems." (p. 142).

According to Lenoir (1998, p. 46), "the interdisciplinary perspective is not, therefore, contrary to the disciplinary perspective; on the contrary, it cannot exist without it and, even more, it feeds on it." According to Fazenda (2011), "what is intended, therefore, is not to propose the overcoming of a teaching organized by subjects, but the creation of conditions for teaching according to the dynamic relationships of the different subjects" (p. 89), aware that there is an immense network of connections between them that needs to be considered for the success of a deeper and more comprehensive analysis. (SOUZA et al., 2022).

Based on the understanding that the composition of the Curriculum Structure is a factor that contributes to the development of interdisciplinary practices within the scope of the courses, its organization, formatting, and presentation need to show the interconnection between the disciplines and portray forms of grouping and approximation between them to facilitate the planning of interdisciplinary actions that address disciplines of a given group and between these groups.

As for didactic interdisciplinarity, this is characterized by its conceptual and anticipatory dimensions, dealing with the planning, organization, and evaluation of teaching actions. It refers to the planning of activities related to the educational process based on approximation and arrangements between the specific contents of disciplines in a contextualized and interdisciplinary way (LENOIR, 1998).

When considering that the Guiding References for Interdisciplinary and Similar bachelor degrees foresee that BIS is a space for university education permeated by interdisciplinarity and dialogue between areas of knowledge and between curricular components (BRASIL, 2010), one can see the importance of the professor understanding that the underlying contents of their menus should be means for students to develop the expected skills and abilities. Also, on didactic interdisciplinarity, Lenoir (1998) mentions that it takes into account the curricular structure to preliminarily establish its interdisciplinary character, aiming to articulate the teaching contents and their insertion in learning situations.

The pedagogical interdisciplinarity is characterized by the updating, in the classroom, of didactic interdisciplinarity, to ensure, in practice, the placement of an interdisciplinary didactic model or models inserted in concrete didactic situations (LENOIR, 1998).

> The practice of the school context is the greatest reference for the selection and production of their knowledge because the pedagogical act is endowed with multiple dimensions - affective, relational, organizational, existential, and social and only through it, through the curriculum in action, it is possible to perceive them because only in action are these dimensions made. Therefore, it is practically impossible to predict, measure and control them; become intangible in curriculum planning. (DOMINGUES, 2015, p. 78).

According to Lenoir (1998, p. 59), "updating interdisciplinarity at the pedagogical level requires to consider a set of dimensions specific to the real dynamics of the classroom, and not just a theorization of interdisciplinary practice on the didactic plan in the context of rich and coherent models." According to the author, it also needs to clarify that it can provide a curricular analysis of the interdisciplinary possibilities offered by the programs in force, without the interdisciplinary practice running the risk of serving as a recipe at the pedagogical level, or in the illusion that everything is possible, that it is enough to place any defined learning objectives in some program to ensure an interdisciplinary activity.

Based on what was said about interdisciplinarity and considering the objective of this study, methodological procedures were carried out that envisaged analyzing documents that regulate the BC&T course and listening to students and professors who compose it.

METHODOLOGICAL COURSE AND RESULTS

To characterize the interdisciplinarity in the Bachelor of Interdisciplinary Studies in Science and Technology (BC&T) course, a qualitative and quantitative study was carried out through bibliographical research, documental research, and field study. The field study used questionnaires applied to students of the fifth and sixth periods and conducted semi-structured interviews with professors who make up the course.

The documentary research, which refers to a procedure based on primary documentary sources that have not yet been analytically treated or that can still be re-elaborated according to the research objectives (GIL, 2008), was carried out through the analysis of the Pedagogical Project of the Course (PPC) and its Curriculum Structure, based on the specific regulations of BIS. In analyzing these documents, we verified, in the fields "Presentation" and "Justification", the information that the course is based on the need to prepare graduates who participate, as professionals and as citizens, in the reality in which they are inserted – reality permeated by constant technological changes, transformations in knowledge, in the world of work and the university.

In the field "General aspects of the academic conception", the curricular organization in trans and interdisciplinary axes is mentioned. It is emphasized that the disciplines reorganize knowledge into six axes for didactic-pedagogical purposes, five of which are aimed at scientific and technological training and the sixth aimed at humanistic training and must be situated in an interdisciplinary context.

The six axes of knowledge cited are Representation and Simulation, which introduces students to the concepts necessary for the use and development of automated systems; Structure of Matter, which develops the understanding of the various states of matter and their forms of organization; Matter Transformation Processes, which offers elements to understand the transformations of materials of different natures; Energy, which provides bases for understanding the concept of energy and its different forms; Cycle of Life, which includes knowledge of the biological cycle and its implication for the conservation of life in different ecosystems; Communication, Languages, Information, and Humanities, which makes it possible to understand the universe of information language, its concepts, and procedures, in addition to contributing to the knowledge of social processes in their economic, political, philosophical and scientific aspects.

However, even citing such organization, we perceived that, both in the PPC and in the Curriculum Structure, the disciplines are classified and organized only as Mandatory, Limited Option, and Free Choice, without any type of information and arrangement between the ones that make up the same axis, not being possible to absorb an interdisciplinary view of the course. This understanding is supported by the information received from the course professors (see Table 11) when most of them declare that it is not possible to abstract an effective interdisciplinary work proposal when analyzing such documents.

The PPC also mentions the forecast of aggregating different areas of knowledge in the same nucleus to expand their interactions and promote an interdisciplinary exchange in research and teaching, which can lead to the appreciation of the student's perception as a subject of learning. However, that document does not present mechanisms for interdisciplinary practices to be planned and developed together with the disciplines, that is, it is not possible to perceive a prognosis of articulation between them.

Concerning the field "Evaluation of learning" foreseen in the PPC, the reflection on the different ways of its execution is left to the professors. In the document, it is suggested that theoretical discussions be promoted to consider the accumulated culture, the level of basic knowledge that students bring from High School, the objective conditions surrounding the organization of the course, the nature of the area, and the pedagogical meaning, confronting the objectives, profile, skills, and abilities expected of graduates. However, the document does not contain any kind of clear prediction of carrying out

interdisciplinary assessments, or information that could contribute to such a methodology being practiced.

As part of the research, a field study was carried out through the approach of professors and students to characterize interdisciplinarity in the context of the didactic-pedagogical actions of the course under analysis.

The option for carrying out a field study is based on the need to bring the theoretical framework and document analysis closer to the practical context in which interdisciplinarity is to be characterized. According to José Filho (2006, p. 64), "the act of research brings with it the need for dialogue with the reality that one intends to investigate and with what is different, a dialogue endowed with criticism, channeling creative moments."

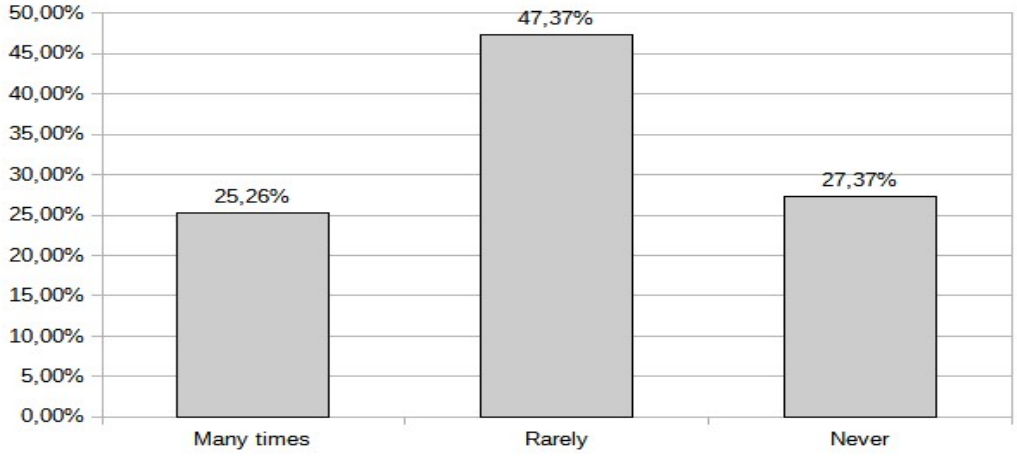
As this is research involving human beings, all the necessary procedures for actions of this nature were carried out, such as the submission of the project for ethical analysis by the Research Ethics Committee – CEP – of the institution, which was duly approved. Also, as part of the legal procedures, the Informed Consent Term – ICT – was signed by the participants.

Questionnaire applied to students of the BC&T course - Results and discussions.

The choice to use questionnaires as a methodological instrument for research with students was made considering some of its advantages, such as the guarantee of anonymity for respondents and the possibility of covering a larger number of people in less time (GIL, 2008). The questionnaire had an online format – Google Docs form – and consisted of five multiple-choice questions involving topics related to interdisciplinarity. It was sent to the email of 100 (one hundred) students enrolled in the fifth or sixth period of the course, randomly invited. Of these, 95 (ninety-five) responded to the survey. The answers were analyzed considering the data frequency.

The first question had the following statement: 'During the BC&T course, have the professor offered you teaching and learning activities involving more than one subject in which you were enrolled?' Such questioning aimed to verify the existence of interaction and integration between the disciplines present in the course's Curriculum Structure. The decision not to directly question the interdisciplinary work was taken considering that the students might not be clear about the meaning of this practice, which could lead to interference in the legitimacy of the results achieved by the research. The graph below presents the data obtained.

Graph 1 – Percentage of student answers about the professor offering teaching and learning activities involving more than one subject in which they were enrolled.



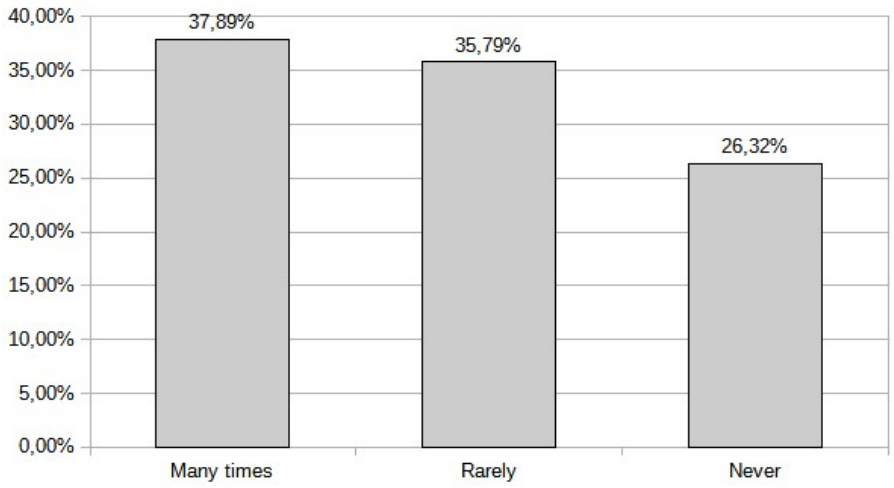
Source: Field Study Data. Questionnaires were applied to students in the fifth and sixth periods of the course.

Considering that interdisciplinarity is understood as a dialogue between knowledge, as a conversation between the different areas of knowledge and their contents, and as the interweaving between the disciplines that form the Curricular Structure, to strengthen, qualify, and contextualizing the process of teaching and learning (FORTUNATO; CONFORTIN, 2013), the analysis of students'

answers to this question leads to the understanding that the development and scope of activities related to the integration between disciplines are not following what was proposed about interdisciplinarity when more than 74% of participants rarely or never had access to teaching and learning activities involving more than one subject in which they were enrolled.

The second question had the following text: 'Within the scope of the BC&T course, have you ever gone through evaluations that covered more than one subject in which you were enrolled?' Here the objective was to verify if the interdisciplinary evaluation permeates the teaching and learning process of the course. The result is shown in the following graph:

Graph 2 – Percentage of student answers referring to the submission to assessments that covered more than one subject in which they were enrolled



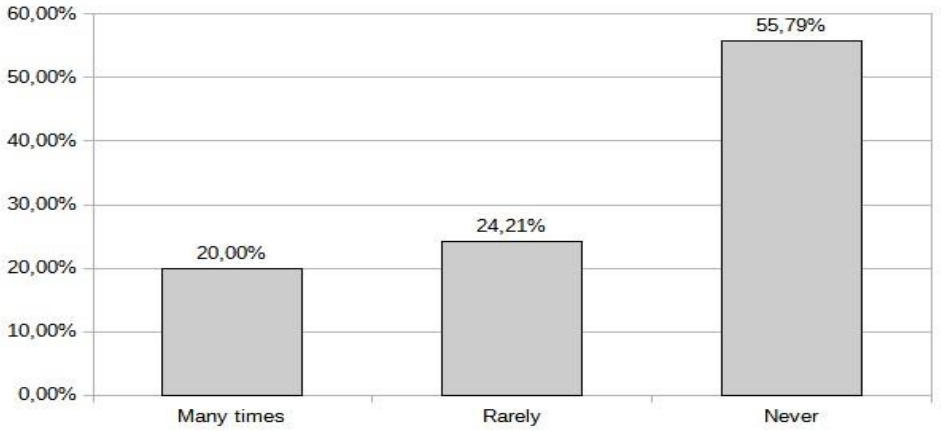
Source: Field Study Data. Questionnaires were applied to students in the fifth and sixth periods of the course.

According to Fazenda (2010), evaluations presuppose coherence between how one works and how one evaluates. Considering that the sum of the percentage of students who rarely or never participated in this type of assessment represents 62.1%, it is possible to understand that interdisciplinary assessments have not been a common practice among professors in the development of the subject(s) under their responsibility.

When submitting this result to a comparison with the interview carried out with the professors of the course, detailed throughout this text, this understanding is even more concrete, because in the answer to the question about the use of interdisciplinary evaluations, most of the professors informed that they did not use this evaluation format (Chart 12).

The third question that made up the questionnaire had the following statement: 'During the BC&T course, have you ever participated in any research or outreach project that involved more than one discipline in an integrated manner?' This question aimed to analyze whether the development of interdisciplinary research and outreach projects, with the participation of students, has occurred in the practice of the professors in the course. The following graph displays the result of the survey:

Graph 3 – Percentage of student answers referring to participation in a research or outreach project that involved more than one discipline in an integrated manner



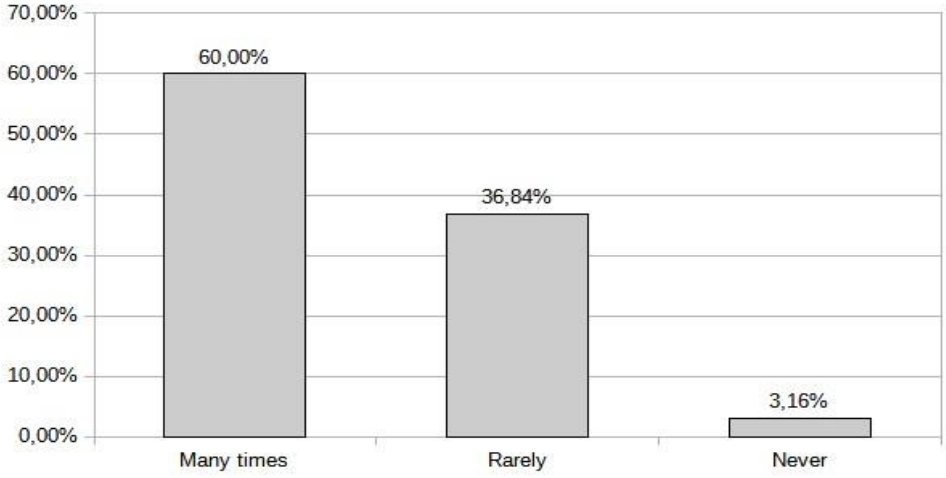
Source: Field Study Data. Questionnaires were applied to students in the fifth and sixth periods of the course.

The information that 80% of the students rarely or never had contact with interdisciplinary research and/or outreach projects demonstrates the lack of use of such actions for the development of interdisciplinarity to contribute to the methodological enrichment of the course and, as a result for the integral formation of the student.

The importance of interdisciplinary research and outreach actions finds support in Fazenda (2011), when the author exposes that, much more than believing that interdisciplinarity is learned by practicing or living it, studies show that a solid formation to interdisciplinarity is found extremely coupled to the dimensions arising from its practice in a real and contextualized situation. Participation in research and outreach projects is a way of approaching this reality.

The fourth question had the following statement: 'Are the contents of the disciplines taught by the professors presented in a contextualized manner?' Its purpose was to verify if the students were able to assimilate the contents properly contextualized and meaningful. The data obtained are shown below:

Graph 4 – Percentage of student responses regarding content presentation by faculty in a contextualized manner



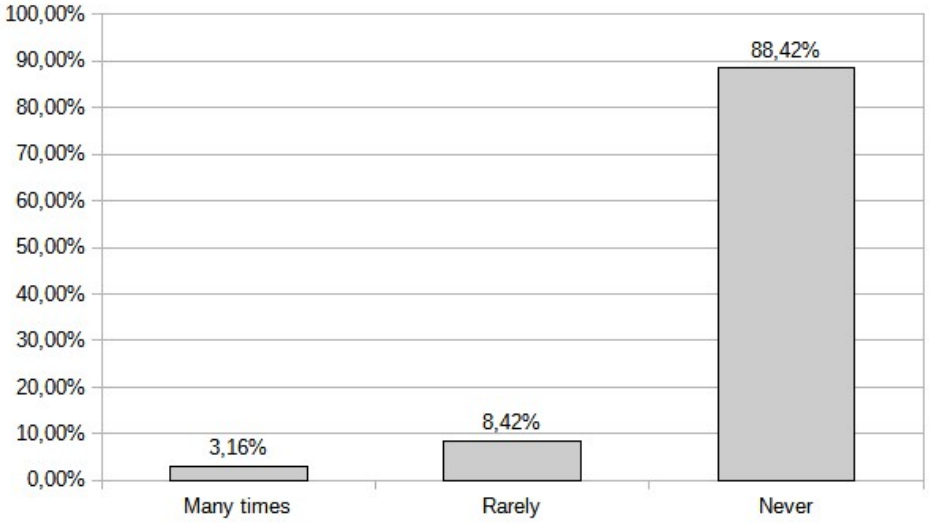
Source: Field Study Data. Questionnaires were applied to students in the fifth and sixth periods of the course.

Most participants consider that the contents of disciplines that make up the course are approached in a contextualized way, which corroborates with the proposal for the interdisciplinary

training process (FAZENDA, 2011). On the other hand, 40% of students rarely or never noticed this contextualization, which leads to the need for professors to review work methodologies, providing for greater interaction and integration between the contents worked on by them.

The fifth question of the questionnaire had the following text: 'Have you ever participated in discussions related to the elaboration, reformulation, and updating of the Pedagogical Project of the Course?' This question sought to verify whether students participate in the planning of course actions through discussions related to the PPC since they are subjects involved in the teaching and learning process. Data are expressed graphically as follows:

Graph 5 – Percentage of student answers regarding participation in discussions related to the creation, reformulation, and updating of the PPC.



Source: Field Study Data. Questionnaires were applied to students in the fifth and sixth periods of the course.

When analyzing the answers, a high percentage of students rarely or never participated in the preparation, updating, and reformulation of the PPC. It is necessary to consider the importance of collective participation in the discussion process of this document, given its guiding character of educational actions.

According to Fazenda (2011), every competent interdisciplinary project is born from a well-defined locus, thus, it is fundamental to be contextualized to know. According to the author, contextualization requires a recovery of memory in its different potentialities, therefore, of the time and space in which one learns. This contextualization is only possible if there is the participation of those involved in the educational process, considering the collective nature of knowledge construction.

Interviews with professors of the BC&T course – Results and discussions

Also, as a part of the field study, interviews were conducted with professors who teach disciplines in the course, to collect information about their pedagogical practices for the development of teaching, research, and outreach activities, as well as verifying related aspects to the view they have of the course and the concept of interdisciplinarity.

A total of 28 (twenty-eight) professors from different areas of knowledge participated in the research. The interview was held in the offices of the participants at a prearranged time.

The choice of this methodological instrument is because in its various applications, "it is a technique of social interaction, informative interpenetration, capable of breaking group, individual and social isolation, and may also pluralize voices and democratic distribution of information." (MIGUEL, 2010, p. 1). In addition, the need for a dialogue between those involved was foreseen, guided by the questions elaborated to allow a more dynamic and contextualized survey of opinions.

The use of a semi-structured form is justified by the possibility for the interviewees to discuss their experiences based on the content established by the researcher, and also to provide free and spontaneous responses, valuing the interviewer's performance (LIMA et al., 1999).

The methodological procedure used for the interpretation of the interviewees' answers was Content Analysis, which, according to Bardin (1977), refers to a set of communication analysis techniques, obtained through systematic procedures and objectives of description of the content of the messages, indicators that allow the inference of knowledge related to the conditions of reception of these messages.

The discursive questions of the interview were divided into categories. The responses obtained were broken down into subcategories so that the interpretation process was possible and consistent with the researched reality. For each subcategory, the percentage of frequency of appearance of the answer is informed.

The survey of professors' data aimed to know the profile of the faculty that makes up the course and the data were shown as follows:

Table 1 – Faculty age range

Category: Faculty age range	
Subcategories	**Freq %**
30-34 years old	32.1%
35-39 years old	32.1%
40-44 years old	10.7%
Over 45 years old	25%

Source: Field Study Data. Interview with course faculty.

Table 2 – Faculty gender

Category: Faculty gender	
Subcategories	**Freq. %**
Male	71.4%
Female	28.6%

Source: Field Study Data. Interview with course faculty.

Table 3 – Length of service of the faculty in the teaching profession

Category: Length of service in the teaching profession	
Subcategories	**Freq. %**
1-5 years old	17.9%
6-10 years old	46.4%
11-15 years old	10.7%
15-20 years old	17.9%
Over 20 years old	7.1%

Source: Field Study Data. Interview with course faculty.

Table 4 – Faculty's weekly workload in BC&T subjects

Category: Professors' weekly workload in BC&T subjects	
Subcategories	**Freq. %**
4 hours	10.7%
8 – 10 hours	57.1%
11 – 16 hours	32.1%

Source: Field Study Data. Interview with course faculty.

We could verify from the tables that the course is composed of a diverse faculty, both in terms of age and length of service in the teaching profession, which enables exchanges of life and professional experiences and contributes to the enrichment of discussions on strategies that promote the development, improvement and constant updating of the course, since, in the collective, "the meanings constructed based on the experiences of each one circulate and give knowledge new meanings – now shared." (PLACCO; SOUZA, 2006, p. 20).

Table 5 – Faculty's degree

Category: Type of degree studied by the faculty	
Subcategories	**Freq. %**
Bachelor's degree	64.3%
Licenciateship	35.7%

Source: Field Study Data. Interview with course faculty.

Most professors have a bachelor's degree, representing 64.3% of respondents. Disregarding the peculiarities of each professor related to teaching, this situation represents an additional degree of difficulty for the insertion and reformulation of didactic-pedagogical activities in the course. According to Gil (1997), most Brazilian professors who teach in higher education establishments, despite having postgraduate degrees, are often not submitted to any systematized process of pedagogical training. Theoretically, professors who have a graduation degree have greater facility to propose and develop pedagogical activities due to their contact with studies related to the area.

Table 6 – Faculty degree of academic training

Category: Faculty degree of academic training	
Subcategories	**Freq. %**
Doctorate	78.6%
Master's degree	21.4%

Source: Field Study Data. Interview with course faculty.

Regarding the profile of the teaching staff, it appears that there are mostly doctors, which adds up positively both to the evaluation of the course before the Ministry of Education (MEC) and bodies for the promotion of scientific research and technology as well as for the development of teaching, research, and outreach activities, as they represent a greater qualification of these professors. In addition, it is following the hiring profile framework established in the PPC.

The second part of the interview consisted of addressing questions specifically related to teaching practices and interdisciplinarity within the scope of the course. The analysis of these questions, presented as categories, is described in the table below:

Table 7 – Professors' view on interdisciplinary work within BIS

Category: What is your view on interdisciplinary work within the scope of the Bachelor of Interdisciplinary Studies?	
Subcategories	**Freq. %**
Work that involves integration and interaction between different disciplines and areas.	67,9%
Work that involves integration and interaction between disciplines and related areas.	7,1%
Work that aims to insert other contents, from other areas, within a discipline, seeking the contextualization of knowledge.	25%

Source: Field Study Data. Interview with course faculty.

This question was proposed with a double objective: the first one was to verify if the professor knows about what interdisciplinarity refers to in BIS; the second was to measure the recognition

of the importance of this methodology and the need for its inclusion in teaching and learning practices among professors.

As shown by the results of the question, most of the faculty interviewed (67.9%) presented a general and summarized understanding of interdisciplinarity, very close to what is proposed for this practice. The idea that dialogue, complementation, interaction, and integration between the different areas of knowledge and between different disciplines prevail as a way of characterizing an interdisciplinary practice is present in the guidelines and information found in the works of the researched authors.

According to Japiassu (1976), it is possible to witness an interdisciplinary undertaking whenever it can incorporate the results of various specialties, using instruments and methodological techniques from other disciplines and conceptual schemes and analyses found in the various branches of knowledge, integrating and converging them after having been compared and judged.

In this way, the interdisciplinary methodology is not limited only to the interaction and integration between disciplines and related areas, as mentioned by 7.1% of the interviewed professors, but also involves dialogue between different areas and disciplines.

Although some of the professors interviewed have a vision of interdisciplinarity as being the interaction and integration of different disciplines and areas of knowledge, in practice, in the context of the researched course, most interdisciplinary research projects only cover related areas and disciplines (see Table 15).

According to Japiassu (1976), for the establishment of interdisciplinary practices, it is necessary to change the mindset of professors to recognize their importance for student training. Although all the professors interviewed demonstrated recognition of the importance of inserting interdisciplinarity within the scope of the course, it is understood that the change in mentality encompasses the change in attitude. Thus, the recognition of interdisciplinary practices as necessary for the formation of students must be reflected in the teaching practice.

Table 8 – Information about professors' contact with interdisciplinary methodologies throughout academic training

Category: During your academic education, were you able to get in touch with interdisciplinary methodologies?	
Subcategories	**Freq. %**
Yes. I had contact with interdisciplinary methodologies of action both in graduation and post-graduation.	21.4%
Yes. I had contact with interdisciplinary methodologies of action only in postgraduate research projects.	32.1%
No. I never had contact with the interdisciplinary methodology throughout the academic training.	46.4%

Source: Field Study Data. Interview with course faculty.

The purpose of this question was to verify whether the interviewed professors had the opportunity to establish direct contact with interdisciplinary practices throughout their academic training that could represent an important basis for the maturing of their knowledge on the subject.

According to the information obtained, only 21.4% of respondents had contact with this teaching methodology throughout their academic training. This fact does not represent a guarantee that, because they have experienced such methodologies, they are necessarily active in the same line in the development of their activities as professors. However, through this contact, the possibility of setting goals for the development of interdisciplinary practices as well as a better understanding of how this process takes place can be facilitated.

We observed that 46.4% of the faculty interviewed had never had contact with the interdisciplinary methodology throughout their academic training. Barbosa (2013) points out that interdisciplinary practice experiences impediments coming from the cultural background of society and that is reflected in the educational sector through training. These professors are trained by fragmented knowledge and perform their work under the most adverse influences that are manifested in the daily life of the classroom, where they perform solitary work and with a lack of stimuli.

Table 9 – Informações sobre a participação dos professores em atividades de capacitação em 'interdisciplinaridade e educação' Information on the participation in training activities on 'interdisciplinarity and education'

Category: Have you ever participated in training activities focused on the theme 'interdisciplinarity and education'?	
Subcategories	**Freq. %**
Yes. Participation in training courses on 'interdisciplinarity and education' at conferences or at other universities where you worked previously.	25%
Yes. Participation in training courses on 'interdisciplinarity and education' at the institution where they currently work.	7.1%
No. No participation in training courses on 'interdisciplinarity and education'.	67.9%

Source: Field Study Data. Interview with course faculty.

This question was formulated to measure the number of professors who have already participated in formal training courses related to the interdisciplinary process in the school environment. The presented results show that most (67.9%) of the professors never participated in training courses in the area.

Fazenda (2011) cites that the barriers to the development of interdisciplinarity by the faculty are the lack of knowledge of the real meaning of the interdisciplinary project and the lack of specific training for this type of work, constituting the main obstacle.

Table 10 – Information on the participation of professors in the elaboration and/or reformulation of the Pedagogical Project of the Course

Category: Have you ever participated in the elaboration and/or reformulation of the Pedagogical Project of the BC&T course?	
Subcategories	**Freq. %**
Yes. Participation in the elaboration and/or reformulation of the PPC.	28.6%
Yes. Participation to divide the workload of subjects between theory and practice in the PPC.	7.1%
No. No participation in the elaboration/reformulation of the PPC.	64.3%

Source: Field Study Data. Interview with course faculty.

The purpose of the question was to verify the participation of the faculty in the planning, elaboration, and evaluation of the PPC, given the importance that this interaction can represent for the coherence and effectiveness of this document.

Through the analysis of the answers, we verified that 64.3% of the professors interviewed never participated in discussions aimed at the elaboration or reformulation of the PPC; 7.1% only participated in the review process regarding the insertion of the division of the workload of the subjects between theoretical and practical, that is, the professors did not participate in a discussion process aiming at a comprehensive reformulation; only 28.6% have participated in the process.

Within the scope of the PPC, we can see the participation of professors in discussions related to the process of updating and restructuring this document. The importance of this participation is given both through the contributions they can offer to improve didactic and pedagogical actions, as well as through the incentive that those involved can receive, resulting from the discussions held. This can mean an opening for the establishment of dialogue which, according to Fazenda (2002b) and Japiassu (1976), represents the basis for the development of interdisciplinarity in the educational process.

Table 11 – Information from professors about the possibility of abstracting from the PPC and the Curriculum Structure of the course an interdisciplinary proposal of effective work

Category: In your opinion, regarding the Pedagogical Project and the Curriculum Structure of the BC&T course, is it possible to abstract from these documents an interdisciplinary proposal of effective work?	
Subcategories	**Freq. %**

Yes. Regarding PPC, it is possible to abstract an interdisciplinary proposal of effective work.	32.1%
No. Regarding PPC, it is not possible to abstract an interdisciplinary proposal of effective work.	67.9%
Yes. Regarding the Curricular Structure of the course, it is possible to abstract an interdisciplinary proposal of effective work.	17.9%
No. Regarding the Curriculum Structure of the course, it is not possible to abstract an interdisciplinary proposal of effective work.	82.1%

Source: Field Study Data. Interview with course faculty.

This question aimed to verify whether the organization of the PPC, together with the Curriculum Structure, can lead the professor to a vision of mechanisms and possibilities for the development of interdisciplinary activities.

The result shows that most professors are unable to abstract from these documents an interdisciplinary proposal for effective work. Considering that the curricular organization implies the curricular practice and is its modifier (THIESEN, 2013), how the PPC and its Curriculum Structure are organized and presented needs to collaborate for the direction of the insertion of interdisciplinary methodologies in the teaching and learning process of the course.

Table 12 – Information on predicting interdisciplinary practices in the subject planning and assessment

Category: In the planning and evaluation of your teaching activities, is articulation and interaction with other disciplines included in the course, as well as the insertion of broader and broader themes related to the current social context?	
Subcategories	**Freq. %**
Yes. There is provision for articulation and interaction with other course disciplines in the planning and evaluation of teaching activities, as well as the inclusion of broader themes linked to the current social context.	21.4%
No. There is no provision for articulation and interaction with other course disciplines in the planning and evaluation of teaching activities.	78.6%

Source: Field Study Data. Interview with course faculty.

The objective of this question was to verify if the professors foresee and plan the interaction and articulation with other disciplines of the course in the search for the development of interdisciplinarity, in which we considered what was exposed by Coimbra (2000), who describes interdisciplinary teaching as part of an intentional process.

Examination of the answers shows that only 21.4% of the participating faculty stated that they planned and evaluated their teaching activities based on the prediction of articulation and interaction with other disciplines that make up the Curriculum Structure, in addition to inserting broad and contextualized themes. However, they claim that planning procedures only involve disciplines that are under their responsibility or disciplines from similar areas.

During the interviews, we observed that many of the professors have a view of interdisciplinarity as a practice that only covers disciplines related to the same area, when, in fact, it refers to a teaching practice that must articulate different areas of knowledge and different disciplines in an environment in which phenomena are observed, analyzed, and understood as connected facts (FERREIRA, 2012).

Table 13 – Pedagogical resources used by faculty for the development of their disciplines.

Category: What activities and pedagogical resources do you use for the development of the subject under your responsibility?	
Subcategories	**Freq. %**

Media	60.7%
Field activities and technical visits	21.4%
Laboratories (practical classes)	42.9%
Practical experiments in the classroom	35.7%
Seminars, lectures, the cycle of debates, and round table	14.3%
Group dynamics	10.7%
Computer simulation	7.1%

Source: Field Study Data. Interview with course faculty.

Table 14 – Activities developed by faculty with their students outside the classroom

Categoria: Quais atividades você desenvolve com seus alunos fora da sala de aula?	
Subcategories	**Freq. %**
Field activities and technical visits	21.4%
Laboratories (practical classes)	50%
Seminars, lectures, the cycle of debates, and round table	14.3%

Source: Field Study Data. Interview with course faculty.

The questions listed in the tables above (Tables 13 and 14) were intended to characterize the use, by professors, of different pedagogical resources in the development of activities related to the subject under their responsibility, aiming at the performance of dynamic, interesting, and diversified classes, as well as such as the use of other spaces that contribute to the accomplishment of a work capable of bringing the student closer to a contextualized practice.

An examination of the answers presented shows that the interviewed professors, in general, resort to the use of diversified pedagogical means to approach the contents of their disciplines.

The importance of inserting diversified teaching methodologies is based on the influence they must awaken students' interest. Specifically in the use of technological support, this fact can contribute to the development of one of the skills expected for IB graduates, which refers to the ability to master and use recognized technologies and methodologies in science, as well as to effectively use and responsible, the technology and equipment available in Science and Technology laboratories (BRASIL, 2010).

During the professors' speeches, we observed that aspects related to the physical structure and financial resources sometimes cause impediments to the diversification of pedagogical strategies.

Table 15 – Information about the participation of professors in interdisciplinary projects

Category: Do you participate in any project where there is interaction between professors from different disciplines/areas of knowledge?	
Subcategories	**Freq. %**
Yes. Participation in projects where there is interaction between professors from different disciplines/knowledge areas	14.3%
Yes. Participation in research projects where professors from different disciplines/knowledge areas interact	67.9%
No. We do not participate in projects where there is interaction between professors from different disciplines/knowledge areas	17.9%

Source: Field Study Data. Interview with course faculty.

The purpose of this question was to verify whether professors participate in interdisciplinary teaching, research, and outreach projects. It appears that 67.9% of respondents participate in projects with the involvement of professors from different disciplines. However, in this context, the predominance of research projects and the lack of projects that directly involve teaching and outreach

activities are identified. In addition, among these research projects, most involve only disciplines in related areas.

According to Nogueira (2001), interdisciplinary projects are a way to achieve integration between disciplines and the diverse knowledge of different areas of knowledge. In this way, according to the author, it is expected that there will be interaction between all participants in the teaching and learning process, and not that the different disciplines taught in a compartmentalized way will serve as subsidies for each student to mentally carry out their integration.

Table 16 – Major obstacles found by the faculty for the development of interdisciplinarity.

Category: What are the biggest obstacles you found to the development of interdisciplinary activities?	
Subcategories	**Freq. %**
The PPC, together with its Curriculum Structure and the subject lists, do not contribute to interdisciplinarity.	25%
Lack of systemic management that encourages the development of interdisciplinary practices among professors.	25%
The very culture and traditional training of professors.	28.6%
Lack of opportunity for dialogue and interaction between professors.	32.1%
Lack of pedagogical meetings between professors.	17.9%
Lack of faculty training focused on interdisciplinarity.	28.6%
Accumulation of activities and functions by professors.	17.9%
Lack of interest and initiative by professors to develop interdisciplinary activities.	25%
Lack of instruments and physical structure of the institution that allows the development of interdisciplinarity.	64.3%

Source: Field Study Data. Interview with course faculty.

The purpose of this question was to gather information about the points for which changes, adaptations, and/or improvements should be proposed, as they refer to obstacles found by professors for the development of the interdisciplinary teaching and learning process.

The most cited obstacle by them is related to the physical structure and the lack of instruments in the institution where they work. This obstacle points to actions that sometimes escape the domain of those directly involved with teaching and learning activities.

The lack of opportunity for dialogue and interaction between professors and the lack of pedagogical meetings with the participation of all of them are also obstacles highlighted in the answers. Even considering that one of the goals of the institution is to establish guidelines for study and pedagogical discussion in the routines of the courses, in the position presented by the professors, it is revealed that the holding of meetings and pedagogical meetings with the involvement of all professors does not occur frequently. In this context, they would have the opportunity to get to know each other, share their plans and lines of study, set joint goals, and propose improvements in academic activities, including proposing innovative strategies.

Concerning the importance of this dialogue, we highlighted Fazenda (2002b) again, according to which the construction of interdisciplinary didactics is based on the possibility of effecting intersubjective exchanges. Communication between the faculty involved can be a difference in the successful development of interdisciplinary activities.

The very culture and traditional faculty training were also cited as one of the obstacles to interdisciplinary practice within the scope of the course. It is a reality and a challenge to be faced. The lack of knowledge about the interdisciplinary methodology as well as the insecurity of some professors in the subject, verified during the interviews, showed how necessary it is for this subject to be part of proposals for improvement and faculty training.

The composition, organization, and current format of the PPC, together with the curricular structure, from the professors' point of view, also do not contribute to the development of interdisciplinarity, as already analyzed in another topic of the interview (Chart 11).

Table 17 – Professors' suggestions for interdisciplinarity to develop in the course

Category: What suggestions do you have for interdisciplinarity to develop in the context of the BC&T course?	
Subcategories	**Freq. %**
Reformulation of the PPC, together with its Curriculum Structure and with the disciplines' menus, aims to contribute to the development of interdisciplinarity.	46.4%
Development of management that encourages the development of interdisciplinary practices.	39.3%
Offering courses, seminars, and training and improvement workshops on interdisciplinarity to professors.	46.4%
Conducting pedagogical meetings with the participation of the faculty aimed at discussing interdisciplinary activities and enabling dialogue and interaction between them.	39.3%
Development of interdisciplinary teaching, research, and outreach projects, as well as other actions involving the student in the 'interdisciplinarity' theme.	17.9%
Investment in physical structure that facilitates and collaborates for the development of interdisciplinary activities.	21.4%
Insertion of interdisciplinary work nucleus.	10.7%

Source: Field Study Data. Interview with course faculty.

The target of this question was the survey of suggestions that aim to contribute to the development of interdisciplinary practices within the scope of the course. At this point, most professors recognize the need to reformulate the PPC and its Curriculum Structure, as well as undertake training and improvement actions focused on the interdisciplinary theme, in addition to the need for investments in physical structure that facilitate and collaborate for the development of interdisciplinary activities.

Also, the need to develop actions aimed at stimulating the interest of professors in the subject was highlighted, as well as the interaction between these professionals to establish dialogues and constant discussions on pedagogical aspects of the development of interdisciplinary practices. According to the suggestions received, this stimulus and dialogue are linked to management that seeks ways to constantly encourage these practices, requiring actions that involve holding meetings to address the issue and developing interdisciplinary projects, in addition to training teaching work centers.

PROPOSALS PRESENTATION AND FINAL CONSIDERATIONS

In response to the main question of the research, considering the analysis of the data resulting from the methodological procedures carried out, we verified that, in general, in the context of the course, an interdisciplinary methodology is not adopted as foreseen in the guidelines and guiding principles of the BIS.

Based on these data and following what was exposed by authors such as Lenoir (1998), Japiassu (1976), Coimbra (2000), Fazenda (2010), Fortunato and Confortin (2013), Tosta (2011), Almeida (2010) and Morin (2003), who address the theme of interdisciplinarity in the educational context, there are presented proposals and discussions that aim to contribute so that the actions carried out within the BIS are directed towards the dissemination of interdisciplinarity in the context of their teaching and learning process.

As we showed, in carrying out the documentary research, through the analysis of the Pedagogical Project of the Course - PPC - and its respective Curricular Structure, these documents do not have elements that promote the vision and the forecast of interdisciplinary work, lacking

reformulation. This finding is reinforced when one considers the fact that most professors do not visualize an effective interdisciplinary work proposal based on such documents (Chart 11).

Com relação ao processo de acompanhamento e discussão do PPC, percebe-se que não é uma prática do curso promover reuniões que contem com a participação de todos os envolvidos no processo de ensino e aprendizagem. As informações manifestadas pelos alunos (Gráfico 5) e professores (Quadro 10) em torno do debate que pressupõe a elaboração, reformulação e atualização do PPC confirmam o exposto.

Concerning the PPC follow-up and discussion process, it is not a practice of the course to promote meetings with the participation of all those involved in the teaching and learning process. The information expressed by students (Graph 5) and professors (Chart 10) around the debate that presupposes the elaboration, reformulation, and updating of the PPC confirms the exposure.

Because of this fact and in keeping with the role of conducting actions provided for in the aforementioned document, we proposed that meetings be constantly held with the participation of the faculty, other professionals involved in the teaching organization process (Educators, Technicians in Educational Affairs, among others) and students, to promote its study and discussion, with a focus on its updating and reformulation to bring the composition of its content closer to the objectives foreseen for BIS.

It is recommended that the course Coordination, given the important role it plays in the management of academic activities, provide spaces and moments for these discussions, acting as an articulator and organizer in the implementation of the PPC. In addition to enabling an evaluation and possible reformulation of this document with collective participation, this action provides the opportunity to disseminate dialogue and interaction between professors, which can contribute to the development of interdisciplinary practices.

Based on the field study, the conclusion about the lack of characterization of interdisciplinarity in the course is also notorious. When analyzing the student's responses to the questionnaire, they rarely or never submitted to activities and/or assessments that involve interaction and integration between two or more disciplines (Graphics 1 and 2). This fact is also consolidated by the information of the professors interviewed when more than 75% of them affirm that they do not foresee the articulation and interaction of the activities and contents related to their disciplines with others of the course. (Chart 12).

It is up to the Coordination, together with the Collegiate of the Course, the didactic-pedagogical management, and the Structuring Teaching Nucleus – NDE (*Núcleo Docente Estruturante)* –, the co-responsibility for the elaboration, implementation, updating, and consolidation of the PPC. Therefore, it is necessary that they carry out meetings to deal with interdisciplinarity within the scope of BC&T and that they foresee actions that aim to promote the dissemination of this methodology among professors, in addition to foreseeing ways to encourage practices related to the theme.

The provision of interdisciplinary assessments as a methodology to be developed by the professor is not contemplated in the PPC analyzed and does not permeate the practice of most professors in the course, which can be proven with the analysis of the answers of the students (Graph 2) and faculty (Chart 12).

Thus, we recommend reviewing the student assessment methodology to promote its adequacy to the interdisciplinary teaching and learning process. It is necessary to include the forecast for monitoring student performance in the PPC, also based on the interaction and integration between disciplines to guarantee an evaluation process that is capable of measuring knowledge, skills, and abilities acquired in other spaces and contexts and that is supported by the non-fragmentation of knowledge.

The need to anticipate interdisciplinary assessments in the PPC is based on the coherence between the way one works and the way one evaluates. The organization of these assessments should always be the result of discussions between the professors responsible for the disciplines involved, who, in this context, define their strategies and criteria.

Regarding the Curriculum Structure, we recommend that the mandatory disciplines that make up the course are presented in the six knowledge axes foreseen for BC&T: Representation and simulation; Structure of matter; Matter transformation processes; Energy; Cycle of Life and

Communication, Languages, Information, Humanities, and that this division is exposed in the PPC. The division of subjects by axes makes it easier to predict interdisciplinary strategies.

The formation of a commission within the scope of each of these axes should also be considered, to proceed with the elaboration of strategies aimed at the development of interdisciplinary practice between these axes and between the disciplines that compose them, and them with the 'Free Choice' and 'Limited Option' disciplines offered by the course.

This discussion and proposed formatting for the PPC, together with its Curriculum Structure and, as a result, for the disciplines' menus, can contribute to bringing the course closer to compliance with the principles foreseen for the BIS, such as aggregating different areas of knowledge in a single core, maximizing their interactions; to promote a comprehensive education of the students, exposing them to scientific knowledge, characteristic of the current state of science, as well as to themes of humanistic and social origin; promote an intense interdisciplinary exchange both in research and teaching, valuing the student's perception as a subject of learning.

With the completion of the field study, we verified the need for training and improvement processes for professors related to interdisciplinarity. Some of them demonstrated the lack of a formed vision of what interdisciplinary work is, often ignoring basic aspects related to the theme. This evidence is added to the information that more than 78% of them had never had contact with interdisciplinary methodologies of action in the teaching and learning process during their academic training (Table 8), and that more than 65% of them had never participated in training activities focused on the theme (Chart 9).

Given this, we suggest promoting events such as workshops; face-to-face and online courses using digital platforms; lectures, and seminars aimed at offering continued training to professors and other professionals involved in course activities, based on the study and discussion of methodology and interdisciplinary practices.

It is also important that professors and technicians are encouraged to participate in events outside the institution that address issues related to the specificities of BIS and interdisciplinarity.

We suggest that the institution create institutional policies aimed at awakening the interest of professors, technicians, and students in the theme of 'interdisciplinarity', even to impulse for the implementation of these practices. An example to be given is the launch of public notices for projects and programs that have the theme of interdisciplinary actions as a requirement.

Still, as a proposal for creating strategies to encourage interdisciplinary practices, there is the provision of moments of discussion and interaction between professors. An example is the planning of a meeting at the beginning and end of each academic semester to discuss the goals and objectives of the course, as well as carry out a balance of the activities carried out and the results achieved. Best practices workshops can also be held, in which professors can report on the interdisciplinary activities developed by them and the results obtained.

With the accomplishment of this research, we could verify that the elaboration and execution of interdisciplinary teaching, research, and outreach projects are not effective, in the scope of the course, to cover disciplines of the various axes and different areas of knowledge with a focus on the interaction and integration between these contents. In addition to enabling the transforming relationship between the university and society, these interdisciplinary projects can contribute to the integral formation of the student, foreseen in the PPC, and to the fulfillment of one of the IB principles that foresee the integrated practice of research and outreach articulated to the curriculum.

Finally, the development of interdisciplinarity as an effective action in the context of the course requires changing the ways of planning the composition and structuring of the PPC, as well as the didactic-pedagogical activities used by the professor when in direct contact with the student. On the path that connects these two extremes, strategies that seek to achieve the objectives set for the course based on the expected profile of students need to be constantly planned, reviewed and updated.

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Author 1 – Project coordinator. Data collection, data analysis, and text writing.
Author 2 – Project advisor. Participation in data analysis and review of final writing.
Author 3 – Co-supervisor of the project. Participation in data analysis and review of final writing.

CONFLICT OF INTEREST DECLARATION

The authors declare that there is no conflict of interest with this article.

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