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AESTHETICS OF CARE AND SUSTAINABILITY IN TECHNOLOGICAL EDUCATION: IMPLEMENTING A GAME-BASED METHODOLOGY

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ABSTRACT
Introducing the notion of Aesthetics of Care (AoC) when teaching sustainability studies and/or sustainability related modules, might be an appropriate way to rethink the role of technology(ies) in human development. Such an approach is a valuable opportunity to reconsider the way we produce, and consume, not just the objects we interact with but also our perception of reality in such a moment of ecological and social crisis. We propose a game-based Teaching Training Programmeme (TTP) for technological higher-education to assess work, behaviour and choices of the participants. We tested three games that could be used to introduce participants from different backgrounds to mobilise the ideas of AoC and Regenerative Sustainability (RS) within their practices, by encouraging teamwork, critical thinking and self-evaluation. These games are: 'Atlas of Weak Signals', 'In The Loop', and 'Revolt'. They serve as educational tools that prompt questioning of decisions, actions, and attitudes concerning ecology, AoC and RS. Results show that such a game-based methodology has the potential to promote and teach AoC and RS in technological higher-education milieux.

Keywords: Aesthetics of Care, technological education, regenerative sustainability, game-based methodology, relationality

1 INTRODUCTION
There is a wide agreement that Sustainability has failed [1]. Planetary resource exploitation and the capitalist call for short-term planning and quick profit (often at all costs) have, arguably, been undermining efforts for a sustainable economy. The most prominent trend insofar as the latter is concerned, is on how to constrain immediate needs (or desires) to serve future ones, rather than seeking regenerative long-lasting strategies. Furthermore, the bridge between the theory and practice of Sustainability has contributed to the acceptance that human beings have decisively altered the atmosphere and have set in motion inevitable drastic changes to the Earth system over geological time.
Fortunately, Sustainability has been undergoing serious changes helping not only to deconstruct the human-nature divide, but also to create bridges between the theory and the practice of the so-called sustainable practices. In this paper we discuss how the notion of 'Aesthetics of Care' (AoC) helps to raise awareness on the development of a Regenerative Sustainability (RS) [2] as well as on its implementation in various contexts. Together with such related notions as "body aesthetics" [3] and "care aesthetics" [4], AoC has become an object of interest in recent times, building on the insight that "human relations can be considered for their aesthetics" and that "care is an important source for ethics which can be understood as an embodied sensory practice" [4]. We define AoC, following work carried out within the European Culture and Technology Lab + "Aesthico" project, as a process aiming ethically responsible action, informed/activated

by sensory experience, and shaped by knowledge and aesthetic consciousness; this entails caring for ourselves, others, and the planet[1].
We propose AoC as a suitable approach to rethink the role of technology(ies) in human development. This idea was firstly addressed by a feminist Ethics of Care, where care is treated as a central value in the society, becoming "everything we do to maintain, contain, and repair our "world" so that we can live in it as well as possible" [5]. As to Sustainability, AoC conceives of it as a matter of relationality where the "care" element also comprises "generalised relational and affective elements" that go beyond caring about or for specific objects or beings [6]. Hence, a concern with the environment that places the AoC definition in close proximity to the recently proposed concept of Regenerative Sustainability (RS) and its three meta-principles of working towards "Wholeness", "Change" and "Relationships" [7].

2 AIMS AND APPROACHES

Many courses are moving toward an integrated model of sustainable education within their programme frameworks rather than relying on standalone sustainability modules [8]. This allows for education systems to not only educate students on the technical aspects of sustainability theory but also the underlying social realities. The approach also encourages a deeper understanding of the challenges of the paradigm of sustainability, including reflections on ecological ethics and issues aligning closely with the Aesthetics of Care (AoC). For this reason, our Teacher Training Programme (TTP) was developed as a mechanism to help teachers to integrate these concepts into diverse curricula and into courses being taken by students of different backgrounds. The programme aims to function as a means of testing how successful the integration of these concepts actually is, and how well students respond to questions around the AoC and sustainability. The TTP was developed by analysing existing approaches to integrating related concepts into education and considering what aspects of the Aesthetics of Care (AoC) were critical for learners to assimilate. As this is a programme aimed at teachers, it is important that it delivers on communicating the core conceptual ideas, but also on providing a pedagogical methodology that learners can employ in their own classrooms. The chosen methodology in this respect was game-based learning [9][10], which employs games as educational tools in order to encourage learners to actively engage in the subject matter and, in our case, question decisions, actions, and attitudes concerning ecology, AoC and RS. A set of learning outcomes of the TTP was developed and these fall into three categories each of which correspond to key desired outcomes of the programme.

2.1 Understanding the Aesthetics of Care

The first part of the programme is oriented towards introducing learners to the basic principles of the Aesthetics of Care (AoC). The relevant learning outcomes state that the learners will "understand the principles of the aesthetics of care and appreciate the importance of integrating this into their teaching practice" as well as knowing how it "applies within their own disciplines". There is also an emphasis on developing an understanding of the "responsibilities of students, teachers and practitioners of these disciplines to themselves and others", this speaking to the central notion of care within ecological and sustainability education as introduced in the previous section. The recommended activities involved here include a presentation of the Aesthetics of Care itself that encompasses a definition, some theoretical resources and consequent discursive elaboration with/by the tutor(s) and learners.

2.2 Teaching with the Aesthetics of Care

The second part of the programme is aimed at providing examples of the use of the game-based learning methodology and serves both as a means of delving further into the conceptual and theoretical ideas of the Aesthetics of Care and also as a way of testing different game-based learning approaches that the teachers might subsequently employ in their own practice. The learning outcomes specify that the learners will know how to use games and role play in their teaching, understand how to "act as facilitators" and know how to use speculative scenarios as a means of communicating the principles, and exploring the implications, of the AoC. A number of games have been tested and proposed as suitable mechanisms for this part of the programme and they will be introduced and discussed in the next section of this paper.

[1] Aesthetics of Care Definition from Aesthico project: *Aesthetics of Care in technological education is a process. Its aim is ethically responsible action. It is informed/activated by sensory experience and knowledge(s) in a relational world. It entails caring for ourselves, others, and the planet (by attending to sustainable forms of creative practice and attitudes of caring).*

2.3 Evolving the curriculum

Of critical importance is the reflective part of the TTP where learners are encouraged to consider how principles of the Aesthetics of Care might impact upon their own teaching practice. The relevant learning outcomes specify that the learners will "examine and question teaching material, pedagogical approaches and processes" in a manner appropriate to a "relational, sustainable and dependent world". The learners also will be able to modify their curricula and teaching approach according to individual needs of students across varied disciplines. Within the context of delivery of the TTP this is to be achieved by a significant number of reflective exercises following the experimentation with game-based learning. This would include group discussion, feedback and other approaches deemed suitable by the tutor.

3 CASE STUDIES

Three distinct games were presented during an Intensive Study Programme (ISP) of a duration of 3 days in total. The games were part of a large set of workshops and events that were set to inspire teachers and learners to test the pedagogical methods resulting from the Aesthico project. A set of keynote talks was performed before playing the games. The aim of the chosen games was to foster teamwork, critical thinking, and exploration of various outcomes related to participants' choice and/or expertise. The games, namely "Atlas of Weak Signals", "In the Loop", and "Revolt", served as educational tools that prompt questioning of decisions, actions, and attitudes concerning ecological ethics, sustainability, design practices, and aesthetics of care.

3.1 Atlas of Weak Signals

The Atlas of the Weak Signals is a toolkit designed by Mariana Quintero and the Fab Lab Barcelona. Its objective is to search of indicators to identify changes in the future with little or no impact on the present, but with the potential to lead to the identification of major impact events. Those indicators are called "weak signals", and they can set trends and indicate certain directions and by that draw up future scenarios. The game provides an opportunity to seek opportunities, threats, challenges and shared visions for innovation, policymaking, intervention, research, and business opportunities in the future. It sets a collaborative approach to the exploration of indicators or "weak signals" that have been detected across our strategic areas of action research over the past decade.

Atlas of Weak Signals affords variations of all sorts and is open-ended in terms of structure and execution. The particular manner it was performed at the ISP involved – the cards aside – big pieces of paperboard that allowed (and rather motivated) the participants to make impromptu notes and sketches as the game proceeds so as both to keep a 'roadmap' of the tenets discussed and to provide a conclusion in a tangible form. The game serves as a useful tool for understanding how speculative and future scenarios can be incorporated into teaching methodologies. It presented an intriguing methodology for questioning and challenging existing systems, using simple techniques and key topics to stimulate critical thinking and group discussions.

3.2 In The Loop

In The Loop is a 2016 board game designed and produced by Katherine Whalen. The motivation for the design and production of the game is to create an educational experience that would introduce players to circular economy concepts such as systems thinking, remanufacturing and critical materials, and make the circular economy "fun and understandable".

The focus of the game is set on the material conditions of manufacturing objects simulating the current economic global trends. Each player represents a business that is encouraged to accumulate raw materials to facilitate the production of specific products, sell them in the global market, and make profit out of it. Different sorts of strategies can be adopted by the players/businesses stimulating the reflection on the ethical and environmental consequences of its actions (positive or negative). Gradually, as the raw materials are being depleted, the game pushes the players to change their business-as-usual strategies (mostly based on economic incentives) to more ethical and sustainable ones.

3.3 REVOLT

REVOLT is a card game designed and produced by Clément Chabot in 2020. The purpose of the game is to provide players with insight into the energy consumption involved in our regular day-to-day activities. The motivation for this is the challenge of transitioning to lower energy consumption habits and the game's proposition is that we can only do this if we have a better understanding of how much energy is involved

in the things that we do every day. Rather than presenting this information using “complex scientific units”, REVOLT employs the clever device of what it calls the “pedalpunk universe”, where all energy consumption is related to how much time it would take to generate a certain amount of energy by pedalling on a bicycle hooked up to an electricity generator.
The dynamic of the game involves players being asked to guess how much pedal-power would be involved in various activities that they would typically do every day, and consequently encourage them to reflect upon energy consumption habits and the challenge of the transition to lower energy and more sustainable ways of living. The purpose of the game is to stimulate discussion and encourage reflection on how consumptive and energy intensive many simple activities that we might take for granted are.

4 RESULTS

A recurring comment highlighted the advantages of transdisciplinary methodologies, collaborative approaches, and the exchange of ideas regarding theory, ecology, and practice. However, a common concern was the need for more targeted material specifically addressing the AoC. The idea of designing a custom-made toolkit, borrowing the structures of the presented games and adapting the content to reflect the project's work, was expressed multiple times by different partners. Additionally, the group recognised an overall weakness in the current material, which lacked practical-based approaches and their relationship to the theoretical aspects of the project.
In The Loop, while it is an involving and engaging experience, it does not function as an appropriate or effective way of communicating the principles of the Aesthetics of Care (AoC). Among the problems identified were (a) it abstracts the players too much from the underlying issues that it seeks to raise concerns about (b) it is too long and too complicated and (c) there is no space for discussion/reflection during the gameplay.
The REVOLT game lacks, therefore, a systemic perspective on the overall ecological impact of the objects in the cards. While focusing on the energy consumption it leaves aside all other aspects that can be explored as part of the materiality of the objects. Still, such tenets could easily surface REVOLT sessions and be discussed accordingly. The game is under a CC BY-NC-SA licence, which makes it possible to adapt it accordingly to the objectives of the activities of the TTP.

5 DISCUSSIONS

Notwithstanding the relationship of the game-based review and its relationship to an AoC, the TTP found in all games, this approach did foster teamwork, critical thinking and exploration of participants positions, choices, and opinions in their everyday life. “Atlas of Weak Signals” offered an engaging approach to examining and contesting current structures, employing basic methods and essential subjects to foster analytical thinking and collective dialogues. It enables relational discursive critical activity among the participants involved. A ‘mapping’ evolves and becomes visible and tangible for each group as statements, challenges and opportunities are negotiated. Cards are placed down on a large paper space where participants write down words and statements. Relational lines are drawn between ideas and propositions.
The ‘In the Loop’ game highlighted, through playing, many of the experiences, knowledges and perspectives that persist in our world economic perspectives presently. In the feedback presented in this report, themes of – ‘abstractness’, competitiveness’; extractive processes; and even ‘concealing intentions and strategies’ are highlighted as coming to the forefront in playing ‘In the Loop’. This aligns to economic values of wealth, ownership, growth, development and individual, that dominate present thinking and activity. This overly highlights these attributes at the expense of emphasising the AoC perspective of care; ecology; relationality and sustainment.
Then "Revolt" demonstrated a more focused approach, using pedal-powered energy concepts to promote understanding of energy consumption, but it was criticized for its narrow perspective and lack of a systemic view. The participants came to the conclusion that while the game provides a useful toolbox that may need to be modified to suit AoC issues and requirements, it does have use in the context of teacher training. In conclusion, the feedback and analysis of these games provided valuable insights for the development of a custom-made toolkit for teacher training that will incorporate the principles of the Aesthetics of Care, taking into account the need for adaptability, ecological thinking, and a comprehensive understanding of AoC in the context of technological education. The ISP highlighted the importance of developing a toolkit that encourages relational thinking, ecological consciousness, and a holistic approach to technology education.
While these games engaged participants and encouraged reflection, some limitations emerged. "In The Loop" was considered abstract, complicated, and lacking space for discussion during gameplay, which

hindered its effectiveness in communicating the principles of AoC. On the other hand, "Revolt" demonstrated a more focused approach, using pedal-powered energy concepts to promote understanding of energy consumption, but it was criticized for its narrow perspective and lack of a systemic view. "Atlas of Weak Signals" offered an engaging approach to examining and contesting current structures, employing basic methods and essential subjects to foster analytical thinking and collective dialogues. The participants came to the conclusion that while the game provides a useful toolbox that may need to be modified to suit AoC issues and requirements, it does have use in the context of teacher training.
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6 CONCLUSIONS

The discussion, actions, workshops and gameplay try-outs undertaken by participants, students and other interested partners was a multidisciplinary approach, Intensive Study Programme (ISP). This was a set of processes devised to question interventions to technological education in order to address an Aesthetics of Care (AoC). The evaluation of existing toolkits examined here, will of course not have a clear connection to the theoretical aspects for this project concerning an Aesthetics of Care. This will need to be to the forefront in developing the toolkit. The findings from this ISP is that, in developing strategies for a teacher training programmeme, we need a tool kit that is relational in how it augments existing activity, knowledge, and ideas of technology, in order to build new approaches that re-think, speculate, re-evaluate, re-imagine approach to thinking as a relational AoC. The most pertinent question being – what is a toolkit of support to enable teachers to have confidence in developing ecological thinking, knowledge, language with processual activities that incorporates an Aesthetics of Care for Technological education. This ISP has allowed the participants to gather in-depth opinions, insights and feedback into the material collected and interrogated in order to develop, in the next phase, a robust custom-made toolkit for a teacher training programme, connecting AoC to technological education.

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