The Long Game to mitigate earth system tipping points

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Abstract

The devastating impacts of triggering earth system tipping points are unfolding, not only in physical and infrastructural losses and damages, but also in increasing eco-anxiety and trauma. Here we present and discuss “The Long Game”, i.e. a concept of gamifying education for triggering action at scale and self-efficacy as well as facilitating active engagements in real-world socio-ecological projects through collaborations with transformation actors. The Long Game can serve as a pedagogical entry point for hosting and fostering unlearning and double loop learning processes in the education system. This in turn can trigger self-reinforcing positive social tipping across wider socio-behavioral, economic, technological and political domains for rapid mitigation of earth system tipping points as well as for healing eco-anxiety and trauma.

1. Introduction

The risk of triggering abrupt and irreversible changes in the earth system, i.e. negative tipping points, is increasing (Lenton et al., 2019). Four out of 16 identified tipping elements are already showing signs of instability (Armstrong McKay et al., 2022). Several major extreme events, e.g. catastrophic flood in Western Europe in 2021 that caused fatalities and widespread damages, have been attributed to the instability in these sensitive tipping elements such as lock-ins in the Jet Stream (Trawdowsky et al., 2023). Moreover, evidence suggests that six out of nine planetary boundaries have already been exceeded, and consequently the humanity is operating in a risk zone that may eventually face collapse (Richardson, 2023).

The devastating impacts of already triggered earth system tipping points are generating a new discourse of fear (Saab, 2023). A characterizing feature of this fear is the insecurity about the future and a growing tendency to develop forms of anxiety and distress, i.e. “eco-anxiety”
(Pihkala, 2020). The ever-growing threats to the stable biosphere and climate are further turning eco-anxiety into paralyzing trauma, existentially questioning humanity’s shared identity, and continually triggering past personal, cultural, and intergenerational traumas (Woodbury, 1999). Both eco-anxiety and trauma are expected to have long-term consequences for physical and mental health, particularly across the young generation (Hickman et al., 2021).

This coupled physical-psychological crisis we are in demands also coupled two-fold action: (i) abrupt, deliberate and self-reinforcing positive change in the society, i.e. positive social tipping points, to rapidly mitigate negative earth system tipping points, and (ii) urgent support to deal with eco-anxiety and heal trauma in young generation. However, over the past three decades, international and national efforts led by United Nations initiatives (such as the Framework Convention on Climate Change (UNFCCC)) have proven ineffective for meaningful climate action and education (Stoddard et al., 2021). Moreover, individuals, particularly young generations, understandably feel overwhelmed and helpless to take meaningful action even when they are well-informed about the causes and effects of these global changes (Hickman et al., 2021).

Here we present and discuss a concept of “The Long Game”, which establishes gamification of education as a model for hosting and fostering “unlearning”, i.e. developing new knowledge, routines and relations countering the conventional unsustainable practices, and “double loop learning”, i.e. participatory learning through collaboration with transformation actors and institutions in real-world action projects (van Oers et al., 2023) (Figure 1). Here the primary system for intervention is the “education system” involving schools providing primary and secondary level education, since eco-anxiety and trauma in the young generation are both faced and can be best dealt with in schools through the transformation of education system (Hickman et al., 2021). We also argue that the Long Game can act as an enabling factor for triggering positive social tipping points across wider systems to mitigate negative tipping as well as for healing eco-anxiety and trauma by actively engaging learners in real-world transformative action projects at an early stage of development.

2. The Long Game

The concept of “The Long Game” (Bhowmik et al., 2022) originates as a response to the concept of “The Climate Endgame” (Kemp et al., 2022), which claims that current climate scenarios underestimate the catastrophic impacts of climate change and hence, urges for enhanced exploration of such scenarios. In contrast, the Long Game prioritizes an action research agenda acknowledging that catastrophic climate change is already here and capacity building and empowerment are key for triggering rapid action and positive social tipping to escape this catastrophe (Bhowmik et al., 2022). Here in this paper, we regard the education system as an entry-point (leverage point) for triggering systemwide positive social tipping through early intervention (as outlined by Otto et al. (2020)). By consolidating scientific evidence to date, we discuss how gamification of education can foster capacity building and empowerment crucial for rapid and transformative action. Hence, the Long Game here does not represent any particular game but rather represents broader gamification of education that triggers real-world participatory social-ecological projects. These games may take diverse forms, e.g. simulation and role-play (Rooney-Varga et al., 2018), and escape rooms (Tania & Wim, 2020), and can be facilitated in both physical and digital formats according to the contexts and resources available.
3. Action at scale

There is a “sweet spot” for a broad range of climate mitigation interventions at a community scale of 10,000 people (Bhowmik et al., 2020). This community scale is not too big, not too small and the size of many local governments (including school districts) and indigenous people bodies. This also represents a “glocal” scale, where individuals living their everyday lives converges with humanity’s planetary scale and thus can optimally trigger positive social tipping in a system.

We suggest that effective participatory learning through gamification at primary and secondary schools can act as a positive social tipping intervention at the sweet spot community scale for triggering rapid transformation dynamics. Gamification of learning at schools can enable action through an acceleration of social learning and engagement using the tight contagion of students, parents, local transformation actors like farmers and entrepreneurs, and peers (Otto et al., 2020). This manifests in a two-step process: (i) Unlearning the complexity and deep intertwinedness of unsustainable growth and cultural dimensions through an education system that facilitates transformative learning, sustainable lifestyles and career pathways, and fosters collective engagement to enable agency for transformation via students-to-parents and parents-to-communities networks (van Oers et al., 2023; Lawson et al., 2019). (ii) Double Loop Learning through multi-level interactions across formal and informal institutions and state and non-state actors including local governments and civil society with schools to increase competence by providing facts, soft skills and strategies for behavioral change (Macintyre et al., 2018).

The Long Game can thus initiate, transfer and provide the means for practical and transformative socio-ecological projects at the community sweet spot, and empower communities with self-efficacy and optimism (Naes 2022). Students that unlearn through transformative learning
processes can transfer and motivate, first their parents and eventually the communities they live in, into the unlearning processes (Lawson et al., 2019). Direct connections, communication and exchanges between local transformation actors and students that are established at schools can continue through communities and mobilize resources and skills from national and local governments, NGOs and industries to community organizations, such as household associations. For example, the Long Game can provide communities with a digital interface with supporting pedagogical materials that feature i) relevant information from a global database of glocal sweet spots/communities that identify environmental and social strengths, weaknesses, threats and opportunities; ii) pedagogical and digital tools including role-playing, simulations, and gamification to inform and empower learners in those communities; and iii) direct support and mutual aid at the glocal scale to reduce risks, increase survivability, and facilitate dynamic inclusiveness and deliberate democracy (Bhowmik et al., 2022).

4. Active Hope

“Active Hope” infers the process of being clear what one hopes for and then playing one’s role in the process of moving into that direction (Macy and Johnstone, 2012). Active hope distinguishes hope from “wishful thinking” by: (i) a deep recognition of the “great unraveling”, i.e. climate crisis and related environmental, social and psychological impacts, (ii) a consensus that “business as usual” is not an option and (iii) a contribution to the “great turning”, i.e. active and in-person engagement in efforts and activities that helps mitigating the planetary crises and and healing the psychological adversities through capacity building and empowerment.

Agency and self efficacy are central to active hope. Gamification of education to address human impacts on the planetary boundaries through pedagogical and digital tools including role-playing, collaborative problem solving and simulations and escape rooms can play a critical role in creating agency and self-efficacy (Rooney-Varga et al., 2018; Tania & Wim, 2020). Students feel intrinsically motivated in game-based learning, which can provide hands-on: (a) knowledge and feedback about global change causes, dynamics and expected impacts, (b) affective engagement including feelings of urgency and hope, and (c) understanding of social dynamics, negotiations and decision making. The Long Game can thus motivate students to actively engage themselves in real world mitigation projects and even invent and initiate projects with community actors, which translates into collective efficacy for directly informing and empowering community sweet spots (Rooney-Varga et al., 2018; Tania & Wim, 2020). These can be as simple as installing solar panels on the roofs of the school buildings, starting and nurturing gardens in the school courtyards and protecting forests nearby.

Action at scale, agency and self-efficacy achieved via game based education can facilitate active hope through the connection established between school classes with local transformation actors, such as farmers, entrepreneurs and NGOs and thus the transformation of schools into living laboratories of climate action, providing a gateway for students suffering eco-anxiety and trauma to involve themselves in activities that shape the future they hope for. In turn, this heals eco-anxiety and trauma and empowers them to become potential seeders of positive social tipping processes.
5. Outlook

We invite the communities conducting research on sustainability science, tipping points, transformation and environmental education to test and validate the effectiveness of the Long Game for triggering positive social tipping dynamics and tackling eco-anxiety and trauma. This involves the assessment of suitability of broad range of games for schools in different world regions, participatory research on how local transformation actors can effectively collaborate with schools and students and how translation of the living laboratories between schools and communities can be facilitated. Strengths and weaknesses of this approach should also be examined and mechanisms for including the Long Game into the existing curricula should be outlined. Research on the Long Game can inform high level initiatives and global networks like Greening Education Partnership (UNESCO, 2024) on strategizing transformation of the education system and schools for rapid sustainability transformation.

Competing interests

The corresponding author has declared that none of the authors has any competing interests.

References


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