

Article

Interdisciplinarity-Based Sustainability Framework for Management Education

Flavio Pinheiro Martins ^{1,2}, Luciana Oranges Cezarino ^{3,*} , Lara Bartocci Liboni ¹,
Amilton Barbosa Botelho Junior ⁴  and Trevor Hunter ⁵ 

- ¹ School of Economics, Business Administration and Accountability, University of Sao Paulo—FEA-RP-USP, Ribeirão Preto 14049-900, SP, Brazil
- ² The Bartlett School of Sustainable Construction, University College London—UCL, London WC1E 6BT, UK
- ³ BLISS Digital Impact, Venice Business School, Ca' Foscari University of Venice, 30123 Venice, Italy
- ⁴ Department of Chemical Engineering, Polytechnic School of the University of São Paulo, São Paulo 05508-900, SP, Brazil
- ⁵ Governance and Management, King's University College, London, ON N6A 2M3, Canada
- * Correspondence: luciana.cezarino@unive.it

Abstract: Business education faces shortcomings that can be mitigated through the broad perspective of interdisciplinarity, fulfilling a call for a greater orientation toward Education for Sustainable Development (ESD). Despite the relevance and urgency, current frameworks cannot embed context-related problems into their design, increasing the detachment of wicked problems and management education, and falling short of the goal-oriented prerogative. Interdisciplinarity is up to this task as an educational attitude and behaviour rather than a toolkit of cross-disciplinary classification. This paper aims to propose a framework for interdisciplinarity-based sustainability management for business education. We established the framework via a literature review analysis, and then we validated it through discussions with specialists from the United Nations Principles for Responsible Management Education (UN-PRME) to introduce a model with 49 evidence-driven, interdisciplinarity practices. We grouped results in three main dimensions of analysis connecting the 16 categories. We gave special attention to spaces of discomfort that ought to be fostered in business schools under a critical thinking perspective and the student's role in the relevance of sustainability education. The work harbours practical implications for developing better practices for management education by blending an interdisciplinary approach to sustainability in the management education literature.

Keywords: interdisciplinarity; Education for Sustainability (ESD); Principles for Responsible Management Education (PRME); business schools



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1. Introduction

Quests for increasing interdisciplinarity in sustainability education within academic curricula, didactics, and the university context are not new [1]. The call has gained momentum as the world is on the verge of crisis, as civilisational demands have challenged narrow visions and require a plurality of competencies, only grasped through a lens combining different fields of knowledge [2].

Interdisciplinarity (ID) is usually simply defined as an integration of existing structured disciplinary knowledge areas and encompasses a wide category including also trans-, multi- and cross-disciplinarity [3]. Beyond disciplines, the integration also relates to knowledge, methods or theories [4]. For this work, we consider one of the recurrent definitions, from the Interdisciplinary Research and Education conference hosted by the OECD in 1970; thus, ID refers to interactions among two or more disciplines. The connection ranges from the simple idea of sharing to an epistemological level where there is a merging of concepts, methodologies, procedures, specific areas of literacy and research [5]. It also

refers to groups of professionals, with different background knowledge areas, working together in a collaborative effort to solve a common problem [6].

Sustainability is intrinsically interdisciplinary [7]; therefore, teaching sustainable development as an isolated discipline seems counterproductive if the final goal is to meet civilisational demands such as peace, justice and environmental preservation for future generations in a perspective of shared value with society [8]. Interdisciplinarity and sustainability find commonalities on the muddy ground of the world's wicked problems that demand cooperation beyond the disciplinary walls [9]. Despite different epistemological origins, both concepts appear to be a potential answer [10]. However, the academic structures of the 20th century still siloed on models of fragmenting knowledge into disciplines and departments, which poses an institutional obstacle, leading interdisciplinarity to a complementary, additive or disconnected position with regard to the educational core [11].

Similarly, business education is also interdisciplinary by default. In the interdisciplinarity studies, business education has an interdisciplinary nature (professional preparation or vocational) [7], while sustainable development studies fall into the "interdisciplinarity" category, ones aimed at responding to a social concern, demand or problem [12]. The ultimate goal of business education is to train professionals with a theoretical repertory and practical competencies in a way that they become actors who can ethically change reality. This includes literacy and implementation of the Sustainable Development Goals (SDGs), since the responsibility to create a sustainable world mostly rests on the shoulders of companies managed by graduates from business schools [13,14].

Sustainability and business education have been connected under a developing construct of Responsible Management Education (RME) [15–17]; this growing corpus of research addresses concepts such as sustainable development, responsibility, education for sustainability and ethics in a connected, and sometimes not precise, interchangeable way. We find common ground on the assumption that when we talk about sustainability in a business school, we are addressing an educational vector derived from corporate social responsibility (CSR). For instance, the Principles for Responsible Management Education (PRME) initiative is considered an "educational arm" of the UN-Global Compact [14,18], the leading community for promoting CSR in enterprises in the world.

Despite some progress, old criticisms regarding the role, relevance and impact of business schools in society [19,20], and questions about their legitimacy [21] and leadership [22], have persisted for the past few years. Rasche and Gilbert (2015) reflect on the decoupling of theory and practice of business sustainability by asking "Why don't business schools walk their talk?" [23]. Borges et al. (2017) highlight the need, for instance, for a "hidden curriculum" detached from the formal school structure for students to develop sustainable development literacy [24]. In the post-COVID-19 years, the inquiry may ask how business students can support a green gateway out of the crisis [25,26].

One of the main criticisms of business education points to the narrowness of a disciplinary approach, which is discrete instead of holistic [27,28], resulting in fragmentation of intellectual production [29]. The call for business schools to move beyond their shortcomings [30] requires the implementation of a broad curriculum that can decode world issues [31] and wicked problems [32]. Both responsibility and sustainability require educators that are able to engage in grand challenges of complexity; uncertainty and risk-disciplinary structures in conventional business education prove inadequate for this task. Traditional approaches lack interdisciplinary proposals for business schools to embed a systemic understanding of sustainability education [33].

Some progress has indeed been made and has materialised in formats such as interdisciplinary sustainability courses, minors and majors [34,35], frameworks and general guidelines [29], nourished by a plethora of case studies that benchmark curriculum solutions from contextual points of view. Despite the clear, evident feasibility and mutual benefits of making business education more sustainability-oriented through interdisciplinarity, this approach still lacks guidelines [34,35].

Contextual interdisciplinarity is represented by two major categories in the epistemological evolution of the literature—critical and instrumental [7]. Although the ontological mainstream of interdisciplinarity is linked mostly with education per se, this specific contribution has impacted management education, provoking the discussion in the following papers about the duality of constructivism and positivism in the efforts of interchanging disciplines.

For the purposes of this study, we consider instrumental interdisciplinarity as an approach; its primary focus is to attend to “market and national needs” and in “short-term solutions to economic and technological problems, pragmatic questions of reliability, efficiency, and commercial value” [7] it can also be called methodological interdisciplinarity [36]. In addition, critical interdisciplinarity is defined by its grounding in context-related societal challenges. It examines knowledge structures focused on transforming societies, raising questions about societal value, motivation and purpose [7]. The perspective responds to the problems and needs of minority, oppressed, and marginalised groups. Reflexivity and critical thinking connect with sustainability, since its nature is inherently complex and representative of real-world problems [4]. From a management perspective, critical interdisciplinarity responds to the call for a less utilitarian curriculum [37] and for a positioning that does not pretend to be neutral in the face of civilizational issues [38].

However, despite the taxonomy there is a noticeable absence of publications addressing responsible management education alongside interdisciplinarity with contextual frameworks, especially focusing on the practitioner’s perspective. A survey of the literature including both terms together only results in a handful of works such as Mousa et al. (2019; 2020) [39,40] and Parkes and Blewitt (2011) [41]. Focusing on how interdisciplinarity manifests in sustainability management education literature [4,7,36] and how this concept can be helpful in practical guidelines to teach sustainability, we create a framework that validates and enhances the classifications of interdisciplinarity, critical and instrumental approaches [7], proposing practical guidelines to strategic management in business schools.

The tension between practice and theory and utilitarianism and societal change is recurrent in management education. The literature stresses other issues such as (I) the utilitarian view distanced from a critical position [37], (II) a curriculum that remains silent under a pretence of academic neutrality [38], (III) the neoclassical economics orientation [42], which is grounded on a morality asserted by stakeholders rather than shareholders [32], and (IV) the decoupling of sustainability education and research activities with practice [43].

Here we argue that by addressing interdisciplinarity through the critical and instrumental perspectives [7], we can create a model capable of mitigating two of the main gaps in sustainability business education: the limited capacity of curricula to transform leadership and the lack of context concerning the role of business education, contributing to mitigating the tensions between practice and theory and utilitarianism and societal change.

We use systematic literature review principles combined with a panel of specialists from the PRME champion schools’ experience to develop an innovative interdisciplinary framework for sustainability management education. The practical implications of this framework unfold in pedagogical policies that can be helpful for business school deans, staff and faculty. It is important to understand their profile as an HEI and how much the critical or instrumental category is aligned with their vocations and values.

Interdisciplinarity Genesis and Management Studies

Education faces difficulties on a global level [44,45]: societies’ cycles of change are accelerated, and the ubiquity of technology unifies and divides simultaneously. Among the many issues of concern are access, equity and gender bias [46,47]. The recent COVID-19 pandemic has exposed cracks in the civilisational tissue [48] and the many shades of global educational fragilities and inequalities [49,50]. The effect has been felt from elementary to higher education [51]. These concerns lead to a broad call for reform in higher education [52] since it has a central role in modelling new professionals’ mindsets, thus acting as a leverage to address civilisational issues like environmental degradation [53].

Higher education institutions (HEIs) have as their primary functions research, education and extension activities. Business schools are a subgroup of HEIs, which focus on vocational studies and the professional preparation of students for real-world organisations, problem-solving using the toolbox of business studies, the analytical approach of organisational theories and interdisciplinary support of other knowledge domains. One example of a business education limitation is how leadership formation is reduced to the mere grouping of contents [54]; although juxtaposed in a logical sequence, they are often disconnected from each other, as well as from the external world.

The patchwork of disciplines, such as accounting, finance, operations, human resource management, marketing, economics and law, loosens in response to concurring forces that mostly affect higher education degrees. On the one hand, you have what Comte called the unstoppable spirit of togetherness, advocating transboundary movements across disciplinary walls to fully integrated and contextual knowledge. On the other hand, HEIs' organisational functioning tries to hold down large amounts of knowledge consolidated under specific conventional disciplinary lanes [55]. The organisational perspectives of educational institutions enforce these conventional disciplinary beacons: HEIs are schools for individual life enhancement but are also companies with objectives, metrics and stakeholders demanding results.

In HEIs' business schools, connecting, unifying or integrating disciplines becomes even more complex at an institutional level because the organisation is the subject of its *raison d'être*. Moreover, the roles of academics and management are occupied by the same individuals. This grey zone makes it harder to draw lines and even harder to walk through disciplines, and in this context, it acts like virtual vessels for the policy decisions in which academic content is forced to fit.

In most colleges and faculties, research and teaching are bound together; therefore, another issue related to ID creates a contradiction: despite a widespread stimulus for interdisciplinary research, many researchers are compelled to stay inside uni-disciplinary models: career promotions, funding decisions, scientific publishing and academic recognition are grounded in the process that usually favours uni-disciplinary research [56,57]. ID research is central for addressing the world's most novel and complex issues [58]. Its outputs should be communicated to undergraduate students to educate professionals for the future. In business schools, higher levels of interdisciplinarity are related to the research involvement of the teachers and coordinators [59].

Another way to address the ID gap in management studies is through the critical-instrumental ID dyad, one of the major fault lines in ID [7,60]. The instrumental ID is born when the motivation for connecting different disciplines lays on strategic positioning in the economic competition, such as the case of biotechnology and biomedicine, and high-tech industries: the ID, in this example, is serving market needs [36]. The instrumental ID bridges fields aimed at problem-solving activities and does not seek synthesis or fusion of different perspectives [61].

Grey's (2007) approach to business education similarly overlaps with the instrumental-critical ID dyad definition, arguing that there is a divide between mainstream business education, understood here as the process of educating "business as usual" managers, and critical management education [61]. From general systems theory, we get a metaphor for the transition in higher education: the shift from simple to complex [62]. While simple structures obey a single rule or set of logic, complex structures operate in a non-linear way, with conflicting logic, feedback, trade-offs and synergies [11].

In a seminal paper on the shortcomings of business education, the authors claimed that business schools fall short when they try to help their students merge the siloed theories that are taught. In this sense, case studies represent an effort to solve this shortcoming, and bridge a gap between teachers and managers, "the educational push from faculty meets the learning pull from students/managers" [20] (p. 5).

Business education is mostly somewhere between this crossroad of two vectors. A dialectical struggle between the simple-complex and instrumental-critical is built to attend

to individual, firm and civilisational needs and pressures. This evolution occurs without necessarily subsuming old versions: one of the myths of ID is that the inter-disciplines of today are the disciplines of tomorrow [7]. The integration does not have a schedule to be complete or a fully merged status to be considered interdisciplinarity and can remain partially connected.

The interdisciplinarity movement for business curriculum change is not a novelty [63]. Efforts to bridge the divides in business study epistemology seem to find support in the perspective of knowledge production located beyond the positivism of the “knowledge unity tree” and are connected to social constructionism. Knowledge development can be a social process, but not detached from external reality or that which it refers to. Suppose it were possible to boil all the underlying factors and variables that compose the struggles of business education present and future in an interdisciplinary studies distiller and obtain only one synthesised component. Any didactic abstraction intended to approach real-world organisational problems is an incomplete attempt to mimic reality. Therefore, disciplines are not one-dimensional mirrors of reality: they are complex economic and psychological devices reflecting as many dimensions as possible. That is one of the reasons why some of the top business schools like Harvard, Ivey, Darden, IESE, Haas, Tuck, Stanford and Wharton use extensive case studies as a primary teaching method [64], assuming that by the emulating experiences, at a higher degree of reality, their students will be more prepared for real-world situations.

It is well known that interdisciplinarity is the only way to represent real-world situations and that approaches like active methodologies can foster employability of business school alumni [65,66]. From an instrumental perspective of education, it is also through the access of a wide array of workplaces and contexts that leaders can promote and integrate a sustainability agenda into an effective business case [42].

2. Materials and Methods

2.1. Review Parameters

This paper’s methodological approach explores management education’s academic evidence, interdisciplinarity and sustainability using systematic review protocols of scientific databases described below and is inspired by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [67].

We used the keyword string with “Interdisciplinarity” in the Scopus database, and scanned for papers published in peer-reviewed journals, written in the English language. After the identification and screening process (Figure 1), we obtained 19 papers to be fully read. We searched for papers that contain, describe or suggest a policy, project or practice concerning sustainability business education using interdisciplinarity. After this process, we excluded 9 papers. During the screening process we found references that led us to a special issue on Responsible Management Education, named “SI: PRME: Looking forward: Leadership Development & Responsible Management Education for advancing the implementation of the Sustainable Development Goals (SDGs)” [68] with a batch of contextual papers adhering to the theme which were added to the pool of papers used. The 18 papers of the issue were included. After examining the papers we extracted a summary of 49 programs, projects, actions or approaches that could foster interdisciplinarity for sustainability in management education. We also analysed the outcomes of each one of the 49 items and assigned them into instrumental and critical interdisciplinarity according to the definitions.

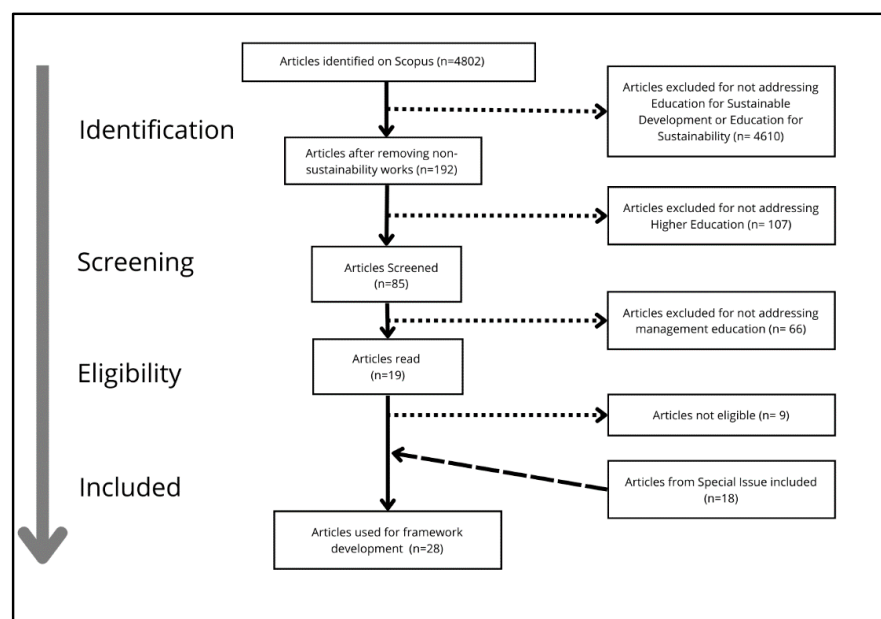


Figure 1. Review main steps. Source: Elaborated by authors.

In addition, we evaluated the items and used content analysis categorization [69] to group them by similarity into a narrowed number of categories (Table 1) as we could identify any pedagogical categories in the text and related them to the dimensions of instrumental and critical interdisciplinarity.

Table 1. Interdisciplinary categories.

Interdisciplinary Evidence from Papers	Category Description	Category ID	Dimension
[38–40]	Broader curriculum	II	Instrumental
[43]	Technological Forecast	IX	Instrumental
[1,5–7,15,16]	Sustainability integrating disciplines	V	Instrumental
[3,4,28]	Diverse learning methodologies	VI	Instrumental
[32,44–46]	Multiple stakeholder partnerships	XI	Instrumental
[10,11]	Planning towards interdisciplinarity	XII	Instrumental
[13,34,35,41,42]	Reporting through interdisciplinarity	XIII	Instrumental
[12,14]	Research-teaching linkages	XIV	Instrumental
[25,33,36]	Autonomous learning environments	I	Critical
[37,70,71]	Creative thinking and reflexivity	III	Critical
[29–31]	Spaces of discomfort	IV	Critical
[2,26,27,47]	Extra-class, experiential and/or service learning	VIII	Critical
[9,19]	Diversity and equality	VII	Critical
[23,24]	Local communities interaction	X	Critical

2.2. Interviews to Discuss the Framework

The categories aligned to critical or instrumental interdisciplinarity were discussed with specialists from business schools that are members of the Principles for Responsible Management Education (PRME) “Champion” group. All of the 37 schools were invited to participate in the research; twelve of them accepted and contributed to the improvement of the framework.

The specialist interviews followed a semi-structured script that aimed to measure perceptions of critical and instrumental interdisciplinarity constructs [7,55], sustainability education at HEIs [72] and how they manifest themselves in Responsible Management Education member business schools [73]. After each interview, the 16 category groupings within the proposed framework were sent to the interviewees for them to assess the level of critical or instrumental interdisciplinarity based upon the extent to which they felt the paper adhered to the given definition of each. Additionally, they were asked to consider the extent to which business schools taught sustainability (i.e., with critical and/or instrumental interdisciplinarity) and to be mindful that there may be a gradient between the two dimensions and that some practices are harder to categorise as only critical or only instrumental.

3. Findings

3.1. Review and Initial Framework

The forty-nine items identified were assigned to critical or instrumental dimensions, and with the aid of content analysis they were grouped into 16 themes (Table 1)

Some interesting practices could be identified in this first phase of data gathering. For instance, the study from [74] described an initiative called “Social media for social good”, an undergraduate module designed by students on a service-learning basis to foster awareness about responsible management, and highlighted the predisposition of students for engagement in social causes. This evidence is labelled “Presence of student-led projects”. In addition, Dallaire et al. described a work called “creating spaces for sustainability”, where a student-led symposium has been organised by students in the McGill University in Montréal for the past seven years [75]. This evidence was also labelled “Presence of student-led projects”. Another example is the work from Hughes, Upadhyaya and Houston (2018), bringing a call for action to an interdisciplinary approach of sustainability in business schools that should also consider student-centred pedagogy [42]. The work was labelled “Presence of incentives for the self-regulated learning process”.

On the other hand, the authors also discuss an educational program involving master’s education, undergraduate training and industry consultancy. This paper was categorised under the label “Partnerships between the triad: business, science and education” [76]. A study labelled “Legitimacy focused partnerships with industry” explored how collaboration models with industries can legitimise responsible management education [77]. Furthermore, Avelar, da Silva-Oliveira and da Silva Pereira (2019) explored the context of stakeholders’ integration from a collaborative network perspective, and was labelled “Collaboration networks for research and education” [78]. All the three items listed above indicated thematic overlapping and were grouped into category XI, “Multiple stakeholder partnerships”. These practices inspired the creation of the categories to be evaluated by the specialists.

3.2. Interviews and Framework Improvement

The specialists’ evaluation of the initial category dimension placement can be observed in Figure 2; right after the verbal conversation they were invited to fill out a form that proposed a division between both dimensions. We found a lot of adherence between the way in which categories were evaluated by the specialists and the outputs from our systematic literature review. The specialists placed (II) Broader curriculum, (V) Sustainability integrating disciplines, (VI) Diverse learning methodologies, (XII) Planning towards interdisciplinarity and (XIII) Reporting through interdisciplinarity along the instrumental dimension. They

placed (III) Creative thinking and reflexivity and (IV) Spaces of discomfort within the critical dimension. Most of the differences in the placement of the categories were for categories that were aligned along the critical dimension during the literature review.

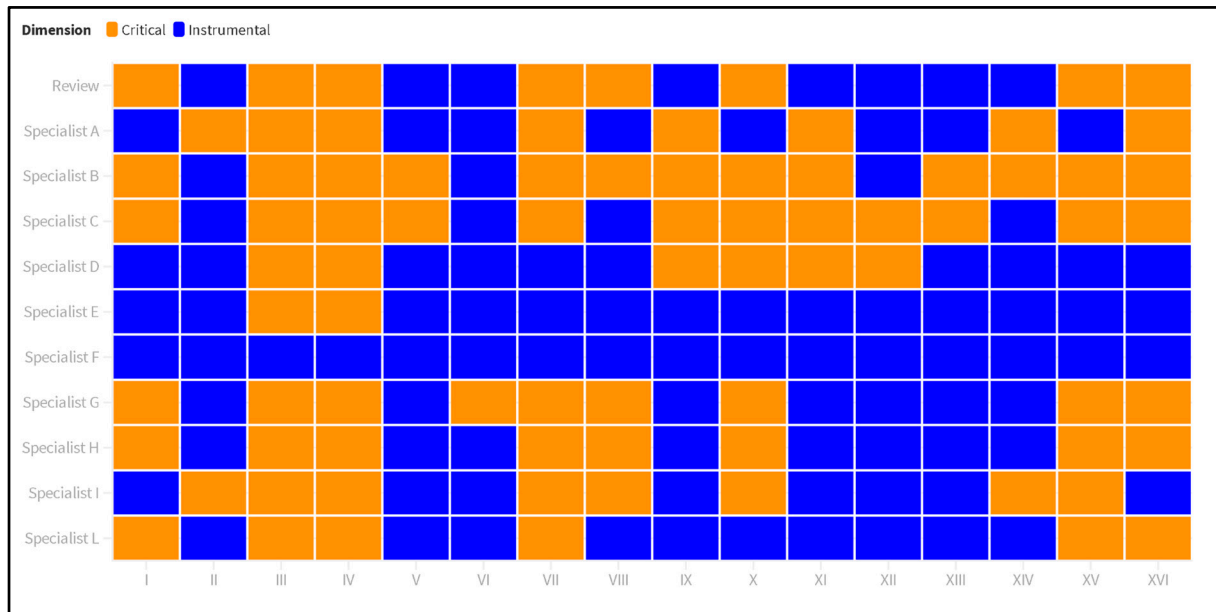


Figure 2. Specialist perspective on the category/dimension placement.

The specialist interviews highlighted the difficulties in dividing the categories into two discrete dimensions. Specialist C, for instance, discussed a case grounded in a finance course. Despite the course integrating the core curriculum of business education, and considered to be one of the most “instrumental” disciplines, the interviewee felt that it could induce serious reflection and critical debate on ethics or sustainability. In addition, Specialist J believed in amalgamating both categories and that it would be a more feasible approach if instrumental interdisciplinarity was framed as goal-oriented practices and projects, and critical interdisciplinarity as the underlying purpose that grounds the achievement of the goals: “Critical interdisciplinarity is more a way we challenge our assumptions, and not a practice or project” (Specialist J).

Specialist E went further, suggesting that context is of utmost importance for critical interdisciplinarity framing since all the categories could be present in a business school without any of them addressing, for instance, the needs of the oppressed, a category identified as part of critical interdisciplinarity goals. Therefore, a framework proposal that considers the gradient of transitions and intermeshing of critical and instrumental interdisciplinarity seems to be more appropriate. Specialist C highlighted many of the ways business schools taught sustainability that would be identified with category (VI) Diverse learning methodologies, such as: incorporating business simulators, online dashboards and business case databases, addressing critical interdisciplinarity through the use of case studies. Case studies are often offered as evidence of “interdisciplinarity” in curricula; however, cases are often taught from the educational “toolkits” point of view, which may be more instrumental in nature.

The specialists tended to agree that the connection “Reporting through interdisciplinarity” (category (XIII)) has with the SDG role is increasingly relevant in interdisciplinarity education, bringing a global political organisational agenda to the inner levels of schools’ policy and projects and adding contextual methodologies in the classroom [79]. Interviewees expressed that it is a diverse and goal-oriented tool easily integrated into leadership training. Specialist J pointed out that SDGs suffer from decoupling since they can act as a “blanket” thrown over the very dimensions of the school; nevertheless, despite its

substantial potential for interdisciplinarity, this blanket seems, most of the time, detached and to “float” over the curriculum with few points of contact.

Interdisciplinarity could be the answer for teaching sustainable development in business schools; despite that, when addressing the issues related to category (II) Broader curriculum, Specialist J points out that business schools “face challenges of their own”, and that it IDS and sustainable development seem not to be part of business schools’ objectives and aims.

Specialist A addressed interdisciplinarity from an organisational perspective, identifying the integration of organisational levels as a prerequisite for interdisciplinarity practice in the classroom. Specialist K summed up the theme underpinning category (III) Creative thinking and reflexivity, and especially the hidden curriculum issue, by stating “today’s undergrads, the upcoming generations, have some predisposition towards sustainability”, suggesting that students’ willingness to do good is growing, and that it can be harnessed and fostered through interdisciplinarity.

4. Discussion

4.1. A Line That Is Hard to Draw: Framework Proposal

The framework proposal, portrayed in Figure 3, presents a model of analysis to address interdisciplinarity under the critical and instrumental dimensions of Klein [7]. It summarises the findings of this paper, including the 16 categories of IDS found in the literature review from management education, in a flexible frame aimed at fostering the exploration of interdisciplinarity–sustainability education alignment of the practices present in a school. The model also includes reasoning from the domains of “Moving Forward Through Discomfort–Critical Lenses”, “Students’ Role in Interdisciplinarity” and the “Instrumental Perspective of Curriculum”.

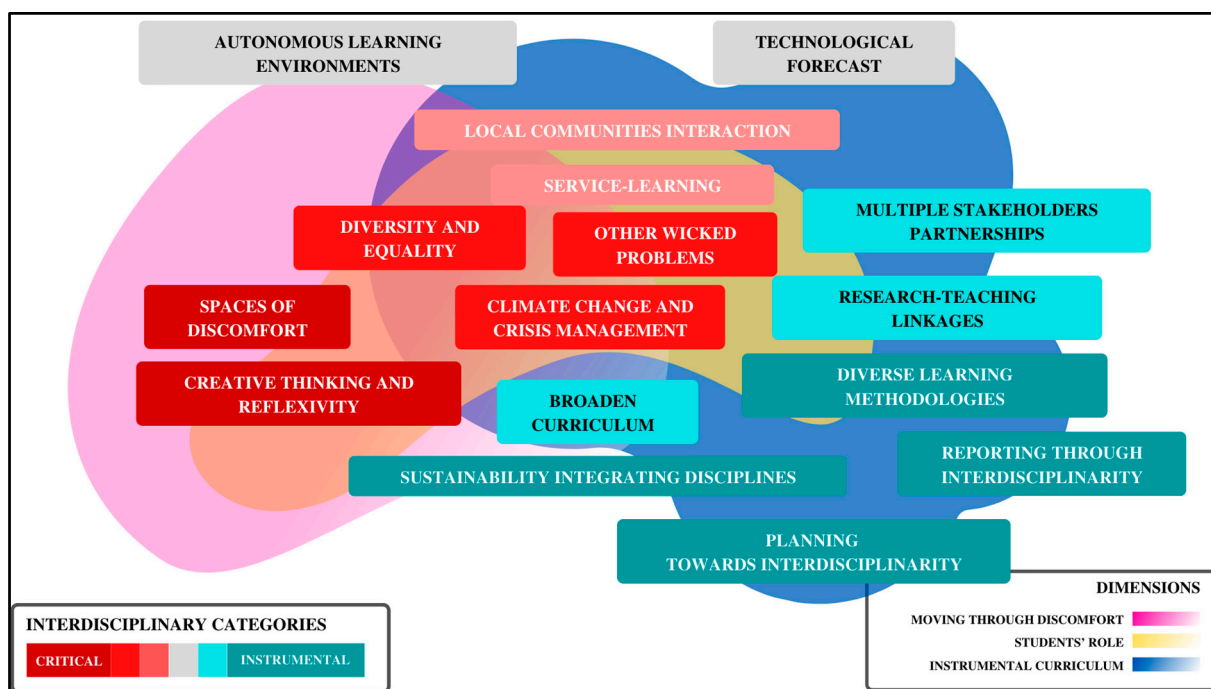


Figure 3. Interdisciplinarity-based Sustainability Education.

The specialists’ interpretations of the categories drawn revealed that the critical–instrumental duality is a simple approach and much more complexity is present between these two extreme points. It comprises a gradient through which it is hard to draw a dividing line. Most of the specialists agreed that it is difficult to define what could be considered a critical approach. Lattuca, Voigt and Fath (2004) argued that ID would prepare students for both problem solving (addressed

here as the main trait of instrumental ID) and critical thinking, by developing the ability to employ multiple perspectives [3]. The validated categories indicate that there are differences in the way in which the categories could be interpreted since only six of them were clearly classified as either critical (Creative thinking and reflexivity; Spaces of discomfort) or instrumental (Broader curriculum; Sustainability integrating disciplines; Diverse learning methodologies; Planning towards interdisciplinarity; Reporting through interdisciplinarity). Most of the categories remain open to interpretation.

This outcome enhances findings in [7]: interdisciplinarity typologies are more of a movable gradient than a static frame division. Our findings expand the definition of interdisciplinarity as the integration of disciplines for clear problem solving; under this perspective, the critical categories would be relegated to the margins, and the instrumental categories would clearly be the focus. The specialists' interpretations seemed to have more in common with a generalist's perception such as [80], who suggested finding a common ground or teamwork, as "integration enough" to be called interdisciplinarity [81]. When Specialist A, for instance, says that "interdisciplinarity is only possible through organisational integration of departments, and that [. . .] from the doorman to the dean, everyone is aware about the SDGs", as a form of interdisciplinarity, he is not addressing epistemological integration for problem solving. Instead the interviewee was addressing an aspect of teamwork, within an organisation, widening the lens of interdisciplinarity practice, along both the instrumental and critical dimensions.

In business school curricula, often cornerstone subjects are expanded through disciplines, acting like a roadmap for the whole degree [63]. This notion is captured by the "Broaden curriculum" category in our study and is considered primarily to be instrumental, and therefore in alignment with the interdisciplinarity perspective. In this specific case, the specialist used a finance course that had content related to the importance of ethical concerns, which would be categorised under the "Other wicked problems" category. In this sense, the specialist's perception is also aligned with a generalist perspective that is more concerned with the question rather than the integration of concepts themselves to answer it [3].

These examples align with Fazenda's (1991) phenomenological view of interdisciplinarity, where the curriculum perspective shifts from the curriculum to the individuals' attitudes towards a transformational purpose [82]. It is the educator's attitude that leads it to pose "questions" about ethics and bring other knowledge areas to a course which could be developed into a "toolkit".

The framework developed brings important lessons in the evolution of ESD using interdisciplinarity in management education. The critical and instrumental categories are the background of the pedagogical practices and can be related to the vocation of the educational institution, public or private, more focused on CSR or less, and also because of the faculty's inclination for services or research. Bringing interdisciplinarity as something planned and with specific and measured actions can be a path for schools that do not have a more procedural or project educational vision. More constructivist schools will choose to allow phenomena of interdisciplinarity to emerge when they provide innovation and the creation of solutions for the surrounding community as a tradition. In this sense, the framework allocates the actions according to each inclination, allowing the business school to have more clarity concerning what should be its choice according to its form of internal organisation and decision making. Education cannot be treated as a factory, but it also lacks quality, performance and planning indicators. In this sense, the framework proposes an alluring roadmap of pedagogical practices according to the most critical or instrumental inclination of each business school.

4.2. Moving Forward through Discomfort: Critical Lenses

In principle, neoclassical economics is opposed to a broader perspective of sustainability and has led to limited education on the subject in business school curricula: most business schools still address it as tertiary and conflate it with CSR [42] or environmental

issues. The economics models that persist in guiding today's management education are still mainly oriented to shareholder supremacy [83], creating curricula limitations that cannot address complex challenges. Despite all the fuss and distrust caused by scandals such as Enron, the Great Financial Crisis and environmental catastrophes, such as the Brazilian Mariana and Brumadinho tailing dam ruptures [84], the themes of ethics, sustainability, CSR and entrepreneurship are still considered add-ons in the formative process of future business professionals [63].

Business education aims to educate work-ready professionals who are not fond of discussing a system that might be harmful to them and the planet [85]. At this point, creating discussions that shed light on issues that are often ignored or too politically charged to be discussed can add robustness to the education of future managers. University systems need to build structures that can bring together academics from different knowledge areas and reward/induce them to ask tough questions and teach critical positioning [4]. Embracing discomfort is an avenue that steps further toward challenging the traditional academic silos and boundaries. It creates a new pedagogical body of comfort, which can fit into an interdisciplinary perspective, an educational attitude that can take place regardless of the curriculum grid [82]. Broeckerhoff and Lopes (2020) illustrate how a researcher of critical marketing faced mistrust and uneasiness from the disciplinary lens of marketing and describe how the cross-disciplinary approach granted comfort when assessing a core business topic from a critical perspective [86]. Therefore, messy and uncomfortable spaces are honest and compatible ways to look at real-world problems, and they can be reached through interdisciplinary interfaces.

While instrumental interdisciplinarity focuses on problem solving, critical interdisciplinarity is grounded on transgression and questioning of disciplinary's very existence [87]; by crossing curriculum boundaries and grasping themes like gender equality, diversity, feminism and decolonisation, curricula can reflect the general improvement of democratic education [88]. Lattuca, Voigt and Fath (2004) highlight one example of the use of gender critique in an interdisciplinary course whose aim was to promote reflective and effective thinking [3]. Reflexivity has a vital role to play as the pedagogical approach that allows learners to see the old and familiar as new and different; by reflecting on disciplinary subjects often addressed as neutral, students can pollinate other disciplines, leading to a gradual change of what is considered a core subject [38]. To bridge the disparate together can be at first considered mainly a critical view of interdisciplinarity, since the "trans-disciplinary quagmire" [89] would be something opposite to the tidy and goal-oriented connections of disciplines; nevertheless, both instrumental and critical interdisciplinarity share enough commonality when it comes to solving wicked world problems.

4.3. Students' Role in Interdisciplinarity

The road to addressing sustainability education at business schools is full of skirmishes related to organisational constraints of centuries-old departmental and disciplinary lanes. Organisations such as the PRME network and international student-led initiatives such as the ENACTUS can provide context for addressing global issues through policies and programs which soften the rigid structures and create an environment of sensemaking for the students which encourages the integration of sustainability into business education [90]. Students are central agents of change and feel more comfortable and emboldened to question the status quo. Sustainability and a wide array of topics deemed necessary, "but not so much so to be in the curriculum", are often adopted by students that will, regardless of their majors, consider social and environmental dimensions in their education [79]. The broad concept of integrative learning builds students' knowledge throughout their curriculum and broadens it outside university walls. This perspective is closely bound to interdisciplinarity [42]. In summary, it seems that when the global calls for addressing wicked problems hit the unyielding curricular grid and cannot correctly penetrate the core disciplines, they liquefy and run through more flexible and versatile student-led contexts and initiatives.

The movement comprising student-led sustainability education initiatives is well explored in research on alternative curricula. Student-led groups can lead the charge for sustainability education in business schools based on community actions [24]. These “concealed” academic goals rely on groups with a higher degree of autonomy and self-efficacy that develop service-learning activities hosted outside campuses and the metaphorical walls of the curriculum. Community and service-learning activities are the best answers to an instrumentally narrowed curriculum [83].

A hidden curriculum also works the other way around. It refers to tacit messages that disrupt the formal claims for sustainability or CSR [91]; schools can advocate the relevance of the themes, but its actions often send the opposite messages to students. Business educators often agree with the relevance of the themes but usually hold a lower level of familiarity [92]; this disconnection signals ambiguity to students and leads to a decoupled [23] perception of faculty, and organisational mission and commitment to sustainability goals. By pressing for new subjects from an outside–inside curriculum movement, students are inquiring into and raising the intrinsic role of business education, which manifests the critical perspective of interdisciplinarity [7].

4.4. Instrumental Perspective of Curriculum

Business degrees are structured to be under a departmental logic which usually relates to core themes. Academic organisational logics reflect disciplines that are well delineated and narrow the curriculum into academic theoretical silos that reinforce departmental divisions [42]. Obstacles for interdisciplinarity integration are related to factors within and outside the faculties. Suppose today interdisciplinarity is mentioned more frequently than it was 40 years ago. External incentives of research metrics remain a limitation: in comparison to many fields, interdisciplinarity-focused journals have an overall lower impact factor [93].

This orientation and lack of incentives reflect from faculty to curriculum, from research to departmental structure, and so on, and reinforce the siloed walls of curricula, making it harder for higher education to address problems anchored in the real world [94]. Theoretically, addressing systemic matters such as pandemics, climate change, biodiversity loss and inequality requires a holistic representation of reality, with many facets harbouring a myriad of disciplinary perspectives. This emulated version of the world must be brought into the “classroom” under a loose knowledge structure. In the parallax from combined perspectives, interdisciplinarity flourishes and real problems are solved. A business student specialising in tourism, worried about industrial shortfalls during times of social distancing, and a pharmacological researcher conducting base research on COVID-19 samples are as far apart academically as can be. They can still find common ground in the combination of different views of the pandemic that could be represented by factors such as public health guidelines for safe air travel, or the design of cost-effective mask displays in airports, or early warning systems identifying the risk of new surges.

The challenges for IDS result from the tension between the disciplinary fundamentals and the call for broader competencies for critical, interpersonal and system thinking (critical dimension), but also for problem solving, normative and strategic (instrumental dimension) [35]. Therefore, the tension is sourced by both perspectives of IDS addressed in this work. We assume that it is no easy task to draw a line between the critical or instrumental dimension of curriculum expansion, but subjects strategically, or casually, placed can act as cornerstones drawn from focal points of the core curriculum and expand through disciplines acting as a roadmap for the whole degree [63]. This movement is one of the manifestations of a spiral curriculum movement towards interdisciplinarity [95] that recurrently exposed students to the same themes under different contexts, manifesting in different formats that are meta-curricular, such as service-learning projects. Despite some controversy as to whether cases are “business as usual” for active methodologies in management education, we assume that they can act as manifestations of interdisciplinarity and active in-class professor positioning that can broaden the curriculum regardless of changes in the curricular grid.

Management education models and tools try to emulate applied science fields such as physics and biology which, some argue, lead it to be too research-oriented and detached from management practices. At the same time, cooperation with other sciences remains limited. The call for social and natural science cooperation has grown in relevance as today's challenges are addressed [93]. Connections with other fields of knowledge, such as medical sciences, often prove beneficial as health-related problems usually demand critique and goal-oriented problem solving [7]. Stevens (2021) states that connection with clinical education models, such as those related to the tutoring of students by specialised practitioners, could help business educators fill this gap through interdisciplinary bridges [96]. In a world where attention is on systemic issues, such as climate crisis and COVID-19, bridging business and other knowledge areas becomes urgent in order to address environmental issues and safeguard socio-economic advances. Still, the task of moving interdisciplinarity from the curriculum level to the inter-institutional level faces many obstacles. The legitimacy of business education is often viewed sceptically with respect to its capacity to provide transformational leadership [19], which only emphasises the need to broaden business schools' curricula.

5. Conclusions

By exploring examples of interdisciplinarity in well known business schools, and linking them to ESD, we provide a blueprint for curriculum design, organisational changes, pedagogical improvements and community outreach projects. The 16 domains as well as the "gradient" categorization between critical and instrumental allows a school to reflect, at an institutional level, on how balanced their practices are and how they might foster one dimension or reduce the other dimension in order to answer existing and future challenges.

The critical and instrumental dimensions are not conflicting divisions or categorizations of interdisciplinarity. Instead we believe that both complete each other, providing a dynamic and cyclical process that both faculty and staff have to develop together. Educators and institutions can be more in charge of critically exploring the grand challenges that the environment of the school can offer as inputs to interdisciplinarity projects. At the same time, the staff and administrative employees of business schools should focus on providing a structure that allows interdisciplinary projects to occur, such as joint events, cross-discipline initiatives and interconnected curriculum content. Both parts comprise the interdisciplinary domain, moving the perspective from critical (outside to inside) to instrumental (inside to outside), thereby evolving the pedagogical and organisation structure of business schools.

The call for educating new leaders such that business sustainability is "baked in" can only be addressed through a process where content is systemically de-siloed, partnerships are created and structures broken down. This paper inherently assumes that management education indubitably benefits from sustainability inputs to its core curriculum through interdisciplinarity domains [79]. The proposed categorisation framework is based upon the instrumental–critical interdisciplinarity dyad, one of the major fault lines in interdisciplinarity [7]. It showed that it is possible to frame an array of 16 categories comprising the most recurrent interdisciplinarity practices in the literature. The specialists' validation shed light on the model by showing how mixed the categories can be and how there is a slight prevalence of the perception that most business interdisciplinarity approaches are instrumental. Nevertheless, there is a consensus among them that, despite the current situation, business school interdisciplinarity should be goal-oriented, provide critical thinking opportunities and solve civilisational matters.

The specialists' interpretations, paired with a literature review, also showed that the instrumental–critical dyad should be read from a contextual and gradient perspective since interdisciplinarity is neither a static concept nor a universal definition [97,98]. Grounded in the assumption of a gradient between the instrumental and critical perspective of IDS, we designed a contextual framework proposal, loose enough to harbour divergence and

balance between the epistemic and ethical disciplinary dimensions that can enable the provision of a sustainability-centric business education [94].

The research question here posited “How does interdisciplinarity manifest itself in sustainability-related business education?” is answered by a proposed model that frames a diverse array of practices into interdisciplinary categories. Business school deans, staff and educational agents can apply the model as a checklist of their practices and orientations to move towards a more interdisciplinary curriculum or strategic objectives. The framework is an invitation to self-reflection at an institutional level, on how the leaders are being trained, how well they are being equipped with the practical competencies and how well they are being invited to think critically when making decisions inside organisations. Further studies might test the efficacy of this model beyond the business school milieu and on a large sample, identifying and quantifying the critical and instrumental IDS intensity.

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