Game-Based Learning for more sustainable tourism businesses

Sara Lupini[a]

[a]*School of Business and Economics, Uit – The Arctic University of Norway*

INTRODUCTION

There is an urgent need to promote a sustainable entrepreneurial mindset in Higher Education (HE) across fields and disciplines, to address the deficit of new and innovative value creation activities and bring about necessary transformations towards sustainability. This can be strategically achieved by educating new generations of entrepreneurs in tackling the sustainability challenges of our times (Lakèus, 2015; Lilischkis et al. 2021;). This asks for human capital with an appropriate set of competences and skills. Today, sustainable and entrepreneurial education must stimulate students to think, know, feel, and then act, allowing them to contextualize their knowledge and apply it (Moca, 2021). Consequently, HE Institutions (HEIs) have a crucial role to play in equipping all citizens with increased entrepreneurial competencies through education (Lakèus, 2015). To succeed, HE needs to integrate new pedagogies, adopting transformational methodologies, thus developing programs where sustainability and entrepreneurship are both positioned at the core of educational models (Zaleniene & Pereira, 2021; Rimanoczy, 2021). Education that successfully promotes a sustainable entrepreneurial mindset prepares students to fulfill the role of successful entrepreneurs who become change agents for sustainability through their work life.

In tourism, entrepreneurship plays a strong role in regional and local development, and it relies on entrepreneurs' capacity to create new value, innovate, and contribute to the sustainable management of a destination. This has long suggested a need for more sustainability-driven tourism entrepreneurs able to navigate highly competitive business landscapes in constant evolution as well as creative processes of change adaptation, crucial for innovating and dealing with the uncertainty, ambiguity, and complexity of tourism systems (Malerba, 2010; Ndou et al., 2019). Attracting qualified human capital in the tourism field demands closer collaborations between HEIs and the industry (Lee et al., 2021). It also requires HEIs to improve their educational offers, meeting the needs of the labor market and encouraging the development of

desirable entrepreneurial attitudes in the sector (Ahmad 2015; Daniel et al., 2017; Ferro et al, 2022; Ndou et al. 2019). From a pedagogical standpoint, the responsibility of HEIs is to identify the most effective way to promote such sustainable entrepreneurial mindset among students that might be willing to build a career as tourism professional and therefore contribute to their future employability needs in the tourism industry. This requires promoting creative thinking, enhancing students' personal and social skills (ElSaid & Fuentes, 2019; Al-Jubari et al., 2021), embedding real-world contexts in the learning environment, and exposing students to risks challenges and opportunities related to business creation and development (Ratten & Jones, 2021, Ferro et al., 2022). Addressing world problems and their contextual implications is in fact a way for students to train their entrepreneurial intentions and attitudes while contributing to solve societal or environmental issues (Lilischkis et al., 2021; Ratten & Jones, 2021). To this extent, traditional entrepreneurship education models are not sufficient, and it is essential to identify new ways of acquiring knowledge competencies and skills at the intersection of tourism, sustainability and entrepreneurship education.

New pedagogies are emerging, confirming a shift towards active-, experiential-, and situated-learning paradigms in both entrepreneurship and sustainability education. Such new pedagogies can go beyond the aims and methods of single disciplines, moving away from objective-based pedagogies, and developing mechanisms able to incorporate value-, knowledge-, and competency- dimensions in education (Wiek et al., 2011, Kassel et al., 2016, Tavanti, 2018; Rimanoczy, 2021). They also emphasize the importance of including ethics, systems thinking, self-awareness, and reflexivity at the core of learning processes and outcomes (Kassel et al. 2016). In such context, Game Based Learning (GBL) has the potential for a fresh contribution to tourism sustainability and entrepreneurship education. Pedagogically, GBL possesses all the right attributes, representing a type of game play focused on learning outcomes that can be fine-tuned around the demands of the tourism sector for knowledge, competences, and personal skills needed in the industry. Games are used to understand specific issues through simulations, experimentation, early failure, and problem-solving (Ferro et al. 2022). From an academic perspective, games have been approached as a research or data-gathering method, considering them an environment for observation and group interview (Mayer et al., 2014; Liburd et al., 2020). Games are also studied as interventions promoting learning, change, or supporting decision-making (Wengel et al., 2021). Using GBL in tourism entrepreneurship education also offers a chance for mainstream entrepreneurship to embrace the tourism industry as a relevant context for furthering entrepreneurship research (Solvoll et al. 2019) and ultimately test the

potential of new pedagogies in delivering what the industry asks for: qualified entrepreneurs able to lead the transformation of tourism systems towards a sustainable future.

In line with the call for new pedagogies, we discuss the development of a game aimed at promoting a sustainable mindset, entrepreneurial attitudes, and innovation. The game sets out a process, through a set of integrated activities to be conducted in the classroom, during lectures, seminars or as workshops, which aligns with the Instructional Learning Outcomes (ILOs) for HE curricula. In this chapter, GBL pedagogy is approached by focusing on methodologies, defined as sets of procedures, tools, and guidelines to underpin repeatable processes and achieve pre-determined objectives (Bertella et al 2021), and a game is presented that tackles tourism systems. The idea for the game design is based on the integration of methodological elements known in Entrepreneurship, Innovation, and Sustainability learning – like value-mapping, business model canvas, scenario building, storytelling, vignettes/personas – but seldom used together. We focused on establishing an actionable-knowledge co-creation process in a safe space, where values and worldview could be openly discussed and collectively processed. Weines (2021) points out that the basic structure of a game is a loop of challenges, responses, and feedback around a core of game design features or activities. We structured the activities around those methodological elements and tested the game 3 times between fall 2021 and fall 2022. This chapter presents the preliminary results showing the relevance of GBL for tourism sustainable entrepreneurial education and discusses the game potential as a transformational learning methodology in tourism. In addition, we hope to inspire other researchers to embrace creative methodologies approaches and apply them in their context of research to spread a mentality shift towards taking action, challenging established practices and the paradigms on which they rely.

GBL transformational and educational qualities

GBL is a learning approach that can foster the transformation of values, attitudes, and behaviors, by successfully combining educational content and game elements through participative experiences. The extent of such combination is usually specific to the theoretical framework adopted and the context in which is applied (Garris et al. 2002; Plass et al. 2015). GBL positions itself within established theories such as social constructivism, flow theory, and situated learning, providing opportunities for social interactions, increase in motivation and engagement, and the transformation of behaviors outside the classroom (Qian and Clark, 2016; Weines, 2021). This theoretical framework implies an interventionist stance according to which

people can reflect on the structures that constrain or enable them and to take action to change those structures (Horcea-Milcu et al. 2019). Furthermore, by creating shared spaces for joint deliberation and reflection, it is possible for people to transcend individual values, narratives, and attitudes, fostering new collective practices and norms (Armitage et al. 2008;). GBL describes an environment where game content and game play contribute to the co-creation of knowledge and skills acquisition, and where game activities involve problem-solving challenges that provide players/learners with a sense of achievement through participation, deliberation, and reflection (Kirriemuir & McFarlane 2004; Plass et al. 2015; Qian & Clark, 2016). Participative processes, in the form of games, can support the construction of new meaning, understanding, and sense-making fostering transformations.

The pedagogical foundations supporting GBL have long been known and applied in entrepreneurial education, under different labels, according to the introduction of constructivist and interpretivist philosophies and approaches (see Lackéus et al. 2013 for an overview). GBL, mostly in the form of simulations, can be adopted to teach how to identify problems and/or opportunities, use them to create innovative value to external stakeholders, and better manage a business (Moca et al., 2021). More recently GBL has gained recognition in transformational research for sustainability as a creative and collaborative methodology. Researchers in the field are confident that GBL might foster transformational interventions in social–ecological systems thanks to its focus on actionable knowledge co-creation or the co-design of innovative solutions through engaged participation and consensus building (Mercer et al., 2017; Horcea-Milcu et al., 2019; Koens et al., 2022). GBL includes new methods of envisioning, reflecting, and engaging with others useful to social processes of transformation and decision making (Hämäläinen, 2011). Moreover, the use of games allows the creation of immersive, spaces where to safely experiment with situations, events, and scenarios, and where immediate feedback on consequences is provided risk-free. It also disregards real-life power relations and provide equal access to the game situation to all participants (Hummel et al. 2011). In addition, the same features that make serious games transformational are known to facilitate and promote meaningful learning through processes of trust building, empathy, as well as competence and skill development through collaborative learning across disciplines (Hämäläinen, 2011; Hummel et al., 2011). This happens as players-learners engage with specific game design elements like self-expression, discovery, immersion, collaboration, competition, and low-stakes failure (Anderson & Bavelier, 2011). In other words, learning though games allow participants to engage and practice learning tasks in a safe environment built around shared

activities, which expose them to real-world issues, and challenge their worldviews and value systems while seeking for suitable entrepreneurial solutions.

Experimentation and interaction in the real world of users and customers is relevant only in combination with reflection exercises and debriefing. Games allow experiential learning to be practiced, yet transformation only comes with reflection. Debriefing allows experience and reflection to be integrated in the learning process (Crookall, 2010; Van der Hoogen et al., 2016). Debriefing can be defined as: "the process in which people who have had an experience are led through a purposive discussion of that experience" (Lederman, 1992: 146). Debriefing is thus a central concept in GBL since it relates to the systematic integration of "shared reflections" after a game or activity and it has been used to legitimize the instructional component of GBL processes, as learning comes from debriefing itself (Crookall, 2010). Research stresses the crucial importance of debriefing in realizing the overall value of serious games, also suggesting frameworks to best structure debriefing (Lederman, 1992; Van der Hoogen at al., 2016). Although our study does not rely on a specific model, it acknowledges that the debriefing should provide a system perspective on the complex features both the game and the context of research present. Nicholson (2012) points out three features of debriefing design that should receive attention in any GBL process: what was done in the activity, how well it worked for the learner, and how the learning can find tangible application. In this way, debriefing gains a collective meta-perspective on the game experience, helping everyone involved to make sense of what happened, how that connects to reality and what can be learned from it. Our game, by integrating the three aspects of learning, transforming, and reflecting, emerges as a significant methodology for the advancement of tourism sustainable entrepreneurship education.

GBL and Tourism sustainable entrepreneurship education

Promoting a sustainability mindset is instrumental for sustainable value-creation in tourism (Gretzel et al., 2014). However, there is a limited understanding of how to successfully implement the transformations of values, attitudes, and behaviors towards sustainability in tourism business practices (Fennel 2020). Entrepreneurship education can be the key, as the approach of teaching "through" entrepreneurship can tie value-laden content to a practical sphere and be relevant to all learners across all levels of education (Handscombe et al., 2008 Lackéus, 2015; Solvoll et al, 2015). The core concept is to embrace a "Learning-by-creating-value" approach, grounded in tourism entrepreneurship and sustainability, wherein

pedagogies that initiate students to the participation to sustainable value-creation processes are chosen over traditional ones (Moberg et al., 2012; Lackéus et al. 2013, Almeida, 2017). From an entrepreneurial perspective, the main goal of tourism HE is to establish new successful businesses and promote a sustainable use of resources to create value for a destination and its visitors (Olsen & Mykletun, 2012; Ahmed et al., 2018). HEIs must therefore promote entrepreneurial attitudes, intentions, and behaviors necessary to meet the needs of the tourism labor market to ultimately enhance "competitiveness and sustainability of tourism destinations" (UNTWO). This requires closer collaborations between institutions and the industry, personal and social skills development among learners, and creative thinking (Ferro et al., 2022). Sigala (2021) advocates that to remain relevant tourism education must reinvent itself and adopt new approaches that embrace values built on strong ethical foundations, and this concretizes personalized, open, and flexible education models. However, for the sake of tourism sustainability, HEIs' promotion of entrepreneurial attitudes and sustainable mindset in future leaders depends on today learners' understanding of tourism systems and the deeper relations between community, culture, and environment (Hales & Jennings, 2017). To this extent games have been popularized to educate the public on sustainability-related issues and have the potential to become an asset for tourism education interested in enabling the sustainable creation of value through tourism enterprises.

Tourism entrepreneurship education is often fostered through experiential learning as both tourism and entrepreneurship studies presents a scattered theoretical landscape and are known to expand interdisciplinary in, HE (Ndou et al 2019). Experiential learning approaches, traditionally based on industry-case studies, internships, and company presentations in class, promote the importance of testing innovations and change processes in real-world settings. GBL goes one step further by providing experiences that influence the way participants think of themselves and of the world around them. This is possible only by focusing on the transformation of values, attitudes, and behaviors from the classroom (Phi & Clausen, 2021). The transformational nature of GBL can be the key to unlocking entrepreneurial and sustainable attitudes in class at once, and co-create knowledge essential to the creation of sustainable value in tourism (Almeida, 2017; Liburd et al., 2020; Phi & Clausen, 2021). Tourism scholars started to embrace transformational research models where knowledge creation is based on empirical contextual evidence and collaborative approaches, fostering the creative capacity to innovate by experimenting and co-creating (Jernsand, 2019; Liburd et al., 2020; Duxbury et al., 2021). This matched a rise in new pedagogies acknowledging the centrality of system thinking

(Moscardo, 2021), creative problem solving (Clausen & Anderson, 2019), and value-driven learning (Phi & Clausen, 2021). Jamal, Taillon, and Dredge have been long recommending sustainable tourism pedagogies to include "a critical, collaborative and praxis-oriented relationship with people, places, spaces and time" (2011:137). They also confirm that the reflective aspect of the game-based learning exercise is essential to measure outcomes in transformative, experiential, and collaborative learning (ibidem). GBL approaches seem bound to become a significant part of tourism education, encouraging entrepreneurship and innovation attitudes and empowering learners to develop their own moral and ethical standpoints with reference to sustainability and the future of tourism.

METHODOLOGY

A prototype of the board game was developed as a kit containing the material needed for the activities, an instruction manual, and a short questionnaire for debriefing. The game is designed as an iterative exercise of progressive problem solving on an experimental, practice-informed basis of modular activities and tasks to be completed in a sequence and concluded with the debriefing of all participants. According to Action Research (AR) principles, the game sessions represent cycles where researchers keep revising the participants' actions, studying the outcomes, and sharing the results trying to get a better handle on how change happens in the setting they are working within (Kemmis, McTaggart, & Nixon, 2013, Jääskä et al., 2021). This matches the GBL model developed by Garris et al. (2002) which instead focuses on how learning happens (see figure 1). The action phase of AR cycles is represented by participants playing a game, eliciting desirable behavioral responses based on emotional or cognitive reactions, which result from interaction with, and feedback from, game play. The planning phase covers the input, which provides the learning framework for game design and its delivery, followed by the observation of the process. Finally, the reflection phase, or debriefing, which is placed between the game cycle and the achievement of the learning outcomes, connecting game experience, and learning for real—world application.
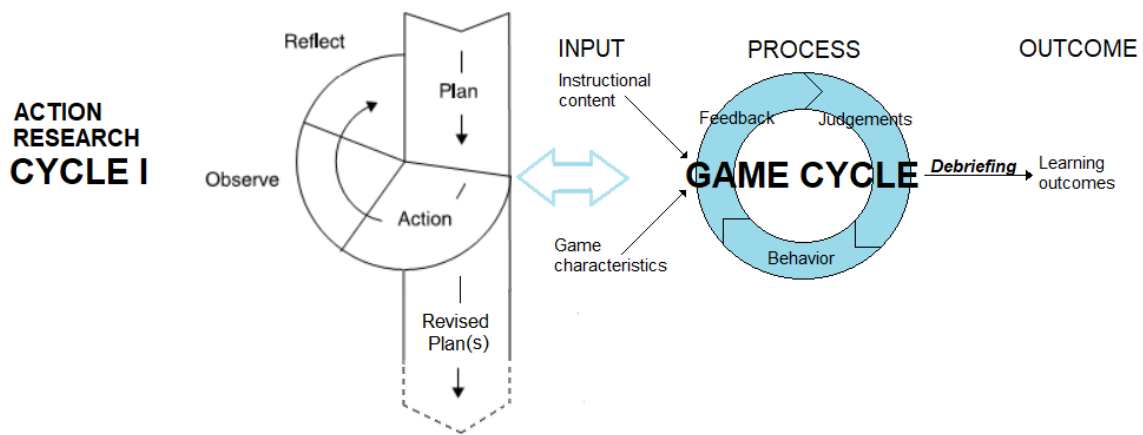
Figure 1 Kemmis-and-McTaggarts-action-research-spiral, indicating the cycles in relation to the test sessions performed and adapted to show that each cycle includes the GBL model according to Garris et al. 2002

Data were collected throughout each stage of AR cycles. Following Kindon, Pain, and Kesby (2007), they were gathered from planning minutes and notes, direct observation of the game process, reflections emerging from the questionnaires and the open discussions after the game, and also from the written artifacts (e.g., maps, stories, persona cards) produced by the participants. A team of two researchers co-developed the initial game design and shared the responsibility of planning the game sessions, while the author alone supervised the observation and data gathering during the game facilitation. To allow for a more neutral assessment of the process a "critical friend", an external observer who did not take part in game design and development, was involved to witness the test sessions (McNiff, 2002). Game facilitation is aimed at assisting students in navigating the conceptual, methodological, and emotional dimensions as they immerse themselves in the learning experience. The facilitator must provide clear activity instructions, examples, and guidance on how to complete the tasks and progress in the game, while keeping track of time and scores. Auto-ethnographic reflections on the role of facilitator were also considered a source of data.

The context and background of the study

The game here presented appeared in the formative plan of two courses hosted by the University of Tromsø – School of Business and Economics (HHT), as part of the bachelor's program in Leadership, Innovation and Marketing. It was delivered in the form of three open seminars conducted in the 2021/2022 and 2022/2023 academic years (See Table 1). The first two seminars were arranged as optional curricular activities for the courses BED -1009 Innovation and BED-2062 Sustainable Business. The course descriptions go into details about creative

methods and processes for developing, selecting, and implementing innovations and managing the establishment, upscaling and restructuring of sustainable businesses. The theory is seen in the context of how such processes take place in practice, therefore novel experiential- learning approaches are often adopted in class. The GBL seminars perfectly fit the design of the courses and the intended learning outcomes (Course Descriptions). The third seminar was run as a workshop for students and staff and open to the industry and the local community, including tourism and hospitality professionals in the experience as participants.

The choice of addressing tourism business creation and destinations' management challenges hinge on the relevance of the tourism industry to the local economy and the future sustainable development of the region (NHO Reiseliv, Tromsø Municipality, 2019; Jakobsen et al., 2018). From the educator perspective, to help business students familiarize with the complex dynamics of the tourism sector supports the mission of preparing them for their future careers and contribute to the needs of the sector. Researcher have been recognizing in the Nordic countries a re-ignited interest in the employment dimension of sustainability competences and skills for the tourism sector (Walmsley et al., 2020). In Tromsø, local tourism companies used the Covid-19 crisis to align themselves better with the national agenda "Restart Reiseliv 2021-2024" (VisitNorway Business). According to this, sustainable entrepreneurship and innovation are the guiding principle for ensuring a desirable future for the industry, which is already on the way of reaching the pre-covid arrival numbers (VisitNorway Insights). Such trend offers ample possibilities to a business school interested in tailoring it offer to the provision of relevant skills and competences to future graduates.

During the seminar, participants form teams of players who embark in a simulated process of transformation of a tourism small enterprise towards sustainability. This aims for the creation of sustainable value through the identification of new entrepreneurial opportunities in the sector. Based on open-ended problem-solving and collaborative mechanics, the game aims to set a precedent for the future development of curricular activities, encouraging a transformative approach to tourism entrepreneurship education. The game is born from the lessons learned during a multistakeholder project conducted in Tromsø, in 2020, where tourism sustainability and entrepreneurship experts from the business school were asked to facilitate, in a creative and critical way, a series of workshops aimed at identifying a shared vision for the future of Tromsø as a tourism destination (see Bertella et al, 2021). The game aims at providing a transformational learning experience where all participants, including researchers, co-create

actionable knowledge to better deal with sustainability issues related to contextualized tourism entrepreneurship initiatives of local relevance.

The game and debriefing

The progress in the game is organized as a learning path (Figure 2). The session opens with an optional ice-breaking activity (Team Building) or with the presentation of a fictitious company associated with the tourism industry in Tromsø, which serves as a case study (Contextualization). A complete business model canvas of the company is provided. Participants are asked to map out values and disvalues brought by the company and its current business operations to identify the criticalities for the sustainability of the destination and all its stakeholders (Problem Statement). The game continues adding design-thinking core elements to stimulate creativity and empathy. A core mechanic of the game is the switch of perspectives from the business/company to those of other destination's stakeholders, aimed at identifying a broader spectrum of values, attitudes, and practices connected to sustainability. The use of future scenarios in the form of storytelling, and vignettes in the form of persona cards, is aimed at fostering the creativity of the participants and moving from problems to solutions (Creative Ideation).

Starting from a state of creative flow, participants carry creative thinking to the next phase where solutions are being anchored to the case study, business context, and business operations. Entrepreneurship, Innovation, and sustainability dimensions are then connected to each other. At the end of the game, the teams present an innovative and sustainable version of a business model that integrates the solutions identified and acknowledges the eco-social- benefits and costs (Formulation of Solutions). After the scores are calculated, the participants are presented with the results and the winning team is announced. The session ends with a reflection on the game experience (Debriefing). Debriefing allows researchers to enter a common space of reflection with the participants, where data are gathered to assess the effectiveness of learning, its relevance, and to identify margins for improvement that could be addressed in the next AR cycle. To ensure enough time is dedicated to both individual and group reflection, debriefing has been divided into 3 phases. After the game session, all participants answer a short anonymous questionnaire, a group conversation follows allowing for an informal tone and free

flow of thoughts. Finally, a round of follow up interviews is scheduled to evaluate the experience more in depth.

Methods & Tools

Value-based team building
Photo Elicitation

Scenario-building
Case study
Market Analysis

BMC
Visualization
Mapping
Design-Thinking

Scenario-building
Vignettes/Persona Cards
Storytelling
Design-Thinking

SBMC
Visualization
Mapping
Storytelling

Questionnaire
Focus Groups
Semi-structured
Interviews

Team Building | Contextualization | Problem Statement | Creative Ideation | Formulation of Solutions | Debriefing

Game Activities

Ice-breaking

Case Presentation & Challenge Launch

Business Model Canvas (BMC)
Values Disvalues & Criticalities

Creative Boost
Future Possibilities

Sustainable Business Model Canvas (SBMC)
Pitch

Score tab & Prize
Self-Assessment
Reflection time

INPUTS & FEEDBACKS

Intended Learning Outcomes (ILOs)

- Creative thinking
- System thinking
- Critical problem assessment
- Critical problem assessment
- Communication skills
- Collaboration skills
- Negotiation skills
- Reflexivity
- Self-awareness
- E&I competences
- Sustainability competences
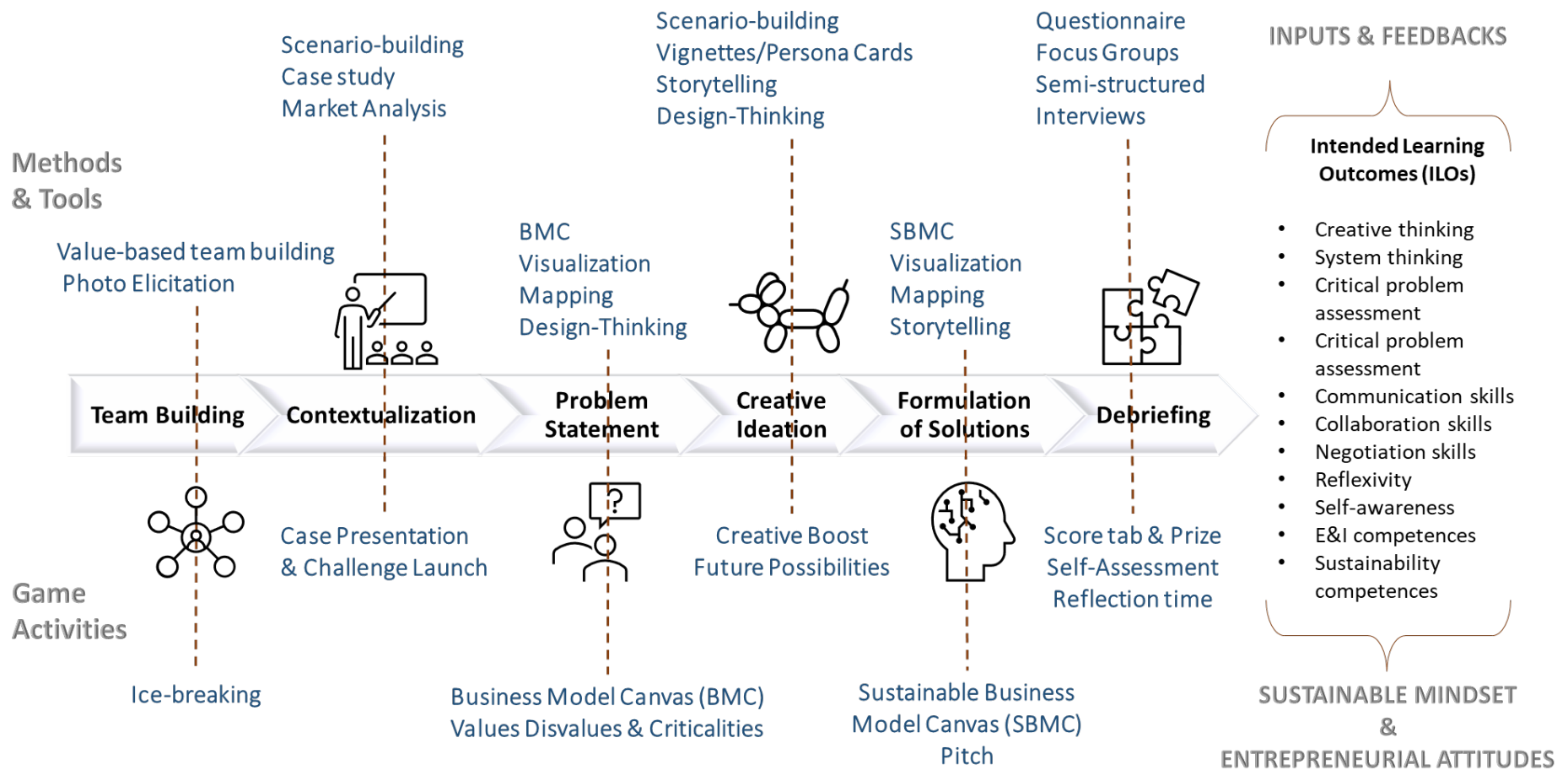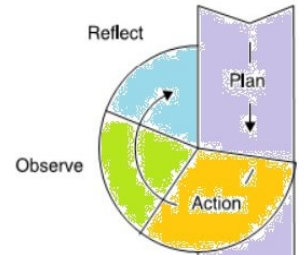
SUSTAINABLE MINDSET & ENTREPRENEURIAL ATTITUDES

Figure 2 Game learning path towards the Intended Learning Outcomes (ILOs), showing methods & tool integrated in the game activities proposed

The test sessions and data analysis

Each test session presented differences in the delivery of the game experience and engagement of participants. A summary of the test details presented below (Tab 2) shows how each test provided feedbacks and elements of consideration to integrate in a revised plan for the next AR cycle, suggesting small changes to the structure and form of the next game session. To investigate the effectiveness of our GBL methodology in promoting a sustainable mindset and entrepreneurial attitudes among learners, the data emerging from each of the 3 tests were triangulated and analyzed in relation to each other. The considerations represented here emerge from approaching the data of the 3 tests as a whole set. Using content analysis on research notes, the questionnaires and the transcription of the group reflections and interviews, researchers can identify and analyze the presence, meanings, and relationships among themes or constructs. A thematic analysis was then conducted on the artifacts collected during the game sessions. We highlighted patterns and identified critical elements able to provide insights on the game's educational potential in terms of how to work in a creative and critical way on sustainability challenges. We also questioned the relevance of the game in connection to the learning outcomes and how its social aspect contributes to build a positive learning environment. In conclusion we assessed the feasibility, in terms of real-world experimentation, of the sustainable business solutions identified.

Table 1 Summary description of the test sessions (T1, T2, T3) conducted through the Action Research cycles

CYCLE I	**Game session - TEST I (T1)** **BED-1009 Innovation** **Fall 2021**	The game and debriefing were carried out in a single session. 8 students chose to participate in the game, two teams of 4 were created. The game session started with the *problem statement* activities as participants were already familiar with the case and challenge. The session lasted 3.5hrs from beginning to end and raised concerns on time management. *Debriefing* was performed immediately after the game; it lacked depth of reflection. The points that needed revision were identified and discussed in a separate meeting among researchers. As a result, an instruction manual containing examples and definitions was drafted.
CYCLE II	**Game session - TEST II (T2)** **BED-2062 Sustainable Business** **Spring 2022**	The game covered 3 seminars + 1 seminars dedicated to reflection. 20 students participated in the seminars, four teams of 5 were created. The first game session focused on *team building* and *contextualization*. The second was dedicated to the *problem statement*. The third was dedicated to *creative ideation* and the *formulation of solutions*. The *debriefing* seminar was used to reflect about the game and the GBL experience. Points of revision were discussed with the participants. As a result, the instruction manual was completed and the questionnaire was expanded, an interview guide was also drafted for a reflection follow-up.
CYCLE III	**Game session - TEST III (T3)** **GAMES4SUS Workshop** **Fall 2022**	The game was played in 1 session, the debriefing was divided between a feedback and reflection session? following the game and separate follow-up interviews within a week. 10 mixed participants, including business students, three teams of 3(4) were created. The game was played in its entirety, from the *contextualization* to the *formulation of solutions*. The game session lasted 5 hours. The *debriefing* was conducted in depth. Points of revision were discussed with the participants. Additional follow-up interviews were scheduled. As a result, there has been no change in the game mechanics, but the reflection pointed out conceptual and methodological elements that need further assessment and testing

Findings

Both during the interviews and in the questionnaires, participants stated the game allowed them to understand the relation between entrepreneurship, innovation, and sustainability in the local tourism context. Tools like visual mapping, BMC and storytelling help to facilitate the practical application of theoretical concepts that would otherwise remain "fuzzy". The allowed them to anchor their understanding to a concrete dimension made of business operations and decisions, gaining insights they could transfer to other courses or external activities. Working hands-on with tourism business models creates the conditions for participants to explore real-world cases, assessing real problems and providing tangible solutions that could be adopted by local companies to improve their sustainability profiles. This concretizes in the participants gaining the capacity to develop recommendations on how to improve a tour company's commitment to sustainability and create shared value for its stakeholders. The feedback from T1, T2 and T3 participants stresses the acquisition of confidence in articulating problems and formulating relevant sustainable business solutions. Participants admit trusting the game process to provide them with an understanding of how to identify and critically address sustainability considerations, although feelings of confusion, frustration and disorientation were at times present due to the openness of the co-creation process and the lack of pre-defined objectives. Those challenges were overcome by a better communication and stronger collaboration within the teams, who found ways to filter information and negotiate consensus. The game space was graded as positive and correctly balancing incentives to collaboration with a competitive edge. Most of the participants felt a stronger connection between the game outcomes and the acquisition of entrepreneurial skills and competences compared to the ones related to sustainability. Nonetheless, artefacts collected show evidence of an internalization of sustainability thinking throughout the final stage of ideation and prototyping of solutions. The sustainable business models produced by all the teams show attainable ideas built upon sustainable premises.

The debriefing offered a safe space for reflection: all participants agreed on its usefulness as they managed to retrace their steps and connect the activities with the ILOs. Team members in T2, were more vocal and outspoken in the final group discussions, showing the socializing potential of a prolonged team's interaction via the game. From the questionnaires a general preference emerges for creative exercises, defined as fun, engaging, and stimulating, compared to other activities, described as demanding, technical, and sometimes stressful. The sentiment

emerging from the interviews confirms a shift in attitude towards the GBL experience starting with the creative activities. The debriefing also reveals a lack of self-awareness around the degree to which sustainability skills and competences are mastered through the game. All the activities related to the sustainability dimension show a satisfactory understanding of sustainability and its relationship with tourism and E&I. Yet the sustainability construct adopted is seldom very strong. Most solutions identified represent some "low hanging fruits" attainable with weak interventions on the company's business model. Only few implied a more radical approach to sustainability, like setting up remote-visiting channels using virtual reality, creating a regional digital currency to exchange sustainable actions for tokens to be spent on eco-tours, and creating a collective green tourism fund to finance medium-/large-scale sustainable initiatives. All the others, ranging from environmental stewardship to new greener products and services and the promotion of better work conditions, show a strengthened entrepreneurial attitude and an overriding priority given to economic and social needs rather than ecological and environmental ones.

A meta perspective on the data sourced also shows that the critical areas for sustainability identified, and the wishes, needs and hopes expressed by the stakeholders' "voices" are generally linked to the sustainable business solutions promoted in the final pitches. When critical areas have been co-determined, there is a focus shift towards identifying sustainable solutions, using creative and critical thinking. Those critical areas provide an overview of the sustainability "wicked issues" affecting Tromsø as a destination (figure 3).

Travel in by plane, increase of air pollution?	Additional pressure on (waste management, transport, health, etc.) infrastructure?	Mass tourism = ready for an even bigger impact?	Limited connection with the local culture?	Uncontrolled growth of the town?
Too many souvenir shops in the city centre?	Limited availability of apartments for long time rent?	Animal welfare challenges for some forms of tourism	Alternative value disappears= what else is there beside s tourism?	Loss of nuances, omologation of the offer?
Protection of socio-cultural norms (allemannsrettigheter, janteloven, etc)?	AirBnb disrupts local community business and sense of belonging?	SMEs get acquired or pushed out of marked by big companies? Monopolies?	Indigenous values&tradition commercialization. Is it patronizing? Cultural appropriation?	Stereotyping paradoxes?
Place branding become tied to tourism ?	Loss of authentiCity?	Death of old for the celebration of new?	Urban architecture catering visitors taste and needs instead of locals?	Social and cultural tensions can escalate?

Figure 3 Examples of "Areas of Criticality" gathered from T1 – T2 – T3

16

Once identified they become part of the know-how teams have co-created and share, they can therefore be considered as a shared reference framework to navigate the following steps. Data show that the themes identified re-emerge either as elements to incorporate in the storytelling and to give voice to the persona cards, representing destination's stakeholders, or as background information to formulate sustainable solutions for local businesses. Many of the "voices" collected confirm this by showing recurring themes as the promotion of local culture, the respect of the natural heritage, greener alternatives to transport, infrastructure, and lifestyle choices (fig. 4-5).

Figure 4 Several examples of "persona cards" gathered from T1 - T2 -T3

In some cases, teams even drafted and added practical suggestions on the topics tourism businesses could incorporate, or visitors could be made better aware of, stressing the relevance in targeting some of the criticalities previously highlighted (fig.5). This brings evidence of a connection, between the *problem statement* and the *formulation of solutions* phases, being obtained through the GBL journey.
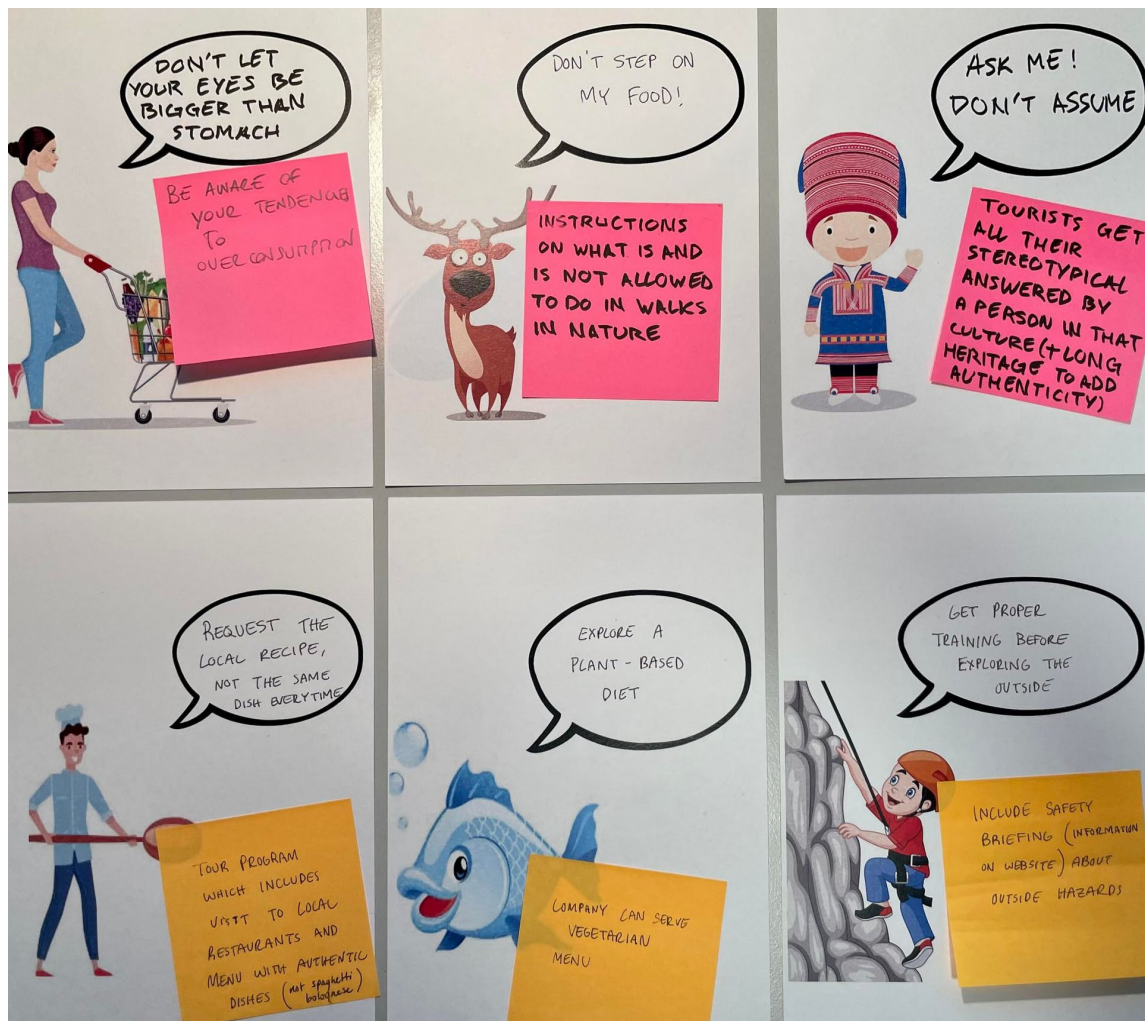
Figure 5 "Persona cards" expressing their voices (in the bubbles) and related solutions/suggestions (as post-it) added by the participants as an example of critical and creative thinking applied throughout the game.

Discussion

Games offer a constructionist approach to learning that can be considered transformational and, when designed for this purpose, can promote a sustainable mindset and entrepreneurial attitudes among participants. Transformation occurs through social interaction in a safe space where power relations are equalized, knowledge can be co-created and critical reflexivity is applied throughout the whole learning process (Wiek et al., 2011; Wiek & Lang, 2016). Actionable knowledge is a type of knowledge that can be acted upon, supporting and informing solutions to complex sustainability issues, while producing evidence about their effectiveness (Feola, 2015, Wiek et al., 2011, Wiek & Lang 2016). The findings confirm that the knowledge co-created during the game sessions can be both seen as a medium to help participants to better navigate the learning process, and as an outcome, providing new insights, new understanding and potentially unlocking new attitudes, values and behaviors that last well beyond the game

experience. This exposes the nature of games as both a source of learning and a tool allowing learners to co-create knowledge during the activities, to become self-aware of the co-creation processes during the debriefing, and ultimately to gain ownership of the learning process. In terms of contribution to tourism entrepreneurship, the game achieved the promotion of entrepreneurial attitudes and the adoption of a systemic thinking interpretive lens. Within a session of game play and debrief, all teams presented sustainable entrepreneurial ideas identifying opportunities with a direct application in the local tourism business, in the form of novel sustainable services and products, showing a propensity for digital solutions that could be brought to market as advocated by research on the topic (Sigala 2021). Furthermore, the participants, most of whom had no previous knowledge of tourism, immersed themselves in the reality of the local tourism environment, navigating the complexity of all the operations a tourism entrepreneur must manage to run a successful business. In line with the most recent research on the topic, GBL delivers by providing a more reliable and all-encompassing perception of tourism business reality (Ferro et al, 2022). It also accounts for an inclusive range of tourism stakeholders' voices as managerial decision were taken and plans were made (Mercer et al., 2017; Koens et al., 2022). There is a need in tourism for methodologies allowing full scale immersion in the practice domain of entrepreneurship, innovation and sustainability, and the game keeps this in focus through each step, adding a dimension of "feasibility" otherwise impossible to achieve.

Although skills and competences become manifest only in time and sustainable entrepreneurial intentions might not always blossom in a full-fledged career, each AR cycle offered plenty of data suggesting GBL as a solid alternative to traditional pedagogic approaches. Mostly in fluid curricula as tourism, business, and sustainability education, whose dynamic nature requires a learning based on an open exchange between action and reflection (Dredge et al 2012; Farsari, 2022, Ferro et al. 2022). To promote sustainable mindsets and entrepreneurial attitudes among learners, HEIs should establish creative learning environments and embrace new pedagogies whereas knowledge is co-created in dialogue with values (Wang et al., 2021; Zaleniene & Pereira, 2021). GBL simply offers such an opportunity by capturing the complexity of the world and its wicked issues in a safe space of play and reflection. The constructivist approach also stresses the importance of embedding learning in realistic and relevant contexts, encouraging the appreciation of multiple perspectives, the use of multiple modes of representation, while providing social experiences in positive learning environments (Plass et al. 2015, Qian & Clark, 2016). To this extent, GBL is known to provide learners with a risk-free environment by

remodeling certain aspects of reality and help them to develop critical abilities and practice important entrepreneurial behaviors like collaborative decision making (Ahmad et al., 2018). The methodology presented here commits to realism by building on data gathered from real companies in Tromsø's tourism industry, and fully anonymized. The choice of using a Tromsø-based scenario and case produces a highly contextualized learning environment, which allows participants to experience the entrepreneurial and sustainable challenges of the local tourism reality. Furthermore, this methodology offers a space for engagement and reflection that not only represents a positive learning environment but also allows for the transformation of values, attitudes, and behaviors (Wengel et al. 2021, Liburd et al.2020). The game here presented is but one tangible approach, a small procedural and practical contribution, to build the capacity of tourism education and research to meet future needs (Liburd et al. 2020; Phi & Clausen,2021; Dredge et al., 2012; Sigala, 2021; Farsari, 2022). To embed whole-system perspectives in tourism education – integrating multiple voices, challenging hegemonies, and power structures, questioning dominant discourses, promoting creative thinking, self-awareness and reflexivity – and setting the bar even higher calls for true transformational approaches.

The question that lingers is to what extent GBL methodologies and approaches can foster the acquisition of skills and competences conducive to an entrepreneurial and sustainable mindset. To measure, assess and evaluate sustainability competences is extremely difficult (Tavanti; 2018). Rimanoczy (2021) explains that to achieve a mindset shift towards sustainability an intellectual knowledge of data is only part of the recipe. Future leaders need to gain a system perspective and train their emotional intelligence, through activities aimed at expanding their self-awareness, developing reflective practices, and enable creative innovation. The key is engaging feelings and emotions that she describes as "fuel for our actions". Furthermore, the game is designed to challenge, from the beginning, the reliance of traditional learning on the assumptions of linearity and rationality and on resolution coming from the identification of a "correct answer". As game activities are introduced, participants realize that traditional strategies based on the dichotomy right/wrong do not apply, as the reward system is built to incentivize system thinking, collaboration and creativity. The teams face the challenge of making a tourism business more sustainable directly tackling the complexity of the tourism dimension and the interconnected dynamics affecting businesses, environment, and communities alike. Emotions flow freely to inspire discussions around values, attitudes, and practices, allowing participants to experience a transformed version of themselves that might

relate differently with elements of the tourism destination. The facilitator needs to deal with instances of confusion, frustration, disorientation as well as excitement, guiding participants towards a self-awareness of the transformative learning process. The acquisition of skills and competences – the promotion of entrepreneurial attitudes and sustainable mindset – will finally emerge as from reflecting together on the co-created knowledge and the emotional dimension explored during the debriefing session.

CONCLUSION

It is imperative, for the future of tourism that sustainability and entrepreneurship are no longer approached as distinct features of tourism development. They are codependent dimensions, needing each other and building onto each other to drive the industry forward. Tourism entrepreneurship and sustainability education must reflect such paradigm, new pedagogies able to merge the two dimensions are therefore essential. The adoption of GBL positively affects the achievement of ILOs set for a specific course or class, with the benefit for participants to have the opportunity to bring theory into simulated real-life situations through a game. Games helps participants to learn how to manage connections between people and activities, integration, and uncertainty (Jamal et al., 2011; Jääskä et al., 2021). In addition to discipline-based skills, GBL can improve general skills such as decision making, problem-solving, communication and collaboration, which future leaders need to practice and master (Ahmed et al., 2018). Specifically, this GBL methodology offers a chance to develop and implement ideas and explore creativity processes based on the challenges tourism industry is facing.

The methodology integrates ideas and tools from various practice-based approaches and literature streams, such as value-based learning, living-labs, design thinking, business models- and value-mapping (Bertella et al. 2021). Thanks to integrative design, game can support learning that promotes a sustainable mindset among students in generic E&I study programs as well as Tourism-specific curricula. Furthermore, participants experience the complexity and interdependencies of tourism destinations, where companies represent just a component of an interconnected system, whose stakeholders' voices can be used as drivers for innovation. This methodology helps to acknowledge the importance of tour companies engaging with other stakeholders within the destination with regards to the development and implementation of sustainable strategies. This study demonstrates that practical activities in gamified situations and educational games help participants to understand and critically apply what was taught as

a theory. It serves the educational purpose of preparing critically reflexive tourism practitioners to enter the job market (Hales & Jenning 2017). The application of GBL to business education empowers students to make critical reflections on the importance of innovation and creativity in organizations both for the company and society at large. It also suggests that the conceptualization of sustainability in entrepreneurship is still a work in progress.

There is a strong belief that entrepreneurs can be made by educating learners into acknowledging their entrepreneurial attitudes, coupling them with intentions and waiting for resulting entrepreneurial behavior (Lackéus, 2015, Ndou et al. 2019). However, the psychological theory of planned behavior can only do so much as to explain how this potentially comes to be. Promoting an entrepreneurial mindset in current and future generations requires transformational approaches. Educational models need thus to implement a series of steps that entail embracing new pedagogies and methodologies. Likewise, sustainability competences and skills are difficult to measure and the definition of "sustainable mindset" remains open to interpretation also because sustainability remains a very confused construct for most (Tavanti, 2018; Rimanoczy 2021). In tourism entrepreneurial education there is a need for strong ontologies, able to merge the passivity of scientific theory and technical knowledge acquisition with practical entrepreneurial methods, value creation, and action, which is difficult to measure and is hard to deliver and require a shift of emphasis from educating "about" to educating "for" or "through" tourism entrepreneurship (Olsen & Mykletun, 2012; Ahmed et al., 2018, Ndou et al. 2019). The same considerations apply to the sustainability pedagogical dimension and that is why methodologies able to integrate learning, with co-creation of knowledge in a safe space are to be brought at the center of inquiry in tourism studies.

Actionable knowledge co-creation is, by nature, an open-ended process that provides no certainty of outcomes and presents challenges for both game designers and participants in balancing game mechanics and expectations: it is therefore important to openly address the frustration that might arise to avoid alienating some participants and to establish a sense of community and trust in the process. Therefore, time and resources dedicated to the design, development and delivery of the game constitute a serious limitation. In the case of custom games, designed in-house for specific learning objectives, the main concerns address how complex, costly and time consuming the process can be, and how to establish proper links to what students are supposed to learn, how they learn it, and how the learning is assessed to clarify how the GBL experience is connected to the subject matter taught in class. Using GBL

in research requires researchers to take on new roles and responsibilities as designers, developers, and facilitators, and develop the skillset needed to manage the diverse preferences, proclivities, and proficiencies of participants to ensure their interest in and motivation for learning throughout the sessions.

To provide future tourism entrepreneurs with the necessary capacities, innovative practices are emerging in HEIs research and education portfolios. Thus, to consistently align tourism entrepreneurial pedagogies with sustainability criteria, the future of research on the topic should involve the integration between theory and practice, ethical discussions, and safe spaces for action and reflection. The game here presented effectively integrates different components regarded as essential, by a vibrant community of scholars, to deliver new pedagogies able to promote a sustainable mindset and entrepreneurial attitudes in the leaders of tomorrow (Hales &Jennings, 2017; Jernsand, 2019, Duxbury et al. 2021, Moscardo, 2021; Rimanoczy, 2021; Farsari, 2022). System thinking, creativity, and empathy are key competences and skills to critically navigate connections between sustainability issues, stakeholders' perspectives, and business agendas for the sustainable future of tourism destinations. More *empiria* is needed in this field of research, mostly aimed at revealing the link between the use of new pedagogies based on transformational methodologies and the implementation of new sustainable entrepreneurial practices in the industry. Farsari concludes her article (2022) pointing out how transformative learning should empower collective understanding and action instead of focusing on promotion of individual skills. The aim of a pedagogy for entrepreneurship, innovation, and sustainability in tourism, now, should be to empower learners in becoming capable, caring, and actively engaged professionals and citizens, ready to transform the world for a sustainable future.

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