

TEACHING FOR MORE-THAN-HUMAN PERSPECTIVES IN TECHNOLOGY DESIGN – TOWARDS A PEDAGOGICAL FRAMEWORK

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Abstract

This position paper presents the initial steps towards the development of a pedagogical framework for teaching for more-than-human perspectives in design, targeting teachers at technology design programmes and courses in higher education. We build on the methodology applied in the Value Sensitive Design in Higher Education (VASE) (2021a) project and the resulting VASE open educational resource (OER) (2021b). This continuation of the project focuses on developing teaching activities that address more-than-human perspectives when teaching the next generation of responsible technology designers. In recent years, there has been a growing awareness towards designing for more complex and holistic systems that include perspectives of nature and the more-than-human. As stated in the United Nations (UN) (2015) Sustainable Development Goals, to achieve sustainable development we need to address the three levels: people (society), profit (economy), and planet (biosphere) since they are all intertwined. Still, most of the design methods professionally practised and taught in technology design education are geared towards humans with a particular focus on users through, for example, human-centred design and user experience design. Thus, there is a gap between methods taught to designers and the methods needed to solve problems related to environmental and social sustainability while also addressing planetary perspectives. This paper puts forward the importance of challenging the dominant paradigm of technology design practices that primarily focus on people and profit by also including planetary and more-than-human perspectives. Examples of existing practices and approaches for including and listening to more-than-human perspectives are presented. By building on the experiences gained from the VASE (2021a) project, we present a path towards a pedagogical approach for how practices of designing for more-than-human perspectives can be turned into teaching activities in technology design education. In doing so, teachers become agents of

change by creating conditions for students to grow into responsible designers of future technologies and play a role in driving adaptation towards a more sustainable future.

Author Keywords

More-than-human; technology design education; open educational resource (OER); UN Sustainable Development Goals (SDGs); cultural education; pluriversal.

Introduction

Designing for/with the More-Than-Human

In recent years, there has been a growing awareness of designing for more complex and holistic systems that include perspectives of nature and the more-than-human (Borthwick et al., 2021; Wakkary, 2021). Still, most of the technology design methods both professionally practised and taught in technology design education are geared towards human stakeholders as in, for example, human-centred design and user experience design. However, with the current climate crisis, it is not enough to just consider the needs of individual users. Attention must also be paid to more-than-human stakeholders and their values. A new kind of framing is needed in which humans share the centre stage with the non-humans with whom we are inherently interconnected (Haraway, 2016; Wakkary, 2021). How can we learn to listen to the voices of our more-than-human companions, and all the species and parts of nature that cannot speak for themselves, but still are affected by or affect our actions and design choices? What if forests and trees, birds and bees were treated as stakeholders – or even a virus, which is probably one of the most prominent stakeholders in 2020-2022?

As stated in the UN (2015) Sustainable Development Goals (SDGs), to achieve sustainable development we need to address the three levels – people (society), profit (economy), and planet (biosphere) – since they are all intertwined. A more-than-human design approach encompasses planetary perspectives where our shared planet and all the living organisms and communities that depend on it are put at the centre of the design process. As highlighted in previous research and by design professionals, there is an identified need to extend the repertoire of technology design methods to fulfil the SDGs (UN, 2015) where all three levels are addressed (Borthwick et al., 2021). Up to now, the technology design community, including design education, has tended to incorporate the perspectives of people and profit, but not enough attention has been given to planetary perspectives and, in particular, the more-than-human perspectives. The neoliberal economic system contributes to framing the ways in which technology designers envision their designs having an impact (Friedman, 2019). Thus, there is a gap between the human-centred design methods taught in technology design education and the need for alternative methods to solve problems related to environmental and social sustainability by also addressing planetary perspectives.

In this position paper, we argue for the importance of challenging the dominant paradigm of technology design practices primarily focusing on people and profit by also including planetary and more-than-human perspectives. Further on, we introduce a few examples of existing practices and approaches and a few educational initiatives where more-than-human perspectives are addressed. By building on the experiences gained from the Value Sensitive Design in Higher Education (VASE) (2021) project, we present a pedagogical approach for how practices of designing for more-than-human perspectives

can be turned into teaching resources published as open educational resources (OERs). The OERs target teachers at technology design programmes and courses in higher education. Finally, we discuss the potential impact and effects of sharing teaching resources about critical societal issues, such as addressing more-than-human perspectives, as an OER and how this initiative can give teachers across the globe access to knowledge and teaching resources to create conditions for students to grow into responsible designers of future technologies. In doing so, teachers become agents of change and play a role in driving adaptation towards a more sustainable future.

Background

Challenging the Dominant Paradigm of Technology Design Practices and Teaching

Technology designers have great responsibility since their designs feed the capitalist market economy and the resulting unsustainable use of resources (Borthwick et al., 2018). As Monteiro (2019) argued, “design is a political act. What we choose to design is a political act.” Thus, today’s technology designers – such as interaction designers, product designers, and engineers – need to become aware of how humans affect the environment and incorporate such an awareness into their designs so that future products, systems, and services contribute to the sustainability transition.

Recently, the field of human computer interaction (HCI) has taken on its fourth wave and is slowly turning away from human-centred design to engage with posthuman theories (Frauenberger, 2019). In particular, we see strong potential in participatory design (PD) (Bødker et al., 2022) and value sensitive design (VSD) (Friedman & Hendry, 2019) for embracing more-than-human perspectives. PD methods have the potential to contribute to the sustainability transition since they address larger contexts with multiple stakeholders and thus can contribute to social change. In addition to PD, VSD (Friedman & Hendry, 2019) focuses on incorporating human values into products, systems, and services. Importantly, Friedman and Hendry (2019) broaden the view of stakeholders to include large groups of people, past and future generations, mountains, and rivers. Through the VSD approach, there is potential to go beyond human values to balance them with values related to nature and investigate how these values might interact.

The challenge of many of today’s technology designs is that they mainly target users as individuals. The vast majority of technology designers work with user-centred design methods and design process models such as the Double Diamond design process (Design Council, 2021) where the focus is on objects and tools that support individual needs. Relatively little attention has been paid to empowering people to act together and orientate themselves towards revitalising and maintaining shared resources, including natural resources. Furthermore, technology designs often happen within the hegemony of Western knowledge systems, where underlying concepts like ownership and individual property have strong implications for new technology designs. As we enter more severe stages of global warming, technology designers should not just be concerned about humans and their everyday lives in urban environments. They should start focusing on establishing and evolving human connections with nature. Haraway (2016) explores the idea of kinship – the development of “diverse practices and knowledges for conjoined human and other-than-human becoming and exchange” (p. 153). How might technology designers develop products, systems, and services that enable humans to live sustainably with each other and beyond, with the more-than-human?

An important step towards answering this question is to overcome the myths of modernity (Leitao, 2018). One myth is the belief in techno-solutions to universal problems that have no critical reflections on the impact such solutions might have on diverse human and more-than-human relations established through cultural practices. Leitao (2018) criticises Cartesian rationality that leads to “mechanistic reductionist science” (p. 5). We need to go beyond this mindset to include cultural education and related community practices that guide how humans might live together with the more-than-human in respectful ways where the more-than-human is not just seen as raw material that can be manufactured into material goods. Leitao argues for a redefinition of what well-being is and emphasises that we are all capable designers of our own well-being: new designs should allow everybody – not just a small elite that creates technological products – to design new ways of life. The idea that there inherently is a desire for new technological development that supports civilisation is too narrow and resembles an idea of a “one-world world” (Escobar, 2020). Other kinds of developments that might not fit the Western understanding of “development” or “civilisation” need to be rendered visible to technology designers to learn how to interact with nature in regenerative ways.

Ingold (2013) suggests a shift in the conceptual thinking around the role of the designers in relation to consumer markets and cultures, for example, from “form-giving” to “form-keeping.” There needs to be a change in the designer’s perception of whom they design for/with: if not merely consumers, who else might they design for or in partnership with? For example, if a group of people have shared responsibility for resources assembled in products, how might they negotiate the endurance of a product in (shared) use (Rosner & Ames, 2014)? How might technology designers spot design openings where they focus on designing for collectives of humans and other species, e.g., through ways in which community practices emerge from products, systems, and services that enable humans to act and change unsustainable behaviours collectively? Technology designers need to not only consider what Mankoff et al. (2007) define as sustainability in design (if it is a sustainable product) but also sustainability *through* design (if the design supports sustainable lifestyles, actions, and decision making).

State of the Art – Practices for Listening to the Voices of the More-Than-Human

In contemporary technology design research and practice, there is a growing awareness of the limits of our resources. The Computing within Limits conference (LIMITS, 2022) is one such example. In addition, we see a spark of interest in expanding the worlds of design by embracing more-than-human (even cosmological) perspectives in the time of planetary crisis (Behzad et al., 2022; Borthwick et al., 2021; Giaccardi & Redström, 2020; Tomitsch et al., 2021; Wakkary, 2021). Inspired by scholars such as Escobar (2018, 2020), Haraway (2016), Bellacasa (2017), and Scharmer (2018), we may develop a more-than-human approach that not only includes the internet of things (IoT) and pervasive computing, but also attends to the great potential of more-than-human participation (Coulton & Lindley, 2019; Clarke et al., 2019). This is achieved by carefully considering “entanglements between human and non-human worlds” (Clarke et al., 2019, p. 60), for example, animal computer interaction (ACI) and cultural and spiritual dimensions of human lives that have evolved to maintain survival as part of a diverse array of ecosystems.

Clarke et al. (2019) draw attention to how design processes can show that “making-with and growing-with have the potential for alternative forms of participation in fabricated

multispecies worlds” (p. 61). Thus, more-than-human approaches to technology designs should go beyond technology centrism and, for example, put emphasis on a) historically and culturally situated knowledge, b) matters of care in eco-social contexts, c) companionship with other species, and d) compassionate approaches to the generation of new economic systems, transforming from ego- into eco-awareness (Scharmer, 2018).

Wakkary's (2021) *designing-with* is a posthuman approach that attends to more-than-human participants in the design process by inviting a broad network of humans and more-than-humans related to a design project. The network is called a constituency and refers to the act of inviting and gathering all stakeholders, including the non-humans, to a design and making process. The process is mobilised through a repertoire of methods and techniques that create conditions for the non-humans to become participants in creative design processes. Explorations conducted as part of the projects *Morse Things* and *Sympathy of Things* (Behzad et al., 2022), a repertoire of methods for *feeling-with*, enable “non-human designers to take part, lead, and generate new design iterations in the process of making, as they find sympathy within and between one another” (p. 4).

Tomitsch et al. (2021) have developed a framework for involving more-than-humans in the design process consisting of four steps: 1) identifying non-human stakeholders; 2) creating non-human personas; 3) forming coalitions through middle-out engagement; and 4) employing non-human personas and their coalitions. When creating non-human personas, common guides for human personas are used, but with adapted categories: type/species, age/lifespan, local population, needs/motivation, food/food sources, challenges/stressors, “interacts with,” and habitat. The third step consists of assessing whether the non-human persona developed accurately represents the non-human stakeholders that were identified in the first step. To achieve this, a middle-out engagement approach is applied “for forming a coalition that can speak on behalf of the non-human species that are impacted by design decisions” (Tomitsch et al., 2021, p. 102). The approach combines the collective knowledge from the top (government agencies, the industry) to the bottom (local communities, NGOs, Indigenous peoples). The final step is to use the non-human personas in the design process alongside and in the same way as human personas.

Pluriversal Ideas About the More-Than-Human

The above-mentioned state of the art examples reflect an integration of *many ways of seeing*. In *Designs for the Pluriverse*, Escobar (2018) calls for multicultural perspectives of design, some of which are more focused on caring for nature and do not see humans in opposition to nature. He points to the bifurcation of the following as a problem:

Human and non-human, live (life/organic) and inert (matter/inorganic), reason and emotion, ideas, and feelings, the real and its representations, the secular and the sacred or spiritual, what is alive and what is dead, the individual and the collective, science (rationality, universality) and non-science (belief, faith, irrationality, culturally specific knowledge), facts and values, form and content, developed and underdeveloped. (Escobar, 2018, p. 95)

In the Western world, value systems are based on this bifurcation because they emerged from philosophies that generated this bifurcation in the first place (Lent, 2017). If

technology designers can, through education, reach an understanding where the above are integrated, then technology designers might be better equipped to shape how people care for, restore, and revitalise the ecosystems that they are part of. By embracing different cultures, we can imagine different ways in which people relate to each other and the more-than-human. According to Nisbett (2003), integrating Eastern and Western ways of knowing will expand the intelligence with which we perceive, understand, and act. Lent (2017) argues for a critical review of our multi-cultural history and that we carefully consider the value systems that we, sometimes blindly, rely on. When highlighting some of the influential thought systems that have shaped the ways in which we live and relate to nature, he emphasises the need to engage with underlying assumptions about how things should be, and thus how we might envision a future where we do not act in destructive ways. This calls for an integration of, for example, Indigenous research methods (Wilson, 2008) with design processes where the central value of *relational accountability* is considered throughout the design process as well as in the roles that a new technology design might play.

One of the most crucial things to take into consideration are the Rights of Nature. In 2008, the constitution of Ecuador recognised the inherent rights of nature (Boyd, 2017). Since then, the Rights of Nature movement has influenced lawmaking around the world. How might Rights of Nature influence technology designers to think differently about their designs? And who can speak on behalf of nature in design processes and through a product, system, or service? How might design students learn to take these voices into account? And are there other movements, theories, and ways of thinking that can become more prominent inspirational sources for technology designers, so that it is not only the individual human being – the “user” (understood as a consumer) – who is the focus of a design process? Design researchers are probably already familiar with Latour’s (2005) actor-network theory (ANT) that focuses on the study of how objects in our environments influence the ways we act and think, and our ways of being and relating to each other and nature.

By paying attention to how more-than-human entities shape the ways in which we interact with one another in different societies and cultures, future technology designers have an opportunity to consider what roles their products, systems, and services might play in shaping human lives and societies. What if, for example, signs of nature were made visible in urban contexts that are otherwise removed from nature? How might that influence the ways in which citizens commit to protecting nature? Until recently, academia has regarded cultural and spiritual ways of knowing as “alternative knowledge systems.” How might designers re-discover how social and cultural practices and their corresponding spiritual and value systems have an impact on how communities of humans orientate themselves towards natural environments and resources?

Teaching for More-Than-Human Perspectives

Educating Technology Designers to Focus on the More-Than-Human

Despite the international design research community’s growing interest in the more-than-human approach to design (Behzad et al., 2022; Borthwick et al., 2021; Giaccardi & Redström, 2020; Tomitsch et al., 2021; Wakkary, 2021), to the best of our knowledge, there are still few examples of educational initiatives where more-than-human perspectives are being foregrounded in technology design education.

One initiative with educational ambitions is the network “Design + Posthumanism” (n.d.) which engages in design practice, education, and research. The network consists of designers and scholars based in northern Europe who all share the common view that designers should learn to pay better attention to the more-than-human. Through their design practices, they explore how design, education, and research can thrive in contact with posthumanism but also contribute to the field. Another example, which is not purely a design school but still a relevant initiative, is the Oslo School of Environmental Humanities (OSEH) (n.d.). By partaking in collaborative lectures, experimental seminars, and field excursions, students learn to better understand and address environmental issues and challenges. An emphasis is put on building an understanding of how different approaches and trans-disciplinary thinking are essential for critically engaging with the challenges of the Anthropocene epoch; that is, the age of the human.

A third example is the company NHCD (n.d.), which has developed a non-human centred design method that is taught to students at design schools such as the Sustainable Design School Nice, HKU Design Utrecht, and Köln International School of Design. In their teaching, they challenge the students to change their design perspective to that of a non-human, and to explore a design context from the point of view of someone or something else. Design challenges explored by the students involve non-human stakeholders such as birds, seals, corals and pose questions such as “How to make a building that doesn't kill birds?”

What has become apparent from the few examples brought forward is that there is a growing interest in the field of design education to include more-than-human perspectives and introduce students to methods and approaches for doing so. Most of the examples that we have learned about so far are small scale, local initiatives, and are not made accessible to other teachers to learn from and be inspired by. To provide more teachers with teaching resources that enable and encourage them to educate students on this topic, we have initiated a pedagogical project that aims to turn practices of designing for/with the more-than-human into teaching resources included in a pedagogical framework. By utilising the teaching resources, teachers can create conditions for students to grow into responsible designers of future products, systems, and services and play a role in driving adaptation towards a more sustainable future.

Extending the VASE Pedagogical Framework on Teaching for (Human) Values in Design to the More-Than-Human

The new pedagogical framework on the more-than-human builds on the pedagogical approach developed by the VASE (2021) project. Similar to VASE, the more-than-human pedagogical framework will be published as an open educational resource (OER) offering teaching resources that teachers can download and adapt according to their own educational contexts and aims. However, as the VASE pedagogical framework primarily addresses human values from a Western epistemology, more work is needed to extend it with more-than-human perspectives.

Thus, the more-than-human pedagogical framework is an extension of the VASE pedagogical framework (Figure 1) that intends to encompass the following components:

- **Three pillars** that cover the competency domains found to be central when educating responsible designers. The VASE pillars “Ethics and Values,” “Designers and Stakeholders,” and “Design and Technology” will be extended to also include 1) Ethics and More-than-Human Values, 2) Designers and More-than-Human Stakeholders, and 3) More-than-Human Design and Technology.
- **Learning objectives** that guide teachers for teaching more-than-human perspectives in design.
- **A curriculum compass** containing specific learning outcomes spanning the three pillars and the SOLO taxonomy (Biggs, 1982) that can help facilitate students’ progression from simple to more complex understandings. The learning outcomes will be linked directly to the concrete teaching activities developed throughout the project.
- **Teaching activities** that materialise, concretise, and integrate the contents of the pillars, overarching learning objectives, and specific learning outcomes into step-by-step activities for teaching more-than-human perspectives in design.
- **Assessment activities** that link back to specific teaching activities to support teachers in checking whether the learning outcomes of the teaching activities were achieved by the students.

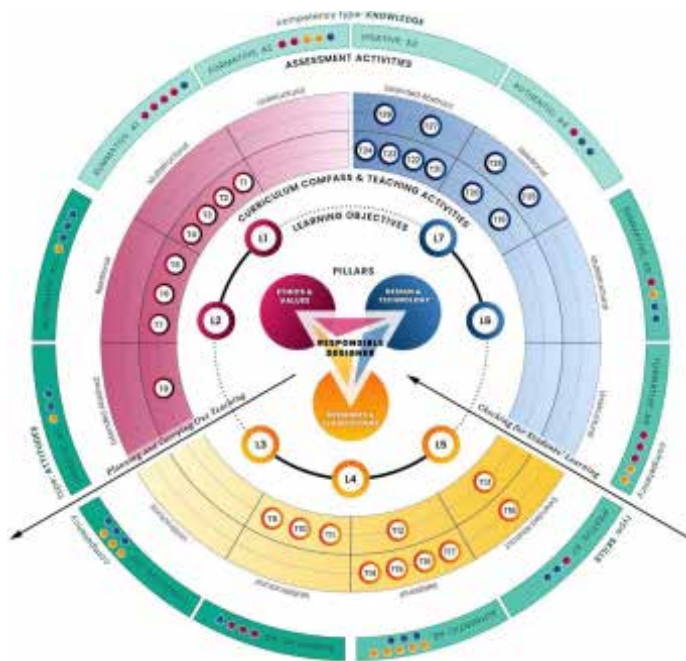


Figure 1. The VASE pedagogical framework model visualises the different components included in the VASE OER (VASE, 2021b), and acts as an inspiration for the more-than-human pedagogical framework.

The more-than-human pedagogical framework aims to provide a concrete and practical tool for teachers to navigate through a wide range of teaching resources to identify specific and concrete teaching and assessment activities that fit their educational contexts and pedagogical aims. The goal is *not* to provide a full curriculum or courses on more-than-human perspectives in design, but rather an inspirational repository of various resources for teachers to explore, experiment with, and integrate into their teaching.

In developing the more-than-human pedagogical framework, we will use a modification of the pedagogical design pattern method (Goodyear, 2005; Nørgård et al., 2019; Nørgård, 2022; Köppe et al., 2018; Laurillard, 2012). By connecting scientific, social, and cultural knowledge fields that address more-than-human perspectives and the field of educational design, we will translate theories and “best practices” into teaching resources. The new teaching resources are expected to provide a constructive proposal on how to include more holistic and planetary perspectives in technology design education to achieve the main learning goal: to educate responsible technology designers.

Discussion

The proposed more-than-human pedagogical framework will not only invite a multiplicity of perspectives on the more-than-human. It will also ask for a critical reflection on the dominant paradigms behind technology designs that are rooted in Western epistemologies. This invitation is not unproblematic – especially when it comes from researchers in the field of design that have inherited educational frameworks that support the development of products, systems, and services that mainly target Western societies and neo-capitalist market systems. Thus, careful work needs to be done to ensure that cultural dialogues and exchanges happen in respectful ways.

When developing a pedagogical framework with corresponding teaching activities that address the UN (2015) Sustainable Development Goals (SDGs), we hope to guide teachers and students in technology design learning environments on how to apply a new repertoire of design methods in a time where multiple societal systems and structures will undergo radical changes because of the consequences of climate change. By gathering ways of knowing that contribute to implementation of more-than-human perspectives in technology designs, we are part of a momentum that contributes to bridging gaps between cultures, facilitating dialogue, and learning to make change. This kind of mutual learning is also apparent in movements like the Pachamama Alliance (2022).

There are at least three issues that we need to pay attention to when developing the pedagogical framework for teaching for more-than-human perspectives in design. The first one is: *how might we listen to the more-than-human and define what more-than-human values are?* The breadth of sources that we listen to need to address the hierarchy of information and knowledge and, in particular, pay critical attention to the hegemony of Western scientific practices where data and “facts” are automatically considered to be at the top of this hierarchy. Learning how to listen to diverse sources of knowledge outside the Western scientific knowledge system might be a challenge, since they have not always been regarded as “scientifically valid.” Yet, non-Western philosophies and Indigenous ways of knowing that have evolved throughout history as strategies for survival in specific natural environments might be even more relevant in these times. They guide ways in which humans can relate to each other and the more-than-human; for example,

wisdom practices where intuitive, embodied, community-based, and spiritual relations to the more-than-human are at the centre.

The second issue is thus related to the first one: *how might we learn from each other across cultures?* The problem of cultural appropriation is obvious in this regard, and we can only learn through respectful exchanges that offer justice to the peoples who decide to share their knowledge and benefit from this sharing in return. It would be quite problematic if we extracted information from sources in the fields of anthropology and ethnography where Indigenous peoples have been exposed to the gaze of “experts” from coloniser and settler nations (Wilson, 2008; Russell, 2005). Even worse is when documentation comes from colonial systems where descriptions of Indigenous cultures and practices can be distressing (Wilson, 2008; Russell, 2005.)

The third issue relates back to our criticism of technology designs for individual users – designs that are often owned by corporate businesses intent on making a profit: *how might we create teaching resources that encourage upcoming technology designers to design for/with collectives of humans who live in networks with the more-than-human?* With the modern understanding of individual freedom, property, and intellectual property rights, it might be challenging to address taken-for-granted rationales behind how designers should operate, what kinds of products, systems, and services they should create, and why.

Future Work

In our work with the pedagogical framework on more-than-human perspectives in design, we will 1) build an understanding of the current state of innovative and best practices on designing for more-than-human perspectives; 2) provide teachers at technology design programmes in higher education with innovative teaching resources for teaching students and future practitioners to address more-than-human perspectives; 3) make educational resources on teaching for more-than-human perspectives in design available as an online educational resource; and 4) disseminate the results of our work to professional networks to foster cross-cultural dialogues and increased capacity to teach for more-than-human perspectives in technology design education. The potential impact and large-scale effects of this work as envisioned in VASE (2021a) could be to upgrade curriculums in technology design educations so that students learn to listen to and work with human and more-than-human stakeholders and take their perspectives into consideration, balance value tensions in constructive ways, and envision long-term societal and environmental effects of a design, including negative effects (e.g., Williams, 2019). They will also learn to critically evaluate features of a new design by consulting with diverse ways of knowing, performing expectation management, and dealing with resistance to more-than-human approaches to design upon entering the job market.

Conclusion

In recent years there has been a growing awareness in the design research communities of the need to design for more complex and holistic systems that include more-than-human perspectives. We need to move away from focusing on individual users and towards focusing on humans who live in sustainable ways as part of ecosystems that include the more-than-human. Yet there is a lack of concrete ways in which teachers in higher education can include more-than-human perspectives in their technology design

instruction. In the present article, we propose how we might further develop the VASE (2021a) pedagogical framework for teaching values in design to also include teaching resources that can, in concrete ways, support technology design students in engaging with more-than-human perspectives. We gave examples of more-than human design approaches, theories, and methods that can serve as inspirational sources for the creation of teaching resources, and we discussed the potential impact and effects of teachings that address the UN (2015) Sustainable Development Goals (SDGs). With this paper, we hope to engage in the discussion about how to address the three levels – people (society), profit (economy), planet (biosphere) – in technology design education in ways that educate responsible designers who see new opportunities for design and are ready to position themselves as game changers.

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