GRAND CHALLENGES AND BUSINESS EDUCATION: DEALING WITH BARRIERS TO LEARNING AND UNCOMFORTABLE KNOWLEDGE

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ABSTRACT

In this article, we explore some of the barriers that prevent learning about grand challenges. By grand challenges, we refer to transformational social and environmental issues and the critical barriers toward addressing them. Despite recent research contributions, initiatives, and calls for action to focus on such concerns, relatively little is known about the different barriers that hinder learning about grand challenges. To explore these issues, we draw from Rayner's (2012) concept of uncomfortable knowledge, defined as knowledge that is disagreeable to organizations because it may challenge their value base, self-perception, organizing principles, or sources of legitimacy. Focusing on the example of recent programmatic attempts to advance "responsible education" in business schools, we identify three barriers to learning about grand challenges: Cognitive overload, emotional detachment, and organizational obliviousness. We conclude by outlining several implications on how to overcome these barriers, adding to recent academic and policy debates on how to make

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business school education more attuned to the transformational and social challenges of our time.

Keywords: Grand challenges; learning; barriers; uncomfortable knowledge; business education; responsible education

INTRODUCTION

With a particular interest in the way that organizations can contribute to tackling intractable and persistent social problems, such as global competition over scarce resources, climate change, or large-scale displacement, the notion of "grand challenges" has become a central concern for organizational scholars. Studies have made significant advances in our understanding of how organizations may bring about change efforts in response to such grand challenges (Lawrence, 2017; Mair, Marti, & Ventresca, 2012; Mair, Wolf, & Seelos, 2016). At the same time, we also see more calls to translate insights from such research into the learning environment of universities and business schools (Hoffman, 2021; Smith & Elliott, 2007). These calls, for instance, manifest in initiatives to reform education curricula in business schools (Rasche & Gilbert, 2015) and demand for broader changes in the culture and incentives of business education (Lotz-Sisitka, Wals, Kronlid, & McGarry, 2015). Yet, relatively little is known about the barriers that can hinder learning about grand challenges. By grand challenges, we refer to transformational social and environmental issues and the critical barriers toward addressing them (George, Howard-Grenville, Joshi, & Tihanyi, 2016).

To explore the barriers that prevent individuals and groups from learning about grand challenges, we draw from the concept of *uncomfortable knowledge*. Rayner (2012) defines "uncomfortable knowledge" as knowledge that is disagreeable to individuals or organizations because it may challenge their value base, self-perception, organizing principles, or sources of legitimacy. Accordingly, uncomfortable knowledge is a type of knowledge in tension with and even hostile toward the legitimated accounts that individuals and organizations have developed about themselves to cope with the complexity of their environment. Rayner (2012) has explored several strategies that organizations and institutions may use to keep uncomfortable knowledge at bay, which act as barriers to engaging with and learning about societal problems. However, the issue of *learning* on grand challenges remains insufficiently explored. Accordingly, we explore the critical barriers to learning about grand challenges and the role that uncomfortable knowledge plays in this context.

To explore these concerns, we draw from recent programmatic attempts to advance "responsible education" in business schools, which seek to align learning objectives with initiatives such as the United Nations Sustainable Development Goals to foster "sustainable social, environmental and economic value" (PRME, 2019). These programmatic attempts have manifested in numerous initiatives, including the Principles for Responsible Management Education (PRME), the Globally Responsible Leadership Initiative (GRLI), or the Academy of Business in Society (ABIS). A particular focus of "responsible education" is to embed relevant research insights, innovations, approaches, and academic discussions in the

curriculum so that business schools can positively contribute to addressing grand challenges (Friedland & Jain, 2020; Rasche & Gilbert, 2015). Yet, while such initiatives are on the rise, they still remain at the fringes of current business education.

Building on the concept of uncomfortable knowledge, we discuss how barriers to learning about grand challenges manifest on different conceptual levels. These levels include a *cognitive barrier* arising from how people react to the temporal, spatial, and conceptual complexity of grand challenges, an *emotional barrier* that sets hurdles to a deeper sense of personal connection to and reflection on uncomfortable knowledge, and an *organizational barrier* that treats uncomfortable knowledge as a potential threat to the legitimacy of the organization vis-*á*-vis external stakeholders and wider institutional pressures. Based on the discussion of these issues, we explore implications about how to overcome such barriers to learning about grand challenges, adding to recent academic and policy debates on how to make business school education more attuned to the transformational and social issues of our time.

Our argument is structured as follows. We first introduce the concept of uncomfortable knowledge and its application to grand challenges topics. Building on uncomfortable knowledge, we then discuss how different barriers to learning about grand challenges form and affect the possibility of engaging with the topic. We outline the implications of these identified barriers for business education and conclude with avenues for future enquiry.

GRAND CHALLENGES AND UNCOMFORTABLE KNOWLEDGE

Drawing from Rayner (2012), we argue that the ways in which individuals and organizations deal with uncomfortable knowledge are essential to advance our understanding of grand challenges. Uncomfortable knowledge forces a reflection on some of the implicit and/or opportunistically induced blind spots that affect learning and taking action to address some of the most significant challenges of our times. Uncomfortable knowledge can originate from a variety of sources, including

> its potential to reveal substantive epistemological disagreements about "facts" or about organizational or ethical principles (values), but […] it may also derive from the potential revelation that parties who appear to have reached agreement, or at least accommodation, actually remain divided. (Rayner, 2012, p. 113)

Dealing with uncomfortable knowledge can thus be a complicated, if not dangerous, undertaking for organizations for several reasons. First, there are incentives to keep uncomfortable knowledge as far as possible from organizational actors. For example, as has been well documented by now, while the fossil fuel industry had detailed information about the likely trajectory of global warming already at the beginning of the 1980s, it developed strategies to divert attention away from such uncomfortable knowledge for decades as it was considered a threat to the existence of the industry. Second, filtering out uncomfortable knowledge implies the persistent danger of sheltering organizations from necessary changes that stem from meaningful engagement with constructive criticism. As

organizations ignore sources of criticism, they risk gradually degenerating into socially irrelevant or even dangerous "zombie institutions" (Beck, 1994, p. 40; see Flyvbjerg, 2013). Accordingly, understanding how individuals and organizations deal with uncomfortable knowledge – both opportunistically and proactively – is critical to foster possibilities of embracing criticism, doubt, and adversity in transformative efforts to tackle grand challenges.

Research has begun to identify strategies that unpack how organizations and institutions keep uncomfortable knowledge at bay (McGoey, 2012; Rayner, 2012). These strategies may include, in increasing order of sophistication, *denial* as a refusal to recognize inconvenient information; *dismissal* by rejecting information as irrelevant; *diversion*, namely the pursuit of practices to divert attention; and *displacement*, which occurs when organizations pretend to tackle an issue but instead substitute the management of the issue with the management of a model or simulation of the issue (Rayner, 2012). These strategies do not only filter out uncomfortable knowledge to enhance self-preservation, but they also act as barriers that may compromise the ability of organizations to bring about change efforts to tackle grand challenges. This perspective on uncomfortable knowledge also foregrounds that ignorance is not necessarily to be treated as a by-product of dysfunctionality as it may be the result of purposeful institutional work that is maintained with much effort, and therefore all the more difficult to overcome (McGoey, 2012).

The theoretical concept of uncomfortable knowledge is apt for investigating learning about grand challenges. A defining feature of many grand challenges is that they tend to be interconnected and mutually influencing (George et al., 2016; (Servigne & Stevens, 2020). Any serious conversation on climate change, for instance, entails acknowledging that its implications are going to have environmental, humanitarian, economic, social, and geopolitical effects. This characteristic of grand challenges and their enduring nature makes learning about them an inherently uncomfortable endeavor. Once denial becomes manifest in its rudimentary simplicity (Rayner, 2012), a common response is to start digging deeper into the issues at hand. However, learning more about grand challenges can frequently covey feelings of frustration: the more we read about grand challenges, the less we may *feel* we know. Their inherent interconnections make grand challenges manifest and unavoidable, and yet they might prove to be especially difficult to grasp and define (see Arciniegas-Pradilla, Da Silva, & Reinecke, this volume). The more we learn, the more we realize the existence of positive and negative externalities that entangle grand challenges and that constantly seem to evade our comprehension as we are faced with a staggering amount of knowledge that exists in different branches of knowledge around these topics.

We also realize that grand challenges topics are identified as uncomfortable because there are no easy answers and, more and more frequently (e.g., during the Covid-19 pandemic), not even experts with common epistemic frames of references (e.g., virologists) are seen to agree on the appropriate responses to specific problems (e.g., how to reliably prevent viral transmission), let alone agree on how such problems interface and interfere with other interconnected crises (e.g., the

mental health consequences of protracted lockdowns). In other words, what we know about grand challenges is seldom a *terra firma* or a stable toolkit that we can reassuringly rely on and deploy to act on ever-unfolding environments. The knowledge in question has a fluid character to it and is frequently shifting like a kaleidoscope. This is not only problematic for academics that devoted their lives to studying complex organizational phenomena but also applies to people that grapple with the implications of their habits and quickly realize the intricate nature of these matters. Because of these reasons, *wanting* to learn about grand challenges frequently starts from feelings of personal anxiety, the anxiety that is felt when attempts at denial begin to crumble.

In the next section, we build on these insights on grand challenges and uncomfortable knowledge and discuss how critical barriers to learning on grand challenges may manifest at the cognitive, emotional, and organizational level.

BARRIERS TO LEARNING ON GRAND CHALLENGES

The Barrier of Cognitive Overload

The first barrier that may hinder learning on complex social and environmental issues that we identify is *cognitive overload*. Cognitive overload presents itself in situations that put excessive demands on people's capacity for cognitive processing and can limit how they learn, mobilize, and apply knowledge to unfolding situations. Research has looked at how the defining features of grand challenges – such as their interconnected nature and the elusive links that make them potentially intractable – influence how actors enact their environments and detailed some of the systematic cognitive issues that may undermine such processes. For example, the literature showed how the complexities of grand challenges could prevent appropriate issue framing and categorization (Hoffman & Ventresca, 1999), generate sensemaking challenges (Gatzweiler & Ronzani, 2019), or compromise attention (Bansal, Kim, & Wood, 2018). These factors may hinder the development of individual and organizational learning and affect if and how uncomfortable knowledge is brought to light rather than being dismissed or denied.

The notion of cognitive overload has also attracted attention in neighboring disciplines ranging from cognitive sciences (Kirsh, 2000), communication studies (Fox, Park, & Lang, 2007), and education (Feldon, 2007). Cognitive overload has been the focus of extensive research by educational psychologists who highlight how it constitutes a barrier to learning that poses pedagogical difficulties related primarily to the risk that the learners' ability to retain and use information may be overwhelmed by complex problem-solving scenarios (Sweller, 1994, 2011). Dominant approaches to cognitive overload in educational psychology focus on how instructional design can mitigate the risks associated with high levels of "element interactivity" (i.e., the complexity of a concept that is attributed to how its implied propositions are interconnected), the type and amount of information that is available, and the learners' prior knowledge (Sweller, 1994, 2011).

Educational psychology approaches commonly attempt to mitigate cognitive overload through simplification. Simplification efforts assume that instructional material can be partitioned in ways that allow the breaking down of the complexity of concepts, ideas, or assignments through functional decomposition. However, in the case of grand challenges that are interconnected, mutually influencing, and reciprocally intensifying (e.g., deforestation, pollution from intensive animal farming, and extinction risk of animal species), trying to simplify what makes some material hard to understand can be short-sighted and potentially misguided (Servigne & Stevens, 2020). Simplifying complex interdependencies can open up entire systems to the consequences of blind spots that may have problematic effects and intensify some of the very problems they try to solve (see Frey-Heger, Gatzweiler, & Hinings, 2021). We contend that seeking simplification can contribute to keeping uncomfortable knowledge at bay instead of unveiling its transformative potential.

Another critical factor that forms part of the barrier of cognitive overload and should induce skepticism toward pedagogical and organizational efforts to simplify learning is the fluid and unfolding nature of existing knowledge on grand challenges. The absence of a stabilized knowledge base to inform grand challenges can lead to multiple legitimate claims that are mutually exclusive but conceptually equally valid and based on different scientific or technocratic arguments. In other words, knowledge on grand challenges is prone to generating controversies among potentially incompatible bodies of legitimized knowledge (see Dionne, Mailhot, & Langley, 2019). This ought not to be interpreted as an overly relativistic position. We may all agree that global warming is a "fact," but this does not imply that "rational" and "legitimate" insights coming from different bodies of knowledge are necessarily compatible.

For instance, while there is consensus on the importance of reducing carbon emissions, there is less clarity on how to achieve it. While we are witnessing a substantial push toward electric vehicles to move away from fossil fuels, the emissions associated with the production of an electric car can be significant, making problematic the assumption that simply switching to electric cars will be enough to decarbonize private transport (Blach, 2020). While there may be numerous environmental benefits associated with the widespread adoption of electric cars, there is fervent debate on understanding and negotiating the economic, environmental, public health, and development impact of such initiatives, and this requires multidisciplinary insights to inform policy. However, such insights are developed through different methodologies, worldviews, and relying on various traditions of argumentation that pertain to each discipline's history. Learning on grand challenges requires navigating the complexity of situations where specific claims become the subject of a dispute between arguments, disciplines, and even visions of the world that affect how scientific, technological, and policy knowledge is applied to emergent issues (see Jasanoff, 1997). Assuming that this knowledge can "peacefully" coexist and inform the development of coordinated action is problematic. Taking stock of the instability of knowledge and the cognitive demands this puts on organizational actors is part of teasing out and overcome the cognitive barrier to uncomfortable knowledge.

We argue that the barrier of cognitive overload cannot be "overcome" through shortcuts or nudges but through the development of cognitive styles that are more apt to engage with complex "real life" problems. Hence, dealing with cognitive overload cannot rely on simplification strategies that conceal the messiness that informs our value judgments. Instead, it needs to expose the key drivers of such potential for being overloaded, such as the cognitive demands that multiple bodies of knowledge put on learners. The discussion of the cognitive barrier highlights how cognitive overload constitutes an important obstacle to learning about grand challenges. Teasing out and acknowledging the limits of our cognition and – crucially – of our knowledge is a necessary part of unveiling and embracing the uncomfortable knowledge of grand challenges. At the same time, these considerations also point to the intrinsic connections that this barrier has to emotional factors that affect learning on complex social and environmental issues.

The Barrier of Emotional Detachment

Dealing with and learning about uncomfortable knowledge further manifests on the emotional level as a form of emotional detachment that prevents individuals and organizations from feeling connected to and "touched by" calls to act in relation to a grand challenge. The emotional barrier manifests itself through individuals and organizations experiencing grand challenges as spatially and temporally abstract and distant phenomena whose scale is so large that any form of action is perceived to occur in vain (see Bansal et al., 2018; Dittrich, this volume; Stjerne, Wenzel, & Svejenova, this volume). Unpacking the emotional barrier is key to understanding the common gap between scientific knowledge about grand challenges, such as climate change, and the (lack of) collective action in response to these issues.

Grand challenges force learners to acknowledge that they cannot stay neutral. Staying neutral in front of biodiversity collapsing, pollution increasing, and inequality rising is problematic. It is either ethically questionable or the product of some non-deliberate neutralization and dismissal strategies (see Vittel & Grove, 1987). For example, neutralization strategies can operate unconsciously to justify behaviors by denying responsibility (e.g., "I'm sure my everyday consumption is not really hurting anybody") or denying victim (e.g., "I am not doing anything about this specific issue, but so is anyone else around me"). Dismissal strategies are more sophisticated and can take the form of condemning the condemners (e.g., denigrating the "accusers") by claiming that they do not have the moral right to escalate specific issues or appealing to higher loyalties. Wanting to learn about grand challenges entails overcoming these neutralization strategies and recognizing that we are directly *affected* by what we learn. As the word "affect" suggests, these concerns do not pertain exclusively to "rationality," and they are not simply a matter of academic speculation: wanting to learn about grand challenges makes us reflect on our capacity to-do-or-not-do something. As soon as we realize this, the uncomfortable dimension of this learning endeavor comes back to the forefront. These issues highlight that the uncomfortable journey of learning about grand challenges cannot be tackled with the language of "rationality"

alone, but it needs to appeal to emotions that make us realize the wicked nature of many of the situations we encounter and make us want to learn *and* do something.

Hence, a central emotional barrier to learning on grand challenges is being *detached* from the object of study. Detachment frequently has positive connotations when it is understood as a form of mental assertiveness that enables actors to maintain their boundaries, impartiality, and integrity in dealing with the emotional demands of individuals, groups, or situations. However, in relation to grand challenges, inducing a feeling of connection to the issues at hand, encouraging learners to feel personally and emotionally involved in the topics of study, and even not being afraid to generate feelings of sadness, anxiety, and anger through the engagement with uncomfortable knowledge is of utmost importance. As Servigne and Stevens (2020, p. 206) argue about the notion of environmental "collapse," building on emotions is essential for prompting understanding, involvement, and action formation:

> More than in other areas, reflection and emotion are intimately mixed in an ecological eschatology where issues of life and death, personal and collective, are the very objects of the investigation. We cannot approach this investigation ingenuously, believing that our lives will not be turned upside down as a result. […] But we do not feel this moral force as external to ourselves, dictated by some dogma or religion: it belongs to our being since both the images and the thoughts of collapse that now populate our minds are mixed, as in an indecomposable alloy that cannot be reduced to it various components.

In this sense, emotions are not a hindrance to understanding, but they can and should play a role in instigating a desire to learn more on these topics. Hence, in the development of new approaches, methodologies, and case studies to foster learning on grand challenges (see Rauch & Ansari, this volume), the focus should not only be on developing conceptual insights on the respective topic but efforts should also be spent on overcoming the barrier of emotional detachment. Using tools such as Mair et al. (2016) study of "locally bound social systems" may offer some promise in overcoming the abstract nature of grand challenges and the perception of distance that learners often experience in relation to social or environmental issues. Focusing on locally bound social systems enables learning about such phenomena in particular places and communities, thereby making them concrete and attentive to the political, cultural, and economic realities on the ground. Recognizing the barrier of emotional detachment is an important step in overcoming barriers to learning about grand challenges. The next step is recognizing organizational barriers that further complicate such learning.

The Barrier of Organizational Obliviousness

We further argue that a critical organizational barrier to learning on grand challenges is *organizational obliviousness*, which is especially relevant in organizations and institutions – such as business schools – that educate individuals with skill sets that allow them to learn and further develop knowledge on grand challenges. We define organizational obliviousness as the subtle ways through which learning on grand challenges can be disregarded at the business schools' organizational

and institutional levels. We differentiate between explicit and implicit obliviousness that either denies and dismisses the importance of grand challenge learning or more subtly distracts from or displaces the problem.

We consider the tendency to label grand challenge learning as a 'hype' an explicit hindrance to learning on grand challenges. Considering grand challenge topics as a "hype that will go away" (Lotz-Sisitka et al., 2015, p. 73) seeks to justify the refusal to engage with or pay more attention to social and environmental issues in business school curricula. Business schools thereby deny that they carry responsibility for educating students and graduates that are often suspected of failing to recognize the role of corporate activities in intensifying grand challenges (Friedland & Jain, 2020). This role is evident in relation to links between corporate carbon emissions and climate change (Ansari, Wijen, & Gray, 2013) and is also well documented for the impact that business activities may have on the reproduction of systemic inequality (Amis, Mair, & Munir, 2020).

Another explicit form of organizational obliviousness refers to the narratives surrounding the instrumentalist objectives of many business schools. Here, the importance of integrating learning about grand challenges might be formally acknowledged; however, it is subsequently rejected given business schools' instrumental value propositions that foreground the "career-enhancing and salary-increasing aspects of business education" (Pfeffer & Fong, 2004, p. 1501). Reasons for rejecting social or environmental issues as part of students' curricula are often a negative answer to the question "Do ethical concerns and considerations of grand challenges 'pay off?'." Many business schools have developed value propositions that indirectly regard students as "customers" who might not want to learn about grand challenges, as long as such learning is not considered of direct (monetary) value (Lynch, 2006; see Jandrić & Loretto, 2021). This objective also explains the current focus on MBA graduates' financial success as an accepted indicator of "teaching quality," reinforcing the "instrumentalist climate" (Friedland & Jain, 2020) of many business schools.

These tendencies may be further consolidated and institutionalized by ranking devices that arguably assign disproportionate weight to the starting salary of business school graduates as a criterion for a school's ranking position. Given such pressures, engagement with topics that do not further value-generation might be delegitimized, marginalized, or dismissed (see Friesike, Dobusch, Heimstädt, this volume). In addition, integrating grand challenge content might also be faced with open dismissal by faculty who do not want to be told what to teach or might fear that their teaching content might be replaced (Millar, Gitsham, Exter, Grayson, & Maher, 2013).

In addition to these explicit factors that explain organizational obliviousness, we identify more implicit ones. For example, business schools' mission statements often divert attention from the absence of grand challenge topics in curricula. According to Rayner (2012, p. 113), diversion *"involves the creation of an activity that distracts attention away from an uncomfortable issue."* For many business schools, such activity means adapting mission statements that outline how they tackle today's social and environmental problems. However, recent studies suggest that grand challenge research and responsible management education are often not

integrated into core learning activities (Beddewela, Warin, Hesselden, & Coslet, 2017; Louw, 2015). Often, such learning is offered in elective modules that remain detached from core curricula (Beddewela et al., 2017). Some scholars consider these decoy activities as mere "cause branding" or "reputation enhancement" (Louw, 2015), which might jeopardize substantive changes to business education.

Even more implicit is the tendency to decouple research and teaching activities on grand challenges. Displacement strategies offer a manageable surrogate for the more underlying uncomfortable issue of learning on grand challenges (Rayner, 2012). In business schools, the fixation with "top publications" and the counting of A-Journal papers (Aguinis, Cummings, Ramani, & Cummings, 2020) that increasingly focus on grand challenge topics presents a manageable surrogate for the process of changing educational curricula. While scholars may engage with social and environmental issues in their research, these issues are still rarely mainstreamed in courses and programmes. In addition, the predominant attention to countable and manageable research outputs leads to a situation in which teaching is generally given less attention, sometimes even considered a "by-product" (Rasche & Gilbert, 2015, p. 245) of the academic profession. While studies on social and environmental issues are more and more recognized in top scholarly journals, they remain sidelined as learning activities and inputs for students.

IMPLICATIONS FOR LEARNING ON GRAND CHALLENGES

We identified and discussed three different types of barriers – cognitive overload, emotional detachment, and organizational obliviousness – that constitute important hindrances to learning on grand challenges and can provide insight as to why business schools have not yet changed to the "extent needed to meet the challenges of the twenty-first century" (Aspling, 2013, p. 40). In recognizing these barriers that contribute to keeping uncomfortable knowledge at bay, in what follows, we discuss their implications for learning on grand challenges.

Addressing the barrier of organizational obliviousness requires business education to work more actively against an enduring and institutionalized myth that has pervaded curricula for decades: the alleged value-neutral nature of business. As emphasized by Hoffman (2021, p. 517) in an essay on the future of business education, "teaching a set of aspirational principles is something that many of my colleagues are uncomfortable doing. They question whether business faculty have the legitimacy to enter such value-based domain." A famous example of the institutionalized nature of the separation between allegedly "neutral" forms of economic value and normative social values is Parsons' pact, which delineated a "division of labour" between economists and the rest of the social sciences. Stark (2009, p. 7) summarizes Parsons' pact along the following lines: "You, economists, study value; we, sociologists, will study values" as the normative principles in which economic affairs are embedded. While it is well accepted within critical streams of management and organization theory research that

business is not value-neutral, this is not necessarily the case for most mainstream business education.

Overcoming the barrier of organizational obliviousness in learning about grand challenges thus implies breaking with Parsons's pact. Significant advances have been made in business research to foreground the notion of public value and the "common good" (see Ansari et al., 2013). Breaking with Parsons' pact requires that business education infuses its traditional curricula surrounding accounting and finance, strategy, entrepreneurship, and human resources with a more robust social science orientation. Due to the institutionalized separation between business and economics subjects on the one hand, and political science and sociologically oriented subjects on the other hand, cross-fertilization between these subjects is still often at an insufficient level to inform teaching on grand challenges meaningfully. Yet, as we indicated, drawing from a multiplicity of values beyond a narrow focus on economic value in business education will foster a deeper understanding of the problems in which businesses are embedded that form the social and physical backbone of today's grand challenges.

Initiating change to organizational obliviousness involves putting the purpose of business and its benefit to society at the center of business school curricula. Emphasizing purpose means asking how organizations are helping to solve problems faced by stakeholders and the environment in a value-adding manner. One way of addressing organizational obliviousness in the current environment might be for lecturers to "hack" the existing system and foster the agenda of grand challenge education without necessarily seeking to overhaul the existing system explicitly. For instance, this could mean using the example of activist organizations or the discussion of hybrids, such as B-Corps, to explain well-established entrepreneurship, strategy, or accounting and finance concepts. Such initiatives can add substance to the approaches that seek to make business education more attuned to the grand challenges we are facing. It could also mean considering more student-centered learning styles that harness students' existing and often diverse knowledge on social and environmental issues. Here, students are considered co-creators of insights and teaching content, while lecturers take on a role of "learning facilitators" rather than "instructors" to promote educational change and engagement with uncomfortable knowledge. Accordingly, approaches with a stronger interdisciplinary orientation require experimentation with different learning tactics that may not be individually elegant but robust enough to initiate change.

Our suggestions on how to address the barrier of organizational obliviousness also have implications for the cognitive barrier. The cognitive barrier was defined by issues surrounding cognitive overload due to how the often unstable and controversial nature of existing knowledge interfaces with the complexities of grand challenges. To deal with cognitive overload, we suggest that learning activities are designed to embrace the tensions, ambiguity, and doubts of such knowledge, rather than suppressing them, which requires a form of learning that can cross conventionally established and legitimated boundaries. We suggest that it is paramount to prevent the development of learning strategies that perpetuate "ontological gerrymandering" (Woolgar & Pawluch, 1985). Ontological

gerrymandering is the process of distinguishing between the claims and the bodies of legitimized knowledge that can be made subject to questioning and those that cannot (Quattrone, 2000). In developing interdisciplinary arguments, ontological gerrymandering frequently operates by "making one science problematic by making some others unproblematic" (Arrington & Schweiker, 1992, p. 527). Hence, it is necessary to instill transdisciplinary approaches to "make connections between diverse elements of human experience through making those analytical distinctions that will enable the joining up of concepts normally used in a compartmentalized manner" (Tsoukas, 2017, p. 132). Preventing this and unveiling – rather than keeping at bay – the uncomfortable potential of knowledge on grand challenges appears to be paramount for overcoming this cognitive barrier.

To do so, it is important to foster a learning attitude that does not take for granted specific prescriptions coming from a body of legitimized knowledge without reflecting on its assumption, applicability, and where and how it may clash with other knowledge bases. A way to embrace the tensions, gaps, and explanatory limitations of knowledge on grand challenges is trying to transcend binary thinking. Binary thinking refers to the instinctive framing of issues encompassing a polar opposition between mutually exclusive alternatives, which tends to occur when individuals and groups are faced with complex events (Wood & Petriglieri, 2005). Reducing any decision to a binary process such as "yes or no?," "this or that?," "is this right or wrong?" can prevent people from looking beyond the polarity of opposite positions, which is arbitrary when approaching complex subject matters such as grand challenges.

We, therefore, argue that it is essential to develop learning activities that hold the tensions and ambiguities "long enough to permit exploration, differentiation, and resolution" (Wood & Petriglieri, 2005, p. 31). In other words, we contend that it is necessary to induce a form of learning that shies away from trying to formulate quick solutions to complex problems and instead interrogates the nuances of their mediating elements. The purpose is to enable learners to cope with and benefit from these tensions – rather than to be paralyzed by them (see Langely, 1995). In the classroom, this could imply integrating "reflection assignments" (Hibbert & Cunliffe, 2015) where learners are asked to interrogate the tensions and ambiguities that they faced during a course on "sustainability grand challenges," "corporate social responsibility" or "accounting for sustainability." The aim is to invite reflections on how each learner deals and copes with the limited and often contradicting information on social or environmental issues.

We identified emotional detachment as another barrier to learning on grand challenges. Overcoming this barrier involves harnessing some of the generative elements that emotions can bring into collective learning on grand challenges. Extant literature has identified at least two such generative roles of emotions in collective action. The first one is the critical role of emotions as triggers for action and energizers for individuals and groups. Research has indicated that being "rationally" aware of a social problem or a dysfunctional element in an existing institutional order is often insufficient to provoke action (Voronov & Vince, 2012). The second generative element that emotions can do to foster learning on grand

challenges is their role as a "social connector, bringing actors together in the collective pursuit of a common aim" (Lawrence, 2017, p. 1772). Since addressing grand challenges involves developing collective action capacities among actors that may not have aligned interests and a shared identity or history (Kornberger, Leixnering, & Meyer, 2019), emotions can be an important "social glue" that drives actors to tackle a grand challenge.

Bringing these enabling elements of emotions into learning on grand challenges provides a promising path to overcoming the barrier of emotional detachment. Such an approach to learning requires looking beyond strictly linguistic ways of communicating insights about grand challenges that seek to overcome some of the limitations of discursive interactions. For example, the use of visual artifacts and other symbolic resources – for example, the use of video material, pictures, artworks, etc. – may be particularly adept fur such a learning purpose. As we have established, the language of rationality and technocratic arguments alone may be too "cold" and insufficient to instigate reflection and action on grand challenges (Servigne & Stevens, 2020). The systematic use of communicative artifacts that seek to entice a reaction from the audience could be more promising to overcome the barrier of emotional detachment and unveil the potential of uncomfortable knowledge on grand challenges.

Visuals and images can be instrumental for the engagement with grand challenge topics in virtue of how they can "speak" to us and sensitize us to issues in a more direct manner compared to other semiotic resources, such as text or numbers (Ronzani & Gatzweiler, 2021; Quattrone, Ronzani, Jancsary, & Höllerer, 2021; Barberá-Tomás, Castelló, de Bakker, & Zietsma, 2019). For instance, interactive visuals haven been shown to work as powerful engines for the engagement with the sustainable development indicators by bringing to life abstract and technical concepts, and prompt collective problem identification and action (Bandola-Gill, Grek, & Ronzani, 2021). Visuals can also connote objects, actions, and relationships in ways that appeal to the senses and people's imagination, thereby allowing the construction of novel and potentially unexpected visibilities on social and organizational phenomena that can generate reflection (Quattrone et al., 2021). Visual artifacts, data visualizations, and artworks can be evocative and, while "they may not serve immediate organizational purposes, [they may] invite enquiry and reflection by de-familiarizing organizational members' habitual conceptualizations" (Barry & Meisiek, 2010, p. 1505). In so doing, the use of visual artifacts to learn about grand challenges can allow people to see and frame predicaments differently and notice more situational clues – both comfortable clues and uncomfortable ones that challenge preconceived assumptions and worldviews.

For example, the communicative difference between pictures of the working conditions in some of the poorest countries by Sebastião Salgado versus a UNICEF report on childhood poverty is stark. Visual representations can prompt esthetically embodied learning processes that navigate past and future: John Martin's famous Victorian depictions of the Biblical apocalypse may generate a reflection on the future that transcend the specificity of their socio-historical conditions of production. Here we are not arguing for a conflation of message

between "art," "science" and "policy"; instead, we are making a case for the use of symbolic artifacts that are developed to entice an emotional response from the audience and can operate as triggers and energizers for learning and action. For these reasons, visuals can be used to generate energy for the enactment of organizational and social change (Barberá-Tomás et al., 2019). We contend that the use of such visuals can prove invaluable in breaching the barrier of emotional detachment as visuals can allow learners to capture at one glance possible realities, cross the boundaries of time and space, and capture grand challenges that might otherwise seem geographically, socially, and emotionally distant.

CONCLUSION

We explored some of the barriers that prevent learning about grand challenges. Informed by the concept of uncomfortable knowledge, we identified three key barriers that manifest on a cognitive, emotional, and organizational level and offered some reflections and implications on overcoming these barriers. One of the implications of our argument was that educators have to be aware of the common strategies to keep uncomfortable knowledge at bay and develop reflection spaces to recognize the inevitable learning challenges that follow from the barriers of cognitive overload, emotional detachment, and organizational obliviousness.

Such spaces for reflections may become more difficult in the wake of the "digital turn" that business education has experienced over the past years and following the COVID-19 crisis. A danger is that learning becomes more focused on "information transmission" rather than collective engagement with the uncomfortable knowledge presented by grand challenges. As we indicated, learning about the multifaceted and multidimensional nature of grand challenges cannot be satisfactorily achieved by simply focusing on transmitting essential background information on these issues. Instead, the focus should be placed on the inherent cognitive, emotional, and organizational messiness and controversies surrounding these issues, beyond learning "basic facts." For these reasons, learning on grand challenges requires adaptation, playful imagination, improvisation, and bricolage to "patch together" insights from different legitimate sources while trying to orchestrate them in a meaningful, reflective manner.

While we drew from emerging literature on grand challenges as we reflected and worked on this article, it became clear that empirical work on learning on grand challenges is still relatively sparse, despite the importance of the topic. As this subject matter is gaining relevance in business education in recent years, extending our understanding of the tools, approaches, methods, and contexts that affect learning on grand challenges forms a promising area of future empirical and theoretical investigation. This will also mean that organizational scholarship may further embrace unconventional empirical sites, such as "extreme contexts" (Hällgren, Rouleau, & De Rond, 2018) and other socially and politically contested settings as learning contexts that promise to offer novel insights into organizational phenomena that are otherwise difficult to tackle.

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