Article

Teaching Scenario Planning in Sustainability Courses: The Creative Play Method

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Abstract

Sustainability management is rapidly progressing from an operational task to a strategic imperative one as environmental and social concerns shape the business environment. Scenario planning is increasingly being used by companies and governments to explore the potential impact of future challenges. Applied in a management education context scenario planning offers teachers of sustainability a tool through which they can promote creativity while developing student knowledge, skills, and abilities, preparing them for work in an increasingly dynamic market environment. Within this article, an instructional innovation is presented as a two-stage workshop designed as an experiential exercise to promote creativity and generate scenarios linked to sustainability. The first stage of the workshop utilizes LEGO to generate creativity before the second stage builds on these creative foundations guiding student teams through the construction of scenarios around sustainability challenges. An evaluation is presented for the instructional innovation reporting its success in producing skills in creative thinking within cohorts of postgraduate students at a major Australian university.

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Introduction

Sustainability management education is critically important in a time when organizations are facing significant disruption due to direct sustainability impacts linked to physical changes, such as extreme weather events, and indirect impacts from their avoidance or (mis)management (Caldecott, 2016; Favato & Vecchiato, 2016; Turnheim et al., 2015). In order to survive and thrive in the future, organizations need to maintain their fit with the evolving environment (Wade & Griffiths, 2020). Future scenario planning is a management tool that is being increasingly adopted by organizations to improve their adaptation and resilience (O'Brien & Meadows 2013). Distinct from forecasting, future scenario planning entails generating "a story about how the future might turn out" (O'Brien, 2004, p. 709). Creating a scenario with a plausible yet extreme view of the future allows managers to strategically evaluate a range of potential threats, stress test their management strategies, and identify areas necessary to develop resilience (Hillmann et al., 2018). Future scenario planning is used by companies such as Shell to strategically prepare for future changes, by the Intergovernmental Panel on Climate Change (IPCC) to inform decisions, and by some governments for policy making. Furthermore, recent developments from the Taskforce on Climate-related Financial Disclosures (2017) have increased the focus of investors on the risks that companies face through climate change, with scenario planning identified as a useful risk management tool.

For management educators, these trends mean that scenario planning should be incorporated into the curriculum of dedicated sustainability courses and programs. It could also be usefully included in sustainability modules within more generalist courses in strategy in business degrees. Yet scenario planning is quite challenging for students to learn. Not only must students gain an understanding of the potential changes derived directly from physical challenges—such as extreme events related to climate change or resource scarcity—but they must also consider the changes occurring as society seeks to mitigate or adapt to such physical challenges. Focusing on expected changes may lead to a short-term competitive advantage for companies but will restrict the ability of managers to identify and prepare for extreme events that might occur in a climate-changed future (Star et al., 2016; Varum & Melo, 2010). Thus, scenario planning is challenging for both management practitioners and students because it requires creative thinking that breaks from business-as-usual frames (Haney et al., 2018; Rieckmann, 2012).

Creative thinking is defined as processes "that produce outcomes that are both original and of value" (National Advisory Committee on Creative and Cultural Education, 1999, p. 30), following from phases of divergent and

convergent thinking (Basadur et al., 1982) and often involving deep feelings or emotions (Shaw, 1989). Common teaching and learning practices in business schools associated with case studies, multimedia, and guest lecturers may be unable to generate the skills in creative thinking that students need to comprehend a sustainable future and to engage in future scenario planning. Scholars have long argued that meaningful learning about sustainability in business courses may require instructional innovations that move beyond standard classroom teaching practices (Kearins & Springett, 2003). Given the importance of developing student's skills in creative thinking about sustainability issues, the purpose of this article is to present an instructional innovation for teaching sustainability students to engage in scenario planning for a sustainable future. This instructional innovation is called the "Creative Play Method" for future scenario planning. This method unlocks student's creative thinking through play with LEGO building blocks and harnesses that creativity to develop and assess plausible scenarios for a sustainable future for a case company.

This article is structured in four sections. The first section provides the theoretical background to future scenario planning and its importance in sustainability management education. The second section presents the instructional innovation of the Creative Play Method for teaching scenario planning for a sustainable future, describing how this method unfolds across two stages of classroom learning activities. The third section reports an evaluation of the effectiveness of the instructional innovation to give sustainability management educators confidence to adapt it for use in their own classrooms. Specifically, the Creative Play Method is evaluated for how it improved student's skills in creative thinking following implementation in a postgraduate sustainability course at a major Australian university. The fourth section offers conclusions on the Creative Play Method and how it may be used by educators to teach scenario planning for a sustainable future in other courses.

Theoretical Background

The sustainability curriculum in management education has evolved in parallel with the progression of the sustainability agenda for organizations from traditional approaches such as the triple bottom line, compliance, and reporting to an integrated strategic perspective incorporating concepts that include new business models, natural capital, social license to operate, decarbonization, and degrowth discussions. An important element in the sustainability agenda is environmental turbulence, which should not be thought of as a temporary deviation from business as usual but instead a defining characteristic of the future market environment (Ramírez et al, 2017). To successfully

transition a company toward sustainability, practitioners need to expand their capabilities from traditional forecasting to tools and techniques that will facilitate building organizational resilience (Haney et al., 2018; Linnenluecke et al., 2011; Wade et al., 2014). Scenario planning represents one of these management tools.

Originally tied to military planning, scenario planning was promoted into a corporate context by Dutch Royal Shell in 1965. It is now a widely known strategic planning instrument facilitating the consideration of future environmental parameters, consequences, and development paths (Meissner & Wulf, 2013; Ramírez et al, 2017; Varum & Melo, 2010; Wilkinson & Kupers, 2013). The process of scenario planning is designed to overcome the expectation that the future will be similar to the present or the past. Essentially, scenario planning develops stories or narratives in place of forecasts to prepare for change and manage uncertainty (Wilkinson & Kupers, 2013). Scenarios are of particular utility in understanding and preparing for extreme events through their focus, not on prediction but on organizational learning (Favato & Vecchiato, 2016; Roxburgh, 2009). When optimally applied, scenario planning breaks dominant patterns of thinking in complex environments and (re)shapes mental models and cognitive frames (Kaplan, 2008). Benefits have been reported to include reducing bias (Favato & Vecchiato, 2016; Meisser & Wulf, 2013), creating "sticky" knowledge (Rickards, Ison, et al., 2014), transferring knowledge (Favato & Vecchiato, 2017), engaging stakeholders (Wilkinson & Kupers, 2013), and exploring long-range risks and opportunities (Favato & Vecchiato, 2017).

As scenario planning spreads throughout organizational and government planning contexts, management educators have advocated incorporating scenario planning into the business school curriculum. For example, O'Brien (2004) has included scenario planning in strategy courses at undergraduate, master, and MBA levels for the past 15 years. G. Wright et al. (2009) describe their experiences in translating insights about scenario planning from their work with organizations into their classrooms. In a different vein, scenario plans developed through an executive education course at Oxford University were subsequently adopted as the basis of corporate strategic planning at Rolls Royce, thereby shaping ongoing investment decisions (Ramírez et al., 2017).

Despite growing interest in teaching scenario planning, management educators in sustainability courses face a significant challenge in designing meaningful learning activities. Scenario planning encourages students to bring together their knowledge of sustainability issues and the interactions of internal and external environmental factors to determine potential consequences of change on an organization. The act of interpreting, navigating,

and managing under an evolving complex organizational environment, such as a climate-changing future, requires a level of creativity that many students find difficult (Lozano, 2014; Przychodzen et al., 2016; Sandri, 2013). Creativity emerges from the interaction of cognitive and noncognitive traits (Lozano, 2014), including both individual process and the interaction of an individual with their cultural domain and the social field (Gardner, 2008). Creativity plays a "critical role in supporting innovation and problem solving to address complex ecological problems" (Sandri, 2013, p. 775). It is essential for developing plausible but extreme future scenarios when students apply scenario planning processes in sustainability classrooms. To assist management educators in developing student's creativity in the context of scenario planning for future sustainability, we developed an instructional innovation that we labeled the Creative Play Method.

The Creative Play Method for Teaching Scenario Planning

The Creative Play Method for teaching scenario planning is based on experiential learning theory, proposed by D. A. Kolb (1984) as learning that involves cycles of concrete experience, reflection, theorization, and active experimentation. Experiential learning is widely used in management education (Akella, 2010; A. Y. Kolb & Kolb, 2009; Sternberg & Zhang, 2001; A. Wright et al., 2018). By allowing students to construct their own meaning through reflection on their own experience of an activity (Hudson, 2018), experiential learning is a form of "transformative learning" that can help management students in sustainability courses challenge traditional cognitive frames (Sipos et al., 2008). The concrete experience that anchors the experiential learning cycle in the Creative Play Method for teaching scenario planning is play with LEGO bricks. Researchers have proposed that when students use fingers during problem solving, thoughts are increasingly creative as abstract ideas become more understandable (Kristiansen & Rasmussen, 2014; Peabody & Noyes, 2017).

The Creative Play Method for teaching scenario planning unfolds in two stages, which are designed to run across two classes of 150 minutes in a semester-long course in sustainability. The activities can also be condensed to run in shorter class sessions, or to run in a single session. The first stage of the Creative Play Method unlocks student's creative thinking through play with LEGO bricks, while the second stage harnesses student's creativity to develop scenarios of the future. A summary of the two stages of Creative Play Method is presented in Table 1.

Table 1. Summary of Creative Play Method.

Element	Time	Resources and details
Stage 1: Unlocking creativity through play		
In-class introduction	30 minutes	A video example that can be shown in class is "Shell Energy Scenarios to 2050" (total video 8:39 minutes with example scenarios shown from 1:40 minutes into the video). Available at https://www.youtube.com/watch?v=jQ2ulPeiEYQ
		Academic articles on scenario planning and strategy include Rickards, Wiseman, et al. (2014) and Ramírez et al (2017)
Team formation	15 minutes	Students assemble into instructor-assigned or self-determined teams of five people
Creative play	60 minutes	Ice-breaker (5 minutes build and 5 minutes judging)
		Individual structures (build 2 minutes, explain 5 minutes)
		Merged structure (build 2 minutes, explain 5 minutes)
		Class debrief on structure (5 minutes)
		Individual sustainability challenge (build 2 minutes, explain 5 minutes)
		Class debrief on challenge (5 minutes)
Activity debrief	45 minutes	Debrief on value of creativity for scenario planning and introduce case company on which students must prepare PESTEL for Stage 2
Stage 2: Harnessing creativity in scenarios		
In-class introduction	10 minutes	Reference texts for scenario development: O'Brien (2004), G. Wright et al. (2009), Miesing and Van Ness (2007), and Bradfield (2008)
		Reference texts for Anthropocene and planetary boundaries: Rockström et al. (2009)
Team formation	At start of class	Students join their teams from Stage 1
Creative scenarios, Step 1	45 minutes	Understand the system
		PESTEL analysis resource: Strategy textbooks include details of a PESTEL analysis as do websites such as https://pestleanalysis.com/what-is-pestle-analysis/
Creative scenarios, Step 2	25 minutes	Identify the most impactful factors from the system analysis
Creative scenarios, Step 3	25 minutes	Create combinations of factors that are meaningful for the scenario theme and define potential logical range
Creative scenarios, Step 4	20 minutes	Identify potential events leading to the scenario placed in the future
Activity debrief	25 minutes	Debrief to begin backcasting step of scenario planning. Teams craft scenario story to link present day condition to future scenario

Note. PESTEL = political, economic, social, technological, environmental, legal.

Stage 1: Unlocking Creativity Through Play

Aims. This first stage of the Creative Play Method aims to unlock students' ability to think creatively and to work effectively within a team. These aims are achieved through team participation in a learning activity based on LEGO Serious Play, which is a "methodology that uses Lego bricks as a medium for communication, expression, and problem-solving" (Peabody & Noyes, 2017, p. 233). In developing the LEGO activity for this first stage, the first author was informed by research into the LEGO Serious Play concept (Blair & Rillo, 2016; Dann, 2018; Kristiansen & Rasmussen, 2014; Peabody & Noyes, 2017) as well as the LEGO Serious Play open-source guide (2010). The first author also corresponded with Dr. Marko Rillo about his work in developing teaching practices associated with the concept of LEGO Serious Play and drew on his instructional videos (SeriousPlayPro, 2016), along with other referenced resources.

Preclass Preparation. The activity does not require an accredited LEGO instructor or the official sets of LEGO developed for Serious Play. Instructors can use bulk generic LEGO sets for the workshop activity. LEGO Serious Play is an open-source method. An introduction to LEGO Serious Play can be seen in the video *Lego Serious Play: Introduction* (20:42 minutes) found at https://www.youtube.com/watch?v=Ucn5QqhtxaU, and an open-source guide can also be accessed by instructors in preparation for running the activity. Students should be asked to prepare for class by completing assigned readings on the role of scenario planning in strategy and by watching a video of how an illustrative company uses scenario planning in practice. The company Shell provides a good example of a scenario story that supports student learning, although we acknowledge the company's environmental reputation is less than stellar.

In-Class Introduction to the Activity. The instructor presents a theory on scenario planning, including its role as a strategic management framework for managing uncertainty. After highlighting the importance of creativity in generating useful scenarios and solving sustainability challenges, the instructor introduces the activity by explaining how playing with LEGO can inspire creative thinking through the combined use of minds and hands.

Team Formation. Students are divided into teams of five or six. The instructor may wish to assign students to teams to promote diversity in gender, age, language skills, experience and background (Andrade, 2006). It is useful to explain the benefits of a diverse team in fostering creativity for the scenario development process. Having a wider variety of backgrounds and cultures in

a team may help avoid biases and may challenge individual assumptions and fixed mind sets, which can undermine future scenario planning.

Creative Play. The creative play section of the activity adapts the LEGO Serious Play method of question, construct, share, and reflect. More specifically, after each team is given a pile of LEGO bricks, the instructor guides teams through the following five steps, which are explained in more detail with suggested timings in Table 1. First, the instructor runs an ice-breaker exercise in which teams compete to assemble the tallest freestanding structure in 5 minutes. After a winner is decided, teams take apart their structures. Second, the instructor asks individual team members to assemble a new structure using 10 to 15 bricks. Individual students must then tell team members what their structure is and explain its purpose. Third, the instructor directs team members to merge their individual structures to create one combined team structure made of LEGO bricks, which represents "the sustainable house of the future." Using their knowledge of sustainability, teams are asked to think creatively and discuss how their sustainable house structure will meet the challenges of a climate-changed future. Fourth, the instructor facilitates a class debrief in which teams are asked to present the innovations within their sustainable house structure and the function that each innovation serves. At the end of the debrief, teams break down their structures. Fifth, the instructor directs each individual team member to build a new structure using 10 to 15 LEGO bricks. Students are then given different challenges related to sustainability to solve, such as describing how their LEGO structure is an innovation that will (1) be a generator of distributed energy, (2) assist in education in developing nations, (3) provide water to remote villages in a developing nation, (4) solve hunger, or (5) remove the need to use plastic for packaging. This process encourages creativity as the individual has no idea what challenge will be set when they are building their structure forcing them to think outside the box about a challenge when it is allocated to them.

Activity Debrief. The instructor debriefs the activity by encouraging students to reflect on how they are often required to think critically but not creatively. The different LEGO-based tasks promote fast and creative thinking, often surprising students in their ability to think beyond business-as-usual solutions. The instructor should emphasize the importance of student's developing an awareness of the need for creativity when working on sustainability-related challenges and the benefits of applying this creativity to evaluate a situation and generate an innovative solution. The instructor might also invite students to reflect on how diversity among team members

(e.g., cultural and educational differences) can improve creativity in tackling complex problems.

Stage 2: Harnessing Creativity in Scenarios

Aim. The aim of the second stage of the Creative Play Method is to harness student's creativity unlocked in the first stage to develop creative scenarios for a case company. In doing so, students develop a deeper understanding of the complexity and degree of interconnection between elements within a system working toward sustainability. Students gain an awareness of the factors that can shape an organization's sustainability, evaluate these factors, and identify key challenges for inclusion in the scenarios.

Preclass Preparation. All students must prepare by reading background information on a case company and completing a PESTEL analysis (political, economic, social, technological, environmental, legal) of the system in which the company operates. When selecting the case company, the instructor should aim to choose a company that operates in a sector likely to be vulnerable to climate change, that has a relatively narrow and/or defined scope of operations (avoid multinational companies), and for which relevant information about the company's operations is readily accessible to students. Two examples of case companies that work well are the university in which the course is being run and a local airport. To help students prepare their PESTEL analyses prior to class, the instructor should provide access to (1) case company materials, such as annual reports and websites and (2) other background materials (reports, articles, and videos) on megatrends and future world problems, including climate change such as from the IPCC.

In-Class Introduction to the Activity. The instructor provides the class with a brief recap on the theory of scenario planning and explains that the scenario planning activity in this class builds on the creativity unlocked in the previous class. Students should be reminded that a lack of creativity and bias can cause problems in scenario development by limiting the value of constructed scenarios for organizations. The instructor then introduces the four steps that will be covered in creating scenarios. The instructor also establishes the overarching theme for the scenario and any assumptions. For example, the instructor might set an overarching theme of a climate-changed future from an optimistic (low emissions) or pessimistic (high emissions) perspective, with an assumption that the case company is still operating. If the scenario planning is linked to formal course assessment, the instructor can also overview the assessment task requirements before beginning the activity.

Team Formation.   The teams formed within the first stage of the Creative Play Method remain together. This helps build on the social connections and creativity that emerged among team members during the LEGO tasks.

Creative Scenarios.   The instructor guides the teams through a four-step process to construct scenarios for a sustainable future. This facilitative process is informed by the pedagogical exercises for teaching scenario planning developed by Miesing and Van Ness (2007), O'Brien (2004), O'Brien and Meadows (2013), Schoemaker (1995), and G. Wright et al. (2009). The four steps that the instructor follows to facilitate the class are briefly summarized below, with more detailed information on timings presented in Table 1.

Step 1: Understand the system.   The instructor facilitates an in-class discussion in which students draw on their preclass preparation and share the factors they identified in each category in their individual PESTEL analyses. As different students report their identified factors, the instructor uses a whiteboard, flipchart, or online media to record each factor in the categories of political, economic, social, technological, environmental, and legal. The resultant "Class PESTEL" analysis represents the system in which the case company operates.

Step 2: Identify the most impactful factors from the system analysis.   The instructor directs teams to rank the factors identified in each category in the "Class PESTEL" from the most important/impactful to the least impactful. For example, if the case company is a local airport, Team A might rank global politics as the most impactful factor, political stability as the second most impactful factor, and sector-specific regulations as the least impactful factor in the political category system of the local airport. The instructor then facilitates a class debrief to identify the two factors that have the most impact in each of the six categories of the "Class PESTEL." For example, class consensus might emerge around "national political agenda on climate change" and "emission regulations" as the top two factors in the political category of the local airport system; "economic stability" and "disposable income" as the top two factors in the economic category of the local airport system, and so on until the set of 12 impactful factors across all categories in the system of the local airport is complete.

Step 3: Create combinations of factors that are meaningful for the scenario theme and define potential logical range.   This step can be broken down into the following process. First, the instructor reminds the teams of the overarching theme for the scenarios. Continuing our example of the local airport, the

scenario theme may be a climate-changed future set 50 years from now at a high level of global warming.

Second, the instructor asks each team to select two factors from the set of 12 impactful factors. The two factors selected should generate a factor combination that team members theorize, based on their sustainability knowledge and creativity, is meaningful for the scenario theme. For example, Team A might generate a factor combination by selecting the factor of "social acceptance of travel" from the sociocultural category and the factor of "low-emission technology" from the technological category.

Third, after each team generates its own factor combination, the instructor directs teams to (1) assume that each factor exists on a continuum from less extreme to more extreme and (2) draw a graphical representation of the continuums for their selected factor combination. For example, after discussion, Team A might agree that the factor of social acceptance of travel exists on a continuum from *acceptable* to *flight shame*, which can be drawn as a vertical two-headed arrow. Team A might also decide that the factor of low-emission technology exists on a continuum from *high availability* to *low availability*, which can be drawn as a horizontal two-headed arrow that crosses the midpoint of the vertical arrow for travel demand (creating a simple two-by-two figure).

Fourth, the instructor asks each team to consider the potential logical range for their selected factor combination, trying to be as creative as possible while also plausible. This means that each team should identify, for each factor in the combination, where on the continuum the factor is logically positioned. This establishes the defining aspects of the team's scenario as the intersection of these two points on their two-by-two figure. For example, Team A might consider that positioning the scenario at the *flight shame* end of the continuum of possibilities for the social acceptance of travel on the vertical arrow will present a challenging condition for the local airport as the case study company. Team A might also speculate that under a high level of climate change (as set by the instructor as the theme for the scenario) there has potentially been little advancement in low-emission technology and therefore decide to place the scenario at the low availability end of the horizontal arrow representing the continuum of possibilities for this factor. The intersection of these two points is Team A's scenario for the local airport (a diagram is included in the detailed example in the appendix).

Step 4: Identify potential events leading to the scenario placed in the future. When teams are satisfied that they have defined a scenario that is creative and challenging yet plausible, the instructor advises them to bring the scenario to life by assuming that the company is still operating in 50 years' time. The

instructor asks teams to discuss what events may have occurred between our present time and 50 years in the future when the scenario is set. Critical surprising events could potentially occur in the areas of customers, creditors, services, competitors, substitute services, suppliers, and demographic, political, or technological changes (Miesing & Van Ness, 2012). Through discussion, each team should identify three to five critical events. For example, when the case company is a local airport in Australia, Team A might identify the potential event in 10 years' time of a failure of global negotiations on emission reductions, followed by another potential event in 15 years' time in which the Australian government follows the lead of the United States to remove their support from the COP21 (the 2015 United Nations Climate Change Conference) agreement. Team A might also predict an event in 39 years in which the Great Barrier Reef suffers a massive, sustained coral bleaching event and is no longer a desired destination for international tourism.

Activity Debrief. After teams have completed these four steps and have identified their three to five critical events, the instructor facilitates a whole-class debrief. As teams discuss and devise these critical events through participating in the facilitated debrief, the instructor can point out that teams have begun moving onto the "backcasting" step of the scenario planning process. The backcasting step involves crafting the scenario story to link present-day conditions to the future scenario. Story development requires teams to combine creativity with facts, building on the research completed in their preclass preparation. Students should avoid focusing their scenario story on what might be considered an obvious "next big issue"—such as those currently within the media or major events like battery storage or a pandemic—since these limit the scope and novelty of the scenario and its usefulness for planning (Bradfield, 2008; O'Brien, 2004). Wilkinson and Kupers (2013) recommend that completed scenario stories should be plausible but not probable, challenging while still relevant. At the completion of this second stage of the Creative Play Method, the instructor might ask teams to name their scenario story and to continue fleshing out the story development in the next class and/or as part of an assessment task, such as a written assignment or presentation. Below, we present an illustration of a scenario story generated by the Creative Play Method, concluding our example of a local airport in Australia as the case company:

> *Scenario name*: Flying Blind
> *Scenario factors*: (1) social acceptance of travel and (2) low-emission technology

Scenario story: It is the year 2070. Climate change has led to a global temperature rise of 3 °C warming over preindustrial levels, and the environment is suffering. The United Nations have called for the reestablishment of the *Intergovernmental Panel on Climate Change*, citing its disbandment after the catastrophic failure of COP30 as the beginning of the end for action on climate change. The failure of global climate agreements led to a return to the 1980s mantra that "greed is good." Fearing that environmental groups led by the adult Greta Thunberg would regain ground on environmental action, some fossil fuel companies accelerated their extraction of resources to maximize returns and minimize the potential to be left with stranded assets should global agreements on climate change be resurrected. With no global agreement on climate change action, investment in low-carbon technology stalled. Under these conditions, the earth reached 2 °C warming far earlier than expected in 2060, triggering tipping points in natural systems leading to accelerated further increases in warming. The catastrophic coral bleaching that occurred in the Great Barrier Reef just prior to reaching the 2 °C rise is unfortunately just one example of damage to natural systems uniting indigenous and nonindigenous populations to demand action. Groups such as the Extinction Rebellion are now mainstream, and social demand for action on climate change has reached unprecedented levels as communities realize that they can no longer rely on governments to deliver action. As these social movements rapidly increased in strength, they harnessed the power of social media to create "shaming" campaigns with the help of popular figures such as movie stars and popular singers. One of the most successful campaigns has targeted "insta" stars who flash their world trips on their Instagram accounts. Long-haul flights have become the new "smoking."

In this section, we outlined the Creative Play Method, which is the instructional innovation for teaching scenario planning that lies at the heart of this article. As described above, the two-stage method involves (1) unlocking creativity through play with LEGO blocks and (2) harnessing that creativity to construct a scenario story for a sustainable future. Instructors who wish to further develop the skills of sustainability students in scenario planning can extend the Creative Play Method through a follow-up assignment. Teams can be asked to write a report or give a presentation that analyzes the case study company with reference to their future scenario. Teams can analyze the potential impact of their scenario story against the company's current operations to develop a new strategy accommodating scenario implications. Any areas of weakness can be identified and advice provided on company actions that might reduce risks and promote resilience.

How Effective Is the Creative Play Method?

The Creative Play Method for teaching scenario planning has been implemented in two sections of a dedicated sustainability course in 2018 and 2019. The course is included in the master of business and master of entrepreneurship and innovation programs at an Association to Advance Collegiate Schools of Business–accredited business school of a university in Australia. Enrolments were 72 students in 2018 and 105 students in 2019. The course is scheduled over a 12-week semester, with one class of 3 hours duration held each week. The Creative Play Method was positioned in Weeks 5 and 6 of the semester, after the introduction of foundational sustainability concepts including change for sustainability, mitigation adaptation and resilience, and innovation for sustainability. Students were required to submit the scenarios they developed through the Creative Play Method, along with their strategic analysis and plans for building the case company's resilience, as part of an assignment that contributed to their final grade for the course (a written report and PowerPoint/video presentation). The selected case companies for scenario planning in 2018 and 2019 were a university and a local airport respectively. More information about the sustainability course and how it implemented the Creative Play Method are included in the appendix.

Student evaluation feedback at the end of the course in 2018 and 2019 supported the effectiveness of the Creative Play Method. For example, one student commented, "Scenario planning part of the course is really good and something completely different from what I have studied till now." Another student noted, "The interactive approach was highly stimulating, as well as extremely fun (note to the day we innovated with LEGO!)."

We collected empirical data to formally evaluate the effectiveness of the Creative Play Method. The first type of empirical material collected was student assignments. Ethics approval was granted by the university in 2020 to access the team assignments produced by students in the course as empirical material for research purposes. In total, 35 team assignments were produced by the students who completed the course in 2018 ($n = 14$ teams) and 2019 ($n = 21$ teams). Providing a baseline for comparison, 13 team assignments were produced by 77 students who completed the course in 2016 ($n = 4$ teams) and 2017 ($n = 9$ teams), when the Creative Play Method was not used to teach scenario planning. These team assignments represent postintervention and pre-intervention empirical material, respectively, which were used to evaluate whether the Creative Play Method was associated with higher levels of skill development in scenario planning and in creative thinking. The course instructor remained the same over the pre-intervention year 2017 and the postintervention periods.

Table 2. Comparison of Pre-Intervention and Postintervention Team Assignments.

Dimensions	Pre-intervention mean ($n = 13$ team assignments)	Postintervention mean ($n = 35$ team assignments)	p value on t test
Scenario construction			
• Appropriateness of factors	2.31	5.00	$p = .001$
• Logic of factor	2.31	3.86	$p = .001$
combination	2.46	3.46	$p = .05$
• Novelty of critical events			
Scenario story			
• Imaginativeness	2.23	3.11	$p = .05$
• Insightfulness of event	2.38	3.46	$p = .05$
links	2.23	3.29	$p = .05$
• Meaningful			

Note. Scores for each dimension coded on a 5-point scale with 5 = *highest* and 1 = *lowest*.

Our evaluation approach proceeded as follows. We began by coding the scenario construction and scenario story in each team assignment. We coded the scenario construction on a 5-point scale (5 = *highest*, 1 = *lowest*) for the following three dimensions: appropriateness of factors, logic of factor combinations, and novelty of critical events. We coded the creativity of the scenario story on a 5-point scale (5 = *highest*, 1 = *lowest*) based on the following three dimensions: imaginativeness, insightfulness of links of events to story, and meaningfulness of story for testing strategy.

We then compared the coded scores for the pre- and the postintervention samples with the results of our statistical analyses presented in Table 2. The mean scores indicate that students who were taught scenario planning using the Creative Play Method identified more comprehensive and less obvious factors (mean = 5), more logical factor combinations (mean = 3.86), and more novel critical events (mean = 3.46) when constructing scenarios than students who were not exposed to the Creative Play Method (means = 2.31, 2.31, and 2.46, respectively). A one-tailed t test confirmed that these postintervention mean scores were higher than the pre-intervention mean at a level of statistical significance of better than $p = .05$. In addition, the mean scores indicate that students taught using the Creative Play Method developed scenario stories that displayed more creativity through imaginativeness (mean = 3.11), more insightful links of events to the scenario story (mean = 3.46), and more meaningful scenarios for stress-testing strategy (mean = 3.29) than did students who were not exposed to the Creative Play

Method (means = 2.23, 2.38 and 2.23, respectively). A one-tailed *t* test confirmed that these postintervention mean scores were higher than the preintervention mean scores at a level of statistical significance of $p = .05$. These statistical analyses suggest that the Creative Play Method improves student skills and creativity in scenario construction and development of scenario stories.

We also collected a second type of empirical material to evaluate the effectiveness of the Creative Play Method. This material took the form of a survey of past students. We gained ethics approval from the university in 2020 to contact students from the 2018 and the 2019 cohorts via their student email and administer a survey. A total of 28 students responded to the survey (response rate = 15.8%). The survey used a 5-point Likert-type scale to evaluate the student experience of the Creative Play Method and included an open-ended question inviting further comments on their experiences. Seventy-one percent of respondents agreed or strongly agreed that the LEGO activity helped their team work cohesively and creatively when compared with other course activities and assignments that they had completed within their program. Responses to the open-ended question included the following comments:

> The LEGO workshop allowed team members to come together, think outside of the box and develop creative solutions.

> It definitely seemed silly in the beginning, but the design thinking approach was pretty interesting and the activity was probably good for group dynamics.

In addition, 64% of survey respondents reported that they noticed an increase in their creativity through the LEGO activity. More than half of the respondents strongly agreed (54%) that their creativity had improved. This was echoed in the open-ended comments, which included the following comments:

> The Lego was an excellent tool for improving the creativity of my responses to the scenarios posed.

> Yes. I totally agree. Particularly, when we can think it out and create a simple beautiful model in less time and build a nice story around our invention.

A final question in the survey enquired whether the students were utilizing scenario planning in their current employment or studies. 75% of respondents reported to the affirmative. In response to this question, one respondent

highlighted how their experience of scenario planning had assisted them in the recruitment interview for a major consulting firm and explained that they were continuing to draw on it in their new employment. Other survey respondents noted that the skills in scenario planning developed through the Creative Play Method helped them in their work roles in the COVID-19 crisis. An example response is presented below:

> At the time I knew scenario planning was important, but I've now realized how vital it is in business success. How crazy to think that last year I might have said a world pandemic would be an unlikely scenario that a company could plan for . . . little did I know that ha ha! In all seriousness, scenario planning is so important for everyone to learn. I wish there was a course like this available for my undergraduate degree. Furthermore, I use the knowledge I learnt every day at my workplace as I work in technology innovation which is always changing and very susceptible to world events.

Overall, the results of our analysis of student assignment data and a survey provide evidence of the effectiveness of the Creative Play Method in improving student skills and creativity in scenario planning when incorporated into a postgraduate sustainability course.

Conclusions

As interest among companies and government in using scenario planning grows, sustainability educators seek out effective ways to teach students the creative thinking needed to engage in future scenario planning. To assist educators, we presented the Creative Play method as an instructional innovation that teaches scenario planning over two stages. In the first stage, creativity is unleashed as students work together in diverse teams to build LEGO structures that offer innovative solutions to challenging sustainability problems. In the second stage, this creativity is harnessed as teams engage in discussion and debate to construct imaginative but meaningful future scenarios and develop challenging but plausible scenario stories for a case company.

We developed the Creative Play Method for students in a postgraduate sustainability course and have implemented it effectively over two sections of the course in 2018 and 2019. We have also applied the Stage-1 LEGO approach in multiple settings. These settings include an innovation conference for early career researchers in a workshop designed to promote creativity and reflection and multiple innovation and entrepreneurship workshops targeted toward developing and exploring agile prototypes. We have also recently included a condensed version of the Creative Play Method in a short

executive education course. Although the method is particularly effective in generating creativity in dedicated sustainability courses, management educators in other courses can also utilize it. The method can also be applied to teach sustainability modules and content within general management and strategy courses at an advanced undergraduate, postgraduate, and MBA levels.

Management educators can adjust the timing of the various activities within the Creative Play Method, as presented in Table 1, to accommodate for different class schedules. Instructors who wish to run both stages of the method within a single 3-hour class could move the tasks associated with team formation, introduction to scenario planning, and PESTEL construction to a different class or complete this online as part of preclass preparation. Doing so would allow Stage 1 to be conducted in 60 minutes, with the rest of the class time devoted to completing Stage-2 scenario generation. Time can be saved in Stage 2 by foregoing the construction of a whole-class PESTEL and asking students to work through the first steps of the creative activity within their teams rather than as a whole class. Once completed by each team, the factor combinations can be discussed as a class to ensure the construction of successful scenarios.

In 2020, we are adapting the Creative Play Method to be run online due to COVID-19 restrictions, which necessitates further creativity on our part as sustainability educators to support a comparable learning experience for students. The pandemic has illustrated the potential for unexpected events to create a sudden major disruption that tests the strategic and operational systems of organizations. This suggests that the Creative Play Method has value in management education not just within course curricula but also as a scenario planning tool that business school administrators and university leaders can apply to help develop a strategic response to the pandemic and build resilience. We invite other management educators to adapt and apply the Creative Play Method to scenario planning for a sustainable future in their courses, programs, and business schools.

Appendix

Detailed Example of Creative Play Method as Taught in a Postgraduate Sustainability Course

Course: Postgraduate course on sustainability.
Seminar length: Two seminars of 180 minutes (150 min teaching time after breaks are provided)
Class size: 72 to 105 students

Cohort characteristics: Students enrolled from master of business, master of entrepreneurship and innovation, master of environmental management, master of engineering, and master of information technology. Majority from international backgrounds.

Timing in course: Seminar conducted in Weeks 5 and 6 within a 13-week program integrating foundational sustainability concepts including planetary boundaries, physical and transitional risks associated with climate change, and systems thinking.

Summary of teaching plan: A summarized teaching plan is provided in Table A1.

Learning objectives: The Creative Play Method of scenario planning is designed (see Table A2) to accomplish the following four key learning objectives:

1. *To develop a deep understanding of the complexity and interconnectivity between system elements when seeking to promote sustainability.*

Sustainability challenges can represent wicked problems. The issues need to be understood from a systems perspective to conceive the complex interactions and avoid the potential unintended consequences.

2. *To develop skills in combining creativity and research in seeking solutions to sustainability related issues*

Students are often required to think critically about a problem but often not creatively. In developing innovative solutions to sustainability issues, creativity is a necessity. The LEGO-based exercise promotes fast and creative thinking by students, often surprising them in their ability to think beyond business-as-usual solutions.

3. *Promote student confidence in speaking about their ideas and research in front of others.*

Students vary in their experience and confidence in public speaking. Within both workshop stages, students are required to share their ideas and their research with their cohort in a relaxed atmosphere, preparing them for future presentations.

4. *Enhance the ability of students to work effectively within a team and promote an appreciation of the value of diversity when tackling complex problems.*

Table A1. Activities and Resources for Parts One and Two.

Learning activity	Time	Supporting resources
Stage 1: Unlocking creativity through play		
In-class introduction to the activity	30 minutes	Shell Energy Scenarios to 2050 video (total video 8:39 minutes with example scenarios shown from 1:40 minutes into the video). Available at https://www.youtube.com/watch?v=jQ2uIPeiEYQ
Team formation	15 minutes	
Creative play	60 minutes	
Activity debrief	45 minutes	
		Academic articles on scenario planning and strategy, for example, Rickards, L., Wiseman, J., Edwards, T., & Biggs, C. (2014). The Problem of Fit: Scenario Planning and Climate Change Adaptation in the Public Sector. *Environment and Planning C: Government and Policy*, 32(4), 641-662.
		Ramírez, R., Churchhouse, S., Hoffmann, J., & Palermo, A. (2017). Using Scenario Planning to Reshape Strategy. *MIT Sloan Management Review, 58*, 30-37.
Stage 2: Harnessing creativity in scenarios		
In-class introduction to the activity	10 minutes	Reference texts for scenario development: O'Brien (2004), G. Wright et al. (2009), Miesing and Van Ness (2007), and Bradfield (2008)
Step 1: Understand the system	45 minutes	
Step 2: The impactful factors	25 minutes	Reference texts for anthropocene and planetary boundaries: Rockström et al. (2009)
Step 3: Combining factors into a scenario	25 minutes	Mega-Trend report example: https://publications.csiro.au/rpr/pub?list=SEL&pid=csiro:EP126135&sb=RECENT&expert=false&n=1&rpp=550&page=1&tr=1&q=PID%3A"csiro%3AEP126135"&dr=all
Step 4: The events	20 minutes	
Activity debrief	25 minutes	
		PESTEL analysis resource: Strategy text books include details of a PESTEL analysis as do websites such as https://pestleanalysis.com/what-is-pestle-analysis/

Note. PESTEL = political, economic, social, technological, environmental, legal.

Table A2. Learning Objectives Linked to Learning Activities.

Stages	Learning activity	1	2	3	4
Stage 1	In-class introduction to the activity	×			
	Team formation				×
	Creative play	×	×	×	×
	Activity debrief			×	×
Stage 2	In-class introduction to the activity	×			
	Step 1: Understand the system	×		×	×
	Step 2: The impactful factors	×		×	×
	Step 3: Combining factors into a scenario	×	×	×	×
	Step 4: The events	×	×	×	×
	Activity debrief	×	×	×	×

Working through the LEGO Serious Play exercise assists students to see the value of their teammates and appreciate the different approaches to the set challenges.

Scenario theme: A climate-changed future set 50 years from now at a high level of global warming.

Assessment: The scenario was incorporated into a key assessment piece completed as a team. Each team was required to submit a written industry-style report plus present their scenario and a strategic analysis and plans for building resilience for a company as either a PowerPoint presentation or a video (or a combination of both).

Case company: Activity has been conducted for a major airport and for a large university.

Situation presented to class: The scenarios constructed were incorporated into a piece of assessment; therefore, at the commencement of the activity, each team was given a brief outlining:

Congratulations! Your team has just been appointed as the climate change advisory consultants for the [company name]'s sustainability group. As part of your appointment, you are required to advise on the development of a long-term climate change and innovation strategy related to [each group is provided with a specific area of sustainability to examine].

[Company name] has recognized that climate change is a great challenge and seeks your team's advice on preparing for a climate changed future based on a future scenario. In addition to providing a future scenario your team is required to provide a strategic analysis of the potential impacts of the scenario to the
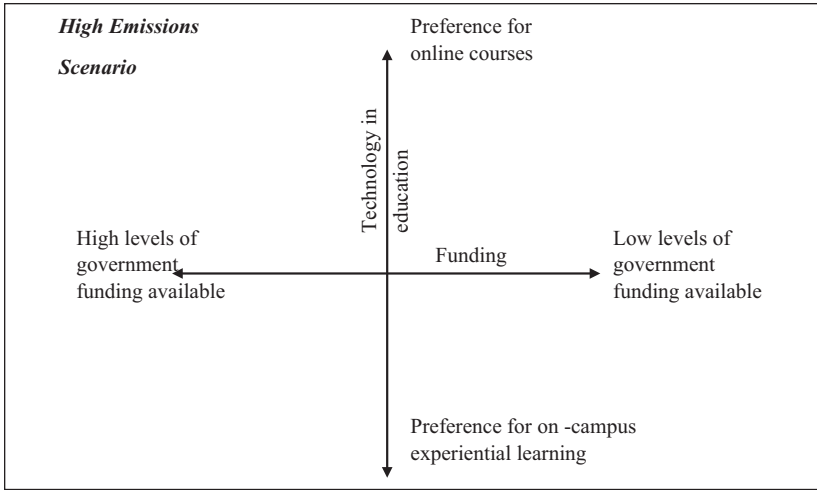
Figure A1. Representation of example of factor combination for a university.

company and a plan for resilience within a report [specific details of assessment included].

Example of scenario factor combinations: Examples of factor combination developed by student teams from both iterations of the workshop are provided below:

For the university: Factor 1 technology in education and Factor 2 access to government funding. One team scenario was positioned at the intersect of a preference for online learning with low availability of government funding for education depicted in Figure A1.

For the airport: Factor 1 social acceptance of travel and Factor 2 low-emission technology. The scenario positioned with low travel demand due to "flight shame" crossed with increasing adoption of transformative technologies depicted in Figure A2.

An example scenario story is presented for the airport exercise below.
Example scenario story:

Scenario name: Flying Blind
Scenario factors: (1) social acceptance of travel and (2) low-emission technology
Scenario story: It is the year 2070, climate change has led to a global temperature rise of 3 °C warming over preindustrial levels, and the environment is suffering. The United Nations have called for the reestablishment
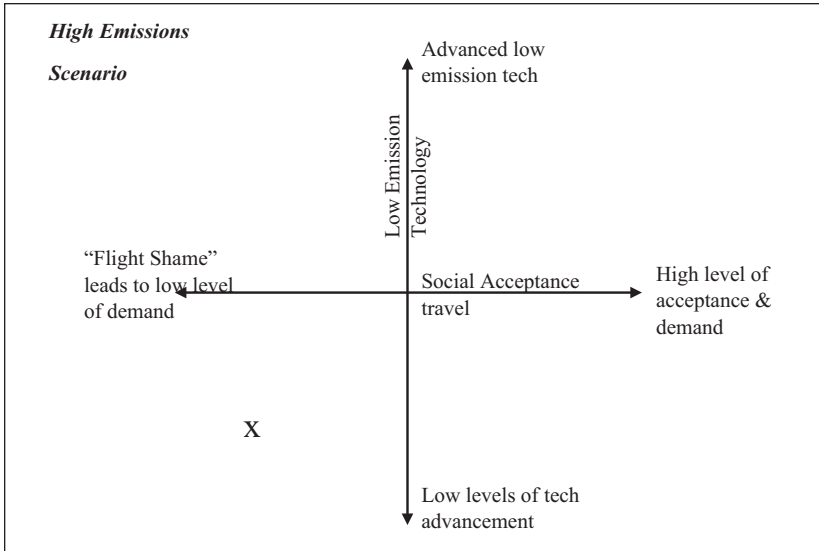
Figure A2. Representation of example of factor combination for an airport (in this case, the scenario position is included as an "X").

of the Intergovernmental Panel on Climate Change, citing its disbandment after the catastrophic failure of COP30 as the beginning of the end for action on climate change. The failure of global climate agreements led to a return to the 1980s mantra that "greed is good." In fear that environmental groups led by the adult Greta Thunberg would regain ground on environmental action, some fossil fuel companies accelerated their extraction of resources to maximize returns and minimize the potential to be left with stranded assets should global agreements on climate change be resurrected. With no global agreement on climate change action investment in low-carbon technology has stalled. Under these conditions the earth reached 2 °C warming far earlier than expected in 2060, triggering tipping points in natural systems leading to accelerated further increases in warming. The catastrophic coral bleaching that occurred in the Great Barrier Reef just prior to reaching the 2 °C rise is unfortunately just one example of damage to natural systems uniting indigenous and nonindigenous populations to demand action. Societal groups such as the Extinction Rebellion are now mainstream, and social demand for action on climate change has reached unprecedented levels as communities realize that they can no longer rely on governments to deliver action. As these social movements rapidly increase in strength, they harnessed the power of social media to

create "shaming" campaigns with the help of popular figures such as movie stars and popular singers. One of the most successful campaigns has targeted "insta" stars who flash their world trips on their accounts. Long-haul flights have become the new "smoking."

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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