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Introducing a Problem-Posing Protocol to Encourage Management Students' Reflections on Sustainability Premises

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Abstract

The goal of this article is to examine and develop problem-posing case study teaching methods to promote business students' reflections on their premises around sustainability practices. Literature on transformative learning in sustainability informed our hypothesis that problem-posing instead of problem-solving case study teaching would yield greater incidences of students' premise reflections at the deepest level. For our quasi-experimental design, undergraduate students at a business school were presented with a teaching case of corporate sustainability then half were given problem-solving prompts for critical reflection while the other half were given problem-posing prompts. Resultant responses were classified to expose differences in the nature and levels of reflection between these two groups. This pedagogical research indicated that the problem-posing group reached deeper levels of reflections, though further research is needed to better understand this phenomenon. We advocate for the utility of a problem-posing approach in sustainability education. This study contributes

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a problem-posing protocol for business schools, curricula, and professors, as well as suggestions for further research for theoretical understanding of problem posing for transformative learning in sustainability.

Keywords
problem posing, problem solving, sustainability, management education, transformative learning, critical reflection

Introduction

This paper discusses transformative learning for sustainability education in business classrooms. Based on the concept of problematization or problem posing (Freire, 1970; Mezirow, 2010; Schön, 1993), we used a pedagogical research design (Kennedy-Clark, 2013) to gather and analyze response data from business students given problem-solving or problem-posing sustainability case study teaching activities. Problem solving (PS) has been the basis of many tools (e.g., case studies and simulations) for decades to teach business students to explore complex situations and make decisions (Brunstein et al., 2021; Prado et al., 2019). Problem posing (PP) has not been employed and popularized, despite claims that it could provide transformative learning (TL) in sustainability education (Brunstein et al., 2021). To begin to understand the relationship of PP and PS frameworks to reflections, we developed a case study protocol, deployed to 173 undergraduate students, then collected and analyzed data from two rounds of individual and group reflections.

PS can promote critical thinking, creativity, and result in learners with competence in overcoming simple and well-structured challenges, but it relies on a more pragmatic and less reflective teaching-learning perspective (Kapur, 2015; Myran & Sutherland, 2016). The logic-oriented mindset built through PS embeds the biases and assumptions of the underlying problem itself (Myran & Sutherland, 2016), whereas PP is an alternative approach promoting learners' anticipation, discussion, and reflection on potential challenges. This deeper reflective practice makes PP vital for promoting transformative learning (Brunstein et al., 2021; Mezirow, 1998) and tackling ill-structured challenges, like sustainability. These ill-defined or wicked problems (Rittel & Webber, 1973; Wals & Jickling, 2002) require reflections on the deepest causes of the challenges (O'Neil, 2018; Sterling, 2011; Wals & Jickling, 2002), so are best served by PP frameworks.

Fostering this paradigm shift for our learners from PS to PP through didactic-pedagogical experiences is a challenge, since teaching-as-knowledge-transmission is such an embedded perspective in education (Boström et al., 2018). This PS to PP shift represents a fundamental change in how we approach teaching and learning, similar to Kuhn's (2012) idea of a paradigm shift in which new examples and approaches are adopted by the scientific community leading to a new way of understanding and approaching problems. In the context of a sustainability-oriented paradigm, we must challenge students to rethink the way they approach problems by (re)positioning them.

Also, critical perspectives in sustainability education require an epistemic and paradigmatic change from our learners (Boström et al., 2018; Brunstein & King, 2018; Leal Filho et al., 2018; Springett, 2013; Sterling, 2011)—something not easily achievable on a large scale without a critical-reflexive management education (Antonacopoulou, 2010). The current paradigm of production and consumption presents models of problems and solutions for a community of practitioners (Kuhn, 2012). For instance, our consumption model is focused on immediate and short-term goals which leads to excessive mining of natural resources. This results in damage to our environment (e.g., loss of biodiversity, erosion, and pollution) and the production of more than we can consume. This model neglects the importance of balancing current needs with aspirations for the future, resulting in a chain of problems from social to environmental (Claar & Forster, 2019).

PP exercises help prevent students from limiting themselves to conventional frames of reference and models, allowing them to examine, for example, production and consumption phenomena from a unique perspective. This enables them to identify or expand on problems using a new frame of reference. If this deeper reflection happens during PS, it is by chance instead of due to purposeful instructional design that guides students to practice reflecting on themselves and on the role of business in sustainable societies (Springett, 2005).

TL processes begin when learners are faced with dilemmas that lead to their critical reflections on values, beliefs, and worldviews that are no longer adequate to resolve the new situations they face (Mezirow, 2010). Such dilemmas drive modifications of learners' existing frames of reference and the creation of new mental habits and behaviors (Mezirow, 2010). However, most of the work on TL since its inception in the 1970s has used individuals as the unit of study—individual dilemmas, reflection, growth, and transformations (Mezirow, 1978; O'Neil, 2018; Sterling, 2011). Studies on TL examining collective transformation and social change are less common (Cranton, 2016; Desapio, 2017; Gambrell, 2016), especially around education for sustainability as a social and critical concept (Gambrell, 2016).

In sustainability education, *collective* dilemmas must become a focus (Brunstein & King, 2018). However, TL research has not yet provided clear instructional frameworks for promoting sustainability-oriented collective outcomes. We assert that PP protocols for sustainability in business classrooms can provide a deeper experience to transform business students' mindsets, producing more purposeful and thoughtful conversations and solutions for global sustainability problems.

Our research sought to identify and evaluate levels of reflection of university business students under either PS or PP sustainability case study teaching activities. We asked:

- What levels of reflection do students employ under a PS versus PP framework?
- If differences exist, what are their characteristics?
- For students reaching the deepest levels of reflection, do any reveal a critical-social perspective?

We collected qualitative data from audio recordings of business administration classroom discussions and from students' written reflections. These were coded, themed, and examined to uncover students' underlying assumptions, levels of individual self-reflection, and levels of collective critical reflection.

The results advance theory about PP instruction and collective reflection in the context of TL. Practically and methodologically, they contribute a PP instructional protocol focused on sustainability that can serve as a reference, template, and source of further study for professors, business schools, and other sustainability education contexts.

Theoretical Background

The Way We Reflect on Sustainability Problems in Management Education Matters

One challenge of sustainability management education is to go beyond adaptative and pragmatic production-consumption perspectives that reinfforce just solving social, environmental, and economic issues (Boström et al., 2018) and instead focus on achieving paradigm shifts (Leal Filho et al., 2018; Sterling, 2011). O'Neil (2018) suggests we advance from an epistemological approach to an ontological one that is transformative, relational, and agential. Sustainability challenges in college classrooms are not always taught in ways that achieve this ontological perspective and purpose. The resulting graduates

are more likely to see sustainability problems and pose questions on the same plane, with little capacity for profound analyses of the root causes or impacts of the problems. The outcomes are superficial understanding of sustainability problems and less creative responses to issues (O'Neil, 2018).

Efforts to include sustainability in undergraduate management textbooks often lead to the inclusion of overused facts and generalized suggestions (Barter, 2016) that are met with distrust and fail to promote new market paradigms (Hubbard, 2010; Starik et al., 2017). Business students entering the job market may only be ready to use the canned practices espoused in those books. The main consequence of adaptative and pragmatic education toward sustainability is its emphasis on training management students to solve problems already set for them, using the standard business model. It puts the emphasis on training executors rather than thinkers capable of reflecting on and repositioning the nature of challenges. Some professionals in corporate leadership positions have focused on solving the most apparent problems, applying ready-made solutions without careful understanding of underlying issues that are the sources of the problems. This rush to solve problems inadvertently adopts the built-in biases and assumptions of the underlying problem itself (Myran & Sutherland, 2016).

This shift in thinking about the way we teach is based on a certain ontological and epistemological outlook. Ontology is pivotal in sustainability education, propelling individual and institutional transformations (O'Neil, 2018). While epistemology centers on the transmission and construction of knowledge regarding sustainability, ontology delves into the realms of essence and existence. It contemplates how students diversify their perspectives and how this metamorphosis influences their identity and relationship with the environment. While epistemology stresses knowledge dissemination and assimilation, ontology accentuates the evolution of students' beings and their interaction with the world (O'Neil, 2018).

Process-relational ontology, as articulated by Whitehead (1978) and explored elsewhere (Hosinski, 1993; Oliver & Gershman, 1989), asserts that reality does not comprise static entities but instead consists of dynamic events and processes. This ontological viewpoint is indispensable for grasping the inherent complexity of sustainability issues. Likewise, Tsoukas (2017) contends that theories addressing complex organizational phenomena should aspire to complexify rather than simplify.

The emphasis on complexity and dynamism within ontology receives further affirmation from *agential realism* in transformative education for sustainability. This perspective underscores the intricate interplay between empowered individuals and structures in shaping reality (d'Angelo et al., 2021). In sustainability education, it becomes imperative to recognize and

incorporate this relational ontology of processes. Learning within such an ontological framework encompasses not only what we know (epistemology) but also who we are becoming (ontology) when confronted with sustainability problems. This framework paves the way for a transformation of beliefs, reordering value priorities, and, ultimately, reshaping one's identity (Illeris, 2014).

Applying TL theory helps us step back to a more ontological perspective and to develop tools for professors and business students to better handle sustainability problems. TL is a central adult educational theory (Knowles et al., 2015), being introduced by Mezirow in the 1970s to build on Knowles' emphasis on andragogy in adult education. While Knowles focused on logical reasoning and problem solving through social philosophy and humanism, Mezirow believed adult learning surpassed Knowles' concept of self-directed learning (Fleming 2018). Instead, Mezirow proposed defining adult learning as testing assumptions and highlighting problem posing. Mezirow (1991) focused on learners' paradigm shifts, so finding how to integrate transformative teaching practices in sustainability management education is vital (Boström et al., 2018; Leal Filho et al., 2018; O'Neil, 2018; Sterling, 2011).

Deeper Reflections through Transformative Learning and Social Perspectives

TL is the "process by which adult learners transform problematic frames of reference in order to make them more comprehensive, distinct, open, reflective and emotionally capable of change" (Mezirow, 2009, p. 92). The processes that lead to transformative outcomes include an experience or set of experiences that cause cognitive dissonance, critical reflections, rational dialog, and taking action (Glisczinski, 2007).

In a way, TL is the evolution of adult learning theory, being positioned as a construct that can accommodate modern globalization, technology, and demographic changes in our learner environments (Merriam et al., 2007). TL is held distinct from deep learning approaches and other andragogical perspectives (Biasin, 2018; Howie & Bagnall, 2015; Jamilu & Hussain, 2022), because while TL seeks consciousness raising in learners accomplished through reflective practice on their presuppositions, deep learning focuses on instructor design of curriculum toward permanence of student understanding (Howie & Bagnall, 2015). Furthermore, TL encompasses a deep learning process, but not all deep learning necessarily leads to a transformation of learners' premises.

Table 1. Contrasting Content, Process, and Premise Reflection.

Type of reflection	Characteristics
Content	• Focus on the "What" • Assessment of the way the problem is perceived, felt, or thought about by the learner • Assessment of how to act in relation to the problem • Questioning "What do I know about the problem?" • Seeking what needs to be done to solve the problem
Process	• Focus on the "How" • Review and assess the strategies and steps to solve the problem • Questioning "How do I know this solution will work?" • Examining how the functions, thoughts, feelings, or evaluations are performed to solve the problem • Evaluating the effectiveness of the solution(s)
Premise	• Focus on the "Why" • Assessment of the problem itself and the beliefs and assumptions underlying the problem • Repositioning the reason for the problem • Questioning "Why am I reflecting on this?" "Why is this important?" "Should I worry about this?" • Requires awareness of why the learner perceives, thinks, feels, or acts in a certain way

Learner reflection operates at several levels, and the most profound level of critical reflection necessitates a change to deep-seated, and often unconscious, beliefs. This can result in new belief structures (Kember et al., 2008). In explaining TL, Mezirow (1998, 2010) also referred to three levels of reflection that occur during learning experiences—examining content, process, or premise (Table 1). Reflection on content occurs as individuals describe and examine a particular problem or experience, focusing on understanding what the problem is and what they need to know to solve it. Process reflection tries to uncover the "how" of the problem and occurs when the individual reviews strategies and steps needed to solve a problem. This can help lead to deep learning. But the most transformative level of reflection is the learner's reflections on premises or assumptions—both their own assumptions and those of others involved in the dilemma. This is the *critical reflection* required by TL theory (Phillips, 2019). As a learner engages in critical reflection, they can resolve the dilemmas presented to them and transform their meaning perspectives. Fostering students' premise reflections means they (re)consider their own values, beliefs, and worldviews.

Our main task as sustainability educators is to construct learning environments that encourage students' critical reflections on sustainability challenges. This environment should supply learners with prompts to promote these types of reflections, not to get an optimal answer from the students but to motivate their deeper thinking (Brookfield, 1995; Mezirow, 1998). Posing problems is considered a key method to promote TL (Mezirow, 1998), because it emphasizes deep reflections on problems instead of rushed searches for resolutions.

However, fostering individual's critical reflections is not enough to tackle complex sustainability problems. We must consider the need for collective transformation around social dilemmas. This leads to the question: How does Critical Social Transformative Learning Theory inform our practice?

TL's social transformative perspective (Brookfield, 2012; Gambrell, 2016; Servant-Miklos & Noordegraaf-Eelens, 2021) pushes learners to identify dominant ideology, unmask power, disrupt dominance, and develop agency to change culture, ideology, and cemented ways of thinking. The critical social transformative teaching-learning process focuses on collective disorienting dilemmas which incite students to a public dialog, especially in relation to massive events, such as economic crises, terrorism, and social demonstrations (Hunter, 2012). PP exercises must guide learners to assumptions about interests, power, ethics toward sustainable development, and the common good.

Problem Posing in Sustainability Education in Business Courses

PP is a way to (re)position problems by expanding, modifying, or formulating new ones (Silver, 1994). It forces a pause to encourage going deeper than PS, the common teaching method in business education (Brunstein et al., 2021; Prado et al., 2019). Prado et al. (2019) researched the effectiveness of case studies and simulations in education for sustainable development. They showed that both techniques are effective for teaching sustainability, with simulations offering a slight advantage in representing the multidimensional and temporal aspects of the subject. This emphasizes the importance and adaptability of these teaching strategies for meeting some level of sustainability learning outcomes. SWOT analyses, BCG matrices, Ansoff matrices (Hitt et al., 2019) and other common business tools, however, regiment the way students visualize, think, and design solutions, crowding out critical reflection. To elicit transformation in learner perspectives on sustainability, students must be encouraged to deeply reflect at the premise level. This involves the learner posing problems and considering the "Why" of the challenges.

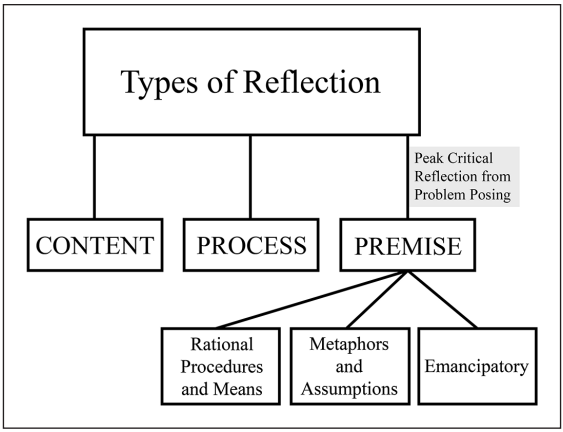

Figure 1. Types of reflection and premise reflection axes.
Source. Prepared by the authors.

There is no consensus on the definition of PP, partly because it is applied differently in different fields (Hocking & Vernon, 2017; Reiter-Palmon, 2017; Schön, 1993; Svihla & Reeve, 2016). The types and results of premise reflections cluster onto three distinct axes: (1) rational procedures (or processes) and means, (2) metaphors and assumptions, and (3) emancipatory (Brunstein et al., 2021) (Figure 1).

The first axis through which premise reflection, as elicited by PP, can be understood is to consider it a way to arrive at solutions to problems. Learners undertaking critical reflection in this axis are doing so following a procedure or only to achieve solutions. Literature on PP in this axis comes mostly from mathematics (Brown & Walter, 2005; Kapur, 2015; Kar et al., 2010) relying on Silver's (1994) definition: "Problem-posing refers to both the generation of new problems and the reformulation of certain problems" (p. 19).

The second axis emerges from theories described by Schön (1993) and Mezirow (1998). The former calls PP "problem setting" and says it includes metaphors or stories told by people. Metaphor includes both interpretation and generativity. The first has to do with the types of inferences by which interpretations are made, the types of relevant evidence, and the criteria that are used to judge and test something. Generativity refers to how people see things in new ways and how they transport frames or perspectives from one given experience to another experience. For Mezirow (1998), PP meant thinking critically and reflectively about the assumptions of a problem in order to reformulate it.

The third axis refers to the idea of problematizing education from Freire's (1970) description of PP. To him, PP was intimately tied to emancipation: ". . .people develop their power to critically perceive the way they exist in the world with which and in which they find themselves; the world is seen not as a static reality, but as a reality in transformation." (p. 83)

We used this understanding to build a PP protocol and conduct a study in business classrooms at a Brazilian university.

Methods

Development of the Problem-Posing Treatment

The PP protocol implemented in this study was developed in phases by the authors. Our approach was theoretically grounded in the PP work of Freire (1970), Mezirow (1998, 2009, 2010), and Schön (1993). Then our practical application in educational settings was guided by the work of Myran and Sutherland (2016) and Kapur (2015). The prompts were developed in a three-phase pilot study carried out at different Brazilian higher education settings than our full study described below. We adapted the original questions from the case, steering them toward a PP perspective to cover: (1) deconstruction of the teaching case, (2) analyzing the case from different angles, and (3) identification of the central problem(s), based on TL and PP theory. The first version of the protocol was completed in the first semester of 2019. As a pilot, seven undergraduate students in the field of business, from various institutions and semesters, were invited to participate in a 4-hour discussion about sustainability. During that discussion, the volunteers received a summary of a teaching case, and after individual reading of the summary, they were divided into two groups for guided discussion of the protocol.

Following the analysis of these students' discussions, a second version of the protocol was created in order to foster more problem posing. In addition, the instructions of the protocol itself were developed in a more detailed manner, so that the students would have the possibility to conduct their discussions without needing to ask the professor questions. After the implementation of this protocol, version 2 was applied in a class of 15 business students during a 4-hour discussion.

The final version of the PP protocol was developed and applied in a class with 97 business students. When applying version 3 of the PP protocol, the PS protocol was also applied to half of the class. The PS protocol was adopted from the teaching case itself (Almeida, 2011), without edits. The original questions of this case were focused on how to perform or solve, exemplified by questions such as: "How would you involve suppliers in this

environmental issue, considering those that are larger and more powerful?" and "How could you get employees committed to environmental preservation issues?" (Table 2). In this last pilot study, we used the same teaching case that is described below for our main study.

Qualitative Research Design

This qualitative design-based research study was used to match our goal of examining a classroom intervention tool (Kennedy-Clark, 2013). We recruited 173 upper-division undergraduate students from three different sections of a business course, Strategic Management for Sustainability, taught by the same professor at a research university in Brazil. Eighty-five percent of the students were between 18 and 24 years of age, with 57% men and 43% women. These students self-selected into groups of approximately four members each, totaling 44 groups across the three course sections, to receive instruction through a case study teaching activity.

The teaching case "Being sustainable to support yourself? The Case of Tropical Beauty" (Almeida, 2011) was chosen for the study and is summarized in Figure 2.

In addition to having a fluid and engaging narrative, the selected teaching case was easier to shift to a PP alternative version because it included questions that provoked students to look at challenges from other perspectives. It encouraged students to contemplate the interests, influence, and perspectives of diverse stakeholders in the scenario. Classroom activities where students assume various roles, such as indigenous representatives or company executives, facilitate a deeper understanding of the pursuit of consensus or decision to maintain dissensus. Instructors refrain from imposing a predefined student perspective. As recommended (Kearins & Springett, 2003; Springett, 2005), we offered students opportunities to ponder questions like, "Who do you think is responsible for this problem?" This query prompts students to envision the viewpoints of owners, managers, stakeholders, and employees, encouraging them to explore uncharted perspectives.

As in Kapur (2015), all groups in our current study were given the same teaching case, however 23 of the groups of students were then randomly selected to receive prompts that stimulated PS, while the other 21 groups were guided by a PP protocol (Table 2). All instruction and the case study were delivered in Portuguese, the primary language of the instructor and students. Students initially discussed the case during a 4-hour block, then returned to the case in a subsequent class to record their reflections in writing. Each group received questions tailored specifically to their designated approach, ensuring that the PP group worked exclusively with PP-focused

Table 2. Summary of the PS and PP Group Protocols.

Steps	PS groups—Protocol A	PP groups—Protocol B
Step 1	Upload group audio recordings in response to these prompts. 1. How would you involve suppliers in this [environmental] issue and which are bigger and more powerful? 2. How could you get employees to commit to issues of environmental preservation? 3. Would it be possible to overcome the spirit of competition and seek the formation of partnerships with other clothing companies to implement joint solutions? 4. Are Brazilian consumers sensitive to the environmental issues? 5. Does the company owner have an idea of the extent and depth of the changes that should be implemented?	Upload group audio recordings in response to these prompts. 1. What are the biases and assumptions behind this case? 2. Are there power struggles in the case? If so, what disputes are these? What is the type/nature of these dispute(s)? 3. Are the discussions proposed in the case meaningful to you? Why? 4. After your discussion, can the case be analyzed in other ways? If so, in which way(s)? 5. Understanding that there are no specific problems and solutions given, show what you see as the main problem and give a rationale to support your ideas. 6. Who do you think is responsible for this problem?
Step 2	One group member submits written reflections compiled from the groups' responses to the following prompts. 1. How can a business based on fashion and programmed obsolescence of shapes, colors, and prints engage in a cause that advocates (which adheres to) conscious consumption? 2. What actions should be prioritized?	One group member submits written reflections compiled from the groups' responses to the following prompts. 1. Which issues presented in the case pertain to social issues beyond the organization? a. Detail and justify your answer. 2. Develop an action plan to solve the main problem you posed.

questions for both the group and follow-up written reflection activities, while the PS group dealt with questions oriented toward solving problems during both activities. This distinction was made to maintain the integrity of the

This teaching case addresses corporate environmental management in the clothing industry, a segment marked by entrepreneurship out of necessity. However, it is the second-largest workforce in Brazil. The case explores Beleza Tropical's production of underwear, as part of the Local Productive Arrangement (APL) of Intimate Fashion of the Nova Friburgo region. It considers the current opportunities in the foreign market for companies that respect the environment and consider environmental factors in their decisions. [...] The case opens on a general manager traveling to Denmark receiving direction by telephone to present a proposal in two weeks of what should be done to transform the production of underwear at Beleza Tropical into an environmentally sustainable process. Considering the company owner's perspective, the manager explores the environmental aspects and impacts related to the activity, questioning:

- the commitment of employees;
- the qualifications and the level of training of the workforce;
- the conditions of the machinery;
- the type of relationships with suppliers; and
- the capacity and potential of the union of the APL companies for the development of joint actions.

Deepening the issue leads the manager to seek more information and question the adequacy of the company's mission, and even question the extent to which the company owner will be willing to make the necessary changes.

Figure 2. Summary of case study used in the research.
Source. From Almeida (2011, p. 1).

experimental design and to accurately assess the impact of each approach on the participants' engagement and outcomes.

After the students carried out the activities, the audio files from the initial discussion were transcribed, and the text was digitized by one of the authors of this paper who speaks Portuguese as their primary language. The audio from the 44 groups included 1007 minutes (about 17 hours) of recordings, and the written material from the subsequent class meeting totaled 182 pages. These data, still in the original language to preserve accuracy and fidelity to the original content (Elliott & Timulak, 2005), were processed in NVivo software for coding and analysis.

Initial codes were established following the guidelines suggested by Nowell et al. (2017), considering the theoretical framework of PP and our pilot study. Then, for the thematic categorization of our data (Appendix A), we resorted to the template analysis method proposed by King et al. (2019). This technique facilitates the categorization, organization, and analysis of data, allowing researchers to structure the information based on themes they consider relevant. The process involves developing a list of codes, or templates, that represent the themes identified in the analyzed texts, ensuring a systematic and detailed approach to thematic analysis.

Our study data was read and reread several times by one of the authors of this paper, being classified as (a) content, (b) process, or (c) premise reflection. NVivo automatically tallied the classification counts. After this initial a/b/c classification, all the materials marked as exhibiting premise reflection were further categorized as rational procedures and means (x), metaphors and assumptions (y), or emancipatory (z) (Appendix A). Again, the excerpts were highlighted by the author-researcher and counted by NVivo. A second researcher with specialization in this discipline and who is fluent in Portuguese followed the same procedures for both a/b/c and x/y/z categorization to validate the results. A third author-researcher, bilingual in Portuguese and English reviewed these classifications, in Portuguese, to discuss questions and suggest reclassifications in an iterative process. Researchers' classifications were compared, and where there were discrepancies, the researchers discussed each case and changed their classifications where appropriate. Once an overall agreement of more than 75% was reached across the three researchers' classifications, interpretation of the results began (Roberts et al., 2019; Saldaña, 2009).

After this processing of the data in the original language of Portuguese, the case study, sample participant quotes, and thematic codes were translated from Portuguese to English by the bilingual, third author-researcher. A fourth author-researcher, a native English speaker and researcher of transformative learning in sustainability, reviewed these results to assist with validation and interpretation as a way of triangulation of analyses. These methods in qualitative analysis in bilingual contexts followed recent recommendations by Yunus et al. (2022) for maintaining meanings of the students' reflections and increasing trustworthiness of our interpretations.

Results

Content and Process Reflections Across Groups

Groups from both PS and PP protocols were concerned with the "what" of the problem, a characteristic of content-level reflections (Mezirow, 1991; Table 1), and these concerns involved suppliers, culture, and competition. These groups understood that the organization's supply chain involved not just the organization itself, but a collective. By mentioning suppliers, they were not looking at sustainability as a responsibility only of the company but as a collective problem of the textile sector. For example, one student said, "I believe that the large supplier, at first, wants to get involved with a sustainable cause, he wants to become well-regarded in society; at the same time, he has the profit on the sustainability that he will adopt."

Students mentioned both organizational and societal culture identifying the "what" of the problem by pointing out how a group acts in relation to the problem. For example, ". . .this mentality that small and medium-sized companies could not so easily become sustainable because of financial limitations." Finally, students pointed to competition as a possible cause of the level of involvement of organizations and society with sustainability as shown by this student's reflection on potential partnerships between the company and other regional groups: "Making a partnership that does not characterize competition and is an example of sustainability for others in the region."

The reflections did not go into depth by relating culture to sustainability behaviors, exploring cultural differences, nor questioning the processes and elements of cultures causing competition.

Both protocols also elicited students' reflections at the process level, namely about improvements to procedures and innovative solutions. Students were concerned with the "how," for example mentioning (1) new clothing collections or (2) using a different raw material to solve sustainability problems, yet without mentioning any details of implementation of these strategies. Some process reflections mentioned sustainability to achieve a greater commercial end, being motivated by economic factors. These ignored the social or environmental dimensions of sustainability, for example, "You can create a new product line that is even more accessible. . .. I think it's cool on the part of the company because in addition to conquering another niche, it can conquer customers. . .."

Premise Reflections Across Both Protocols

Both PS and PP protocols elicited students' reflections at the premise level in this study, though only one prompt from the PS protocol led to this level of reflection while four prompts from the PP protocol did so. Among those reflections, we identified three main themes (Table 3). When PS group reflections were further classified to the specific type of premise reflection, they were found to be rational procedures and means and metaphors and assumptions types from one of the protocol prompts. None were classified in the emancipatory axis. PP protocol students were found to reflect across all three axes of premise reflections (Table 3). We chose individual representative quotes below to exemplify evidence on each axis from both protocols.

Rational Procedures and Means Axis. One group of PP protocol students responded to the prompt about who is responsible for the problem by identifying the production chain of the fashion industry:

Table 3. Common Premise Reflection Topics from PS and PP groups.

Case study prompts that generated reflection types		Synthesis of the students' reflections			Themes across both protocols
Protocol A (PS)	Protocol B (PP)	Rational procedures and means	Metaphors and assumptions	Emancipatory	
How could you get employees to commit to issues of environmental preservation?	Are the discussions proposed in the case meaningful to you? Why?	Urgent need to reposition the textile industry's objectives toward sustainability-oriented practice	Need for a new view of competition—cooperation as a condition to face socio-environmental challenges	*[PP only]* Questioning past mistakes; reflection and accountability on society's behavior and its influence on environmental degradation	Review of the relationships of organizations, society, and the individual with the dilemmas and challenges of sustainability
	After your discussion, can the case be analyzed in other ways? If so, in which way(s)?		Emergence of examples of sustainable companies and their impacts	Demonstration of willingness to act differently, going beyond legal and basic aspects of sustainability	
	Are the discussions proposed in the case meaningful to you? Why?	Proposals for improving company procedures but without considering sustainability issues in organizations	Analysis of contemporary consumer behavior in relation to the past	The production chain often operating based on greed and exploitation	The role and responsibility of society and its culture: Moving from a business problem to a social one
		The importance of pro-sustainability actions	Repositioning of standards and customs	Formal education and education for sustainability as a way of raising awareness and autonomy for human beings	
		Repositioning the micro- to a macro-social view		Repositioning the culture of consumerism to a culture of education for sustainability; understanding what is wrong and the causes of the problems	
	Who do you think is responsible for this problem?	Proposals for new alternatives for the production chain to review its procedure and products	Example of life history and its relationship with the textile industry's production chain	Production chain involved with jobs analogous to slavery	The accountability of the textile industry production chain
		Recognition that fashion industry organization does not concern itself with sustainability-oriented issues	Questions about the employment relationships of employees in the textile industry	Questions about the operation of the production chain and about the individuals who consume its products	

> The fashion industry. . .ends up making people not pay attention to this sustainable side, because it increasingly wants to spread consumption. So, there are several seasonal collections. . .And it's always disposable. . .. They [the fashion sector] do not have this sustainable concern, since it is not profitable for the industry.

By arguing that the industry itself discourages people from looking at consumption as unsustainable, they attributed the problem to the textile industry and moved toward a solution by proposing that they (a) create alternatives to reuse products and (b) use the leftover fabric to make other products.

Similarly, a PS protocol group responded to the prompt about getting employees to commit to sustainability with, ". . .they need to understand the impacts they are generating due to the lack of sustainable culture. . .the world is collapsing. . .it is being consumed in excess." They assessed what lies behind the problem (Mezirow, 1991) presented in the teaching case and conveyed their belief that the industry needs to reposition itself by looking at sustainable practices. Despite raising questions of culture, their answers focused only on the organization. This shows that they looked at these macro-social and -structural issues only as the way to solve the company's problem, not involving the company itself in addressing cultural issues.

Metaphors and Assumptions Axis. As with the first axis, both PS and PP protocols elicited premise reflections in the metaphors and assumptions axis (Table 3). One PS group, in response to, "How could you get employees to commit to issues of environmental preservation?" said:

> Employees need to understand the importance of this topic [sustainability]. . .. For you to engage your employees, you can bring examples from abroad, with lectures, show which countries are most developed, with the highest HDI [Human Development Index] . . . [and are] sustainable. . .. The company can start rewarding employees who generate less production waste, this will create an internal culture of sustainability.

This was classified on the metaphors and assumptions axis because, first, the students raised an assumption that the HDI is related to sustainability in organizations. Indeed, data point to this relationship (Corporate Knights, 2019; Strauss, 2019; United Nations, 2019). Second, one of the members mentioned his company: "My company is green, it is sustainable, it cares, it has this long-term sustainability thought, thinking about nature, in scarce resources, renewable energy and such things." Here, we see that he looks at his company as an example. He makes a self-assessment and infers from his

own experience that there is a way to develop a culture in Beleza Tropical focused on sustainability.

Two PP groups, in response to the prompt about the meaningfulness of the case to them, mentioned the production chain. In one of those groups, a student additionally evokes personal experiences:

> The discussion of the text is very important. For me it means a lot, because I came from a family of seamstresses, so I know how it is. I grew up. . .as a four-year-old, sewing shirt cuffs, and my grandmother paid me a cent for each shirt cuff.

Schön (1993) says that human beings establish social problems from the stories they tell. And that's exactly what this student did—they gave meaning to the teaching case from their own history and experience with the textile industry. In other words, this student's understanding and reflection on the teaching case were profoundly affected by their history with this textile industry.

Despite some students in the PP group not explicitly stating that society is responsible for the problem, they hint at it "between the lines" of their dialogs when they suggest that society needs to change its consumption habits:

> [We need] a change in customs and standards in our society. The issue of using clothing for only a short period, either because it's damaged or out of fashion, that sort of thing, the turnover of goods is too high, and it shouldn't be this way. 50 years ago, it wasn't like this, and these habits occur, for example, with cell phones. [We need] an overall change, from the media, from the government. . . That issue they talk about "hidden water," which is the water consumption for the production of each product; for instance, a pair of jeans was one of the items that used the most water, the entire water usage process ends up being unsustainable.

The qualitative coding revealed that this group reformulated the problem when moving to the written activity of the protocol by proposing that the main problem lies with society—including culture, business owners, and the government. This redefinition of problems, considering other assumptions, is an element of the metaphors and assumptions axis (Mezirow, 1991; Schön, 1993).

Emancipatory Axis. Unlike for the other premise reflection axes, we only saw evidence of students in PP protocol reflecting in the emancipatory axis. Some PP students, when asked if the discussions proposed in the case were meaningful, responded with:

> The time in which we are living is a very important time for us to see how unsustainable we are. So, just this year, in July, all the natural resources that we

> could have by the end of the year have run out. . .so we are already using more than we should. . .. We begin to reflect on our own day-to-day and on the actions that we take on a daily basis. . .. We have to live in a more sustainable way, without harming the environment.

This group discussed the impact of the firm's actions on the planet, making at least two assumptions: (a) the current generation is not missing natural resources, and (b) Earth is overburdened. This Earth overload argument is supported by Earth Overshoot Day, which identified 28 July 2022 as the day when humanity's annual demand for nature exceeded what ecosystems could replenish in that year (Global Footprint Network, 2022).

These students sought to assess what was behind the problem (Mezirow, 1991), and they continued to advance in their reflections, showing signs of a transitivity toward critical social thinking (Freire, 1996). This is reflected in individuals who think globally and critically about their current conditions and decide to act for change (Kitchenham, 2008). In this case, students understood that they needed to go beyond the basics when thinking about sustainability-oriented practices.

While some of the groups in the PP protocol pointed to the production chain as responsible for problems, others argued that society in general is responsible:

> [The problem is] society has no education about sustainability. . .. We have a very strong consumer culture. I also think that this is in the nature of the person, the person already starts to think wrongly, it is based on society. . .. Society only cares about it more when it reaches a level like Sweden, with a very high HDI; people are fine there, there is not so much inequality.

Students in this group began by evaluating the assumptions that underlie the teaching case, based on the premise that society is responsible for the problem. Then, they pointed out that such responsibility occurs because: (a) there is no education on sustainability, (b) there is a culture focused on consumption, and (c) HDI impacts sustainability-oriented behavior.

Discussion

Prior studies have not included explicit discussions about the prompts to elicit PP and influence learning, despite discussion about the importance of transformative shifts for sustainability education (Harder et al., 2021; Rodriguez Aboytes & Barth, 2020; Tien et al., 2020). We tackled this gap by researching a classroom protocol for encouraging collective reflection toward

emancipatory reflections on students' premises about sustainability. Though we found that both PS and PP protocols stimulated both content and process student reflections, almost a quarter more PP than PS groups engaged in premise reflection. In addition, the only reflections classified on the emancipatory axis of premise reflections were from students in the PP groups.

Theoretical Implications

Our research contributes to understanding PP, business management education, TL theory, and critical social TL theory. This study demonstrated that three distinct axes of PP could be identified in student reflections: (a) rational procedures and means, (b) metaphors and assumptions, and (c) emancipatory. Though PP exists in the academic literature (Brown & Walter, 2005; Freire, 1970; Kapur, 2015; Mezirow, 1998; Schön, 1993), this classification of PP axes had only recently been suggested and needed further exploration in an educational context. Because PP can be approached from various perspectives, from rational to emancipatory, and across different disciplines, perhaps a standard definition of PP is not possible. In each usage there is an essence of (re)positioning problems and opening space for expanding, modifying, or creating new ones. However, depending on the perspectives of PP, distinct research avenues and classroom applications uniquely interpret and employ the concept. As its objective, this paper elucidated PP through a classification framework while identifying practical methods for its implementation in management classrooms.

Second, we exemplified that PP could be integrated into business management instructional settings to motivate other researchers to explore the concept.

Third, this research adds to discussions about the factors that promote TL, since, according to Mezirow (1998), premise reflection is part of TL processes. It can be inferred that students who engage in a reflection on their premises in the emancipatory axis are much closer to repositioning sustainability problems according to the principles of strong sustainability toward lasting change (Brozovic, 2020). This goes beyond legalistic and reactive issues and instead grows from other business support bases compared to students who engage in a reflection of the premise in the rational procedures and means axis.

Fourth, the theoretical contribution of the research supports Gambrell's (2016) proposal that TL take place not only at the individual level (Mezirow, 1998), but also at the social level (Freire, 1996). When our study found that some PP students underwent emancipatory reflection, that aligned with TL research in the social and critical axis (Brookfield, 2012; Cranton & Taylor,

2012; Gambrell, 2016). Those authors claim that the field must move beyond individual impact toward a deliberate goal of raising collective consciousness within TL.

Practical Implications

This study has practical implications for instructors, students, protocol development, business schools, and case authors/publishers.

Instructors. Instructional staff are key to promoting an environment that provides PP within the classroom. However, it is insufficient to only provide them with information or training about PP, as teaching with PP requires their own competence and paradigm shift. This shift must happen through instructors' own professional development, reflection, and dialog. Faculty must give up traditional conceptions of teaching—where they see themselves as central figures who need to deliver content and problems that have already been defined to students and for which there is already an expected answer—and instead consider education as dialogic. As suggested by Freire (1970), dialogs arising from the students' reality can lead to significant reflections and problematization.

PP adds complexity to teaching, but toward the goal of transformative learning through collective dilemmas and reflective dialog. Results are learners' expanded perspectives on sustainability issues, instead of a single, best solution (as those may not exist for such ill-structured problems as sustainability raises). This requires teachers to integrate methods such as flipped classrooms, in which students are gaining content knowledge outside of the classroom, giving time for active learning, like group discussion of PP case studies, during class (Mazur, 2009). Methodologies with TL as an outcome employed during class can provide numerous opportunities for learners to reposition problems and reassess their values, beliefs, and assumptions. Examples include reflective diaries, paired discussions, and critiquing academic articles, videos, or scenarios.

Even more important than active pedagogical tools, teachers need to provide time and space for students to have autonomy to think about problems and reposition them, not just follow pre-established guidelines. The creation of a reflexive culture oriented to problematization of collective dilemmas of sustainability becomes essential in this context. For that, training and practice in PP must be provided, since instructors are strongly influenced by previous teaching practices to which they were submitted as students (Oleson & Hora, 2014).

Students. How can students develop skills to formulate and reposition problems to engage in TL? The continuous exercise of reflection requires practice, so students must restrain from rushing to solve educational problems and bypassing questioning their own assumptions. This can happen both inside and outside of class, especially in flipped classroom setups. In classrooms, students should be encouraged to review their analyses, discussions, and even problematizations from reflective spaces open to this process of continuous questioning. Working on reflective diaries are also powerful tools for students to reflect on their beliefs, values, experience and assumptions, making this action a habit. Beyond reflection, students must openly dialog, in safe environments, with others also willing to question and review their own assumptions. They must undertake numerous opportunities to pose problems, reflect, and dialog, both in and out of class to increase their capacity to grow and transform.

Protocol Development. Existing educational materials are geared toward PS, so they must be modified, or new materials developed, with a PP framework. Our PP activity for this study can be adapted and used in other teaching cases that can be built around PP logic—being less pragmatic in pointing out preexisting problems and giving more opportunities for students to analyze the case through different perspectives. We suggest the following, based on our work for adapting teaching cases:

1. Explicitly ask students to NOT find solutions when they first read the case. It may ease their stress to let them know they will be given multiple opportunities to read through the case.
2. Plan time for students to reflect on what they have just read in the teaching case. To help with this, invite them to think about or share an example from their own lives in relation to the case.
3. Suggest that the student make another, critical reading of the text, looking specifically at the narrative of the story. A critical reading could include analysis of how this story is told, who it favors, or how it positions the various actors involved.
4. Ask the students to identify and elaborate on the problems they identify in that teaching case.
5. Propose that the student outline phases they will undergo to solve the problem(s) they raised.
6. Divide students into at least pairs to discuss the case and their self-reflections. In online, synchronous classes, this could be done in breakout rooms. In online, asynchronous classes, the same could be

accomplished online, in shared spaces (e.g., Google Docs) or discussion boards assigned to pairs.

7. After paired discussions, convene a whole class discussion, ideally with students arranged in a single circle, or for online, asynchronous classes into whole-class discussion boards. Ask them to present the central points or most common themes of their discussions and what parts of the case attracted the most attention.
8. Pose questions to students focused on social and critical perspectives: The common good, power relations, and social awareness.
9. Ask students to identify ideological, political, and/or social assumptions of the case.

Business Schools. This shift cannot be isolated within a department or single course but must be built across the curriculum and co-curriculum so that students are prepared to reposition and/or formulate problems based on highly dialogic and reflective processes. As students in our PP groups advanced in their reflections, they considered the impacts of their decisions beyond the economic outcomes of the company. Business schools, through their pedagogical guidelines, could systematically establish ways for both students and instructors to engage in PP reflections across their course of study. To accomplish this, curricula, pedagogical objectives, teaching methodology, syllabi, and evaluation criteria must be built to include PP. A cultural shift will need to happen such that faculty and the student body value not only PS, but reflexively posing problems to discuss.

Case Authors and Publishers. Our research shows evidence that case study teaching using a PP, rather than PS, framework can result in the types of learner reflections needed for transformative learning to occur. Transformative learning, in turn, is needed at a collective level to produce citizens with perspectives and skills to address complex, sustainability challenges. Because PS frameworks appear to be more common than PP frameworks in case study teaching (Brunstein et al., 2021), we call on case study authors to create more PP cases for use in sustainability education. Concomitantly, this requires publishers of educational case studies to request, encourage, and publish these types of cases so they are more readily available for educators.

Conclusion

This research posited that PP-oriented teaching-learning experiences create transformative opportunities for sustainability education in business schools.

We note that this study was carried out at an institution that has already been working with pedagogical strategies that promote critical reflection in sustainability education. Even so, when opportunities are created for students to reposition problems, their critical reflection is even more stimulated, leading them to consider not only PS but PP.

Our quasi-experimental design in this study included limitations: (1) the students knew that they were being evaluated through the activities which could have impacted results; (2) the sample was entirely from one educational institution, with students who were in the last year of their program so lacked some diversity for generalizing findings; (3) all activities were carried out in groups; and (4) a single teaching case was used in the three classes. Future studies using PS and PP protocols that are even more disparate could reveal more pronounced differences in outcomes. We also recognize the importance of the impacts of the affective domain on student reflection and learning, but we did not investigate student's climate anxiety, hope, nor their satisfaction with PP versus PS protocols. These are areas of future research to improve pedagogical tools for sustainability education.

To extend our work, we also suggest (a) applying our protocol to students at additional institutions and in different semesters, to contrast our results; (b) applying the protocol in other disciplines, even if not explicitly oriented to sustainability; (c) carrying out action research within a specific discipline, integrating PP in all activities from the beginning of the semester; (d) conducting longitudinal studies of students in PP treatments to analyze their ongoing reflections, abilities to reposition problems over time, and autonomous use of premise reflection due to scaffolding; (e) carrying out similar studies outside of formal education (e.g., corporate training); and (f) integrating PP frameworks into other teaching resources and modalities (e.g., business games, service learning, online discussion boards, collaborative learning).

Appendix A

Qualitative Coding of Student Reflections

A. CONTENT

1. Assessment of the way the problem is perceived, felt, or thought by the person
2. Assessment of how to act in relation to the problem
3. Questioning about "What do I know about the problem?"
4. Shows concern about the "what" of the problem
5. Questioning what the problem is and what needs to be done to solve it

B. PROCESS

6. Review of strategies and steps to solve the problem
7. Evaluation of the problem-solving method
8. Questioning about "How do I know if this solution will work?"
9. Reflection on the process, worrying about the "how"
10. Examination of how functions, thoughts, feelings, or actions are performed to solve a problem; and evaluation of the effectiveness of this solution
11. Reflection on strategies and procedures for problem solving

C. PREMISE

12. Reflection on the assumptions of the problem
13. Assessment of the problem itself and the beliefs and assumptions that underlie the problem
14. Assessment of what underlies the problem
15. "Why am I reflecting on this?"
16. Reflection of the premise is concerned with the "why"
17. Significant change in perspective that involves becoming aware of why we perceive

x. RATIONAL PROCEDURES AND MEANS

x1. Problem survey as understanding
x2. Procedures and means to solve a problem
x3. Problem creation

y. METAPHORS AND ASSUMPTIONS

y1. Definition of the problem as a metaphor
y2. Tell a story about the problem
y3. Identify the ideological definition
y4. Objective and subjective reformulation of the problem
y5. Transfers of frames or perspectives from a given experience to another experience
y6. Critical reflection of narrative and action assumptions

z. EMANCIPATORY

z1. Demonstration of freedom and creativity
z2. Transitivity for critical social thinking
z3. Reflection and action for emancipation
z4. Process that can help improve social awareness
z5. Reflection on the reasons for one's existence
z6. Ontological vocation for humanization
z7. Promoting and increasing confidence and strength to deal with one's own problems

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