Rajala, Cantell, Haapamäki, Saariaho, Sorri, & Taimela (in press). Engaging with the political in learning: Possible futures, learning, and agency in the Anthropocene. In P. Patrick (Ed.), Applying Learning Theories in Research Outside the Classroom: How People Learn Science in Informal Environments. Springer.

Shortened

> "All designs and theories of learning are implicit theories of society." (Philip & Sengupta, 2021)

The aim of this chapter is to discuss the application of recently emergent critical theories of learning. These theories have emerged in response to and as a critique of the neutrality of the field of learning sciences, including its inability to engage with the ethical and political dimensions of learning. The chapter gives an overview of applications of critical theories of learning in the research literature, focusing specifically on out-of-school settings. The chapter also illustrates the application of critical theories of learning with examples from the authors' own research, all of which addresses learning in the current epoch of Anthropocene, a new geological epoch, in which over-consumptive and fossil-fuel-dependent human activities have already made a fundamental, permanent change on the planet's climate and environment. The chapter argues science learning should foster students' civic action and learning of crucial skills and dispositions needed for generating novel solutions to challenges of sustainability and human wellbeing in the Anthropocene. However, being knowledgeable about climate change is insufficient for fostering actions for a sustainable future; if schools are to raise active citizens, they must provide their students with involvement in the transformative activity of envisioning and enacting sustainable futures. The two examples, discussed in this chapter, build on utopian methodology, which refers to re-imagining and building of alternative futures and ways of social organizing as well as the prefigurative enactment of these visions and futures in the present.

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Designing alternative forms of food production

Next, we discuss examples from our ongoing research project based on a design-based research methodology that examines the pedagogical potential of the concept of concrete utopia in promoting youth agency and climate activism in educational settings. The methodology of social design experiments (Gutiérrez & Jurow, 2016) informed our research approach. Accordingly, we sought a design process that promotes social transformation and positions the participants as historical actors capable of designing social futures (see also Espinoza, 2003; Gutiérrez et al., 2019). The differing factor in regard to more conventional design-based research is that the latter often seeks change and improvement within the confines of the existing institutions instead of seeking to change the institutions and their relations to the wider society. In line with these considerations, we grounded the methodological approach in collaborative partnerships between researchers, teachers, youth activists, non-governmental organizations and other stakeholders (Coburn & Penuel, 2016). Based on collaboration between researchers and practitioners, the use of this approach should result in design principles, pedagogical models, theories and empirical findings about youth learning and agency. It should also lead to processes of social transformation as a result of youth agency. To support the envisioning and building of concrete utopias, we organized four preparatory workshops with the teachers. These workshops included NGOs and youth climate activists as well as expert lectures based on the above-outlined theoretical framework and collective design of the pedagogical approaches and tools.

In this chapter, we focus our discussion on urban gardening projects in the Otaniemi Upper Secondary School in Finland. Two of the co-authors of this chapter, Kirsi Haapamäki and Aki Saariaho, designed and implemented these projects, basing the documentation and analysis of the project and preparatory

workshops on an ethnographic research approach and data collection. Ethnography is understood as both a research methodology and research product; it is a reflexive account of social life that prioritizes participants' perspectives (Hammersley & Atkinson, 2007). The data collection methods included interviews, participant observations and field notes (supported by video recordings and photography as well as document analysis).

The two teachers designed and implemented a project motivated by a utopian vision of promoting a circular economy and alternative forms of food production in their school. In the following excerpt, Kirsi Haapamäki reflects on their vision:

Excerpt 3

> Our dream is to create a learning environment of these growing methods mentioned, such as aeroponic, hydroponic and aquaponic, but also meadows, insect hotels, a real greenhouse, an instant house for growing oyster mushrooms, cell pods for cell cultivation producing berries or potato saplings, making biocarbon for cultivation and using bokashi liquid absorbed into it at school. We already have bees. This allows us to get concrete experiences about food production and all the things related to it. In this mini environment, we try to tackle challenges created by the accelerating greenhouse effect and loss of biodiversity. Hands-on doing gives us power and hope. What should be done on a big scale in the world is done on a little scale at our school.

This excerpt illustrates how the utopian vision did not remain at the level of abstract ideals, but took steps toward concrete action to realize the vision in practice. Implementing a form of circular economy in the students' lives, the students re-used materials in their everyday lived environments to cultivate food, such as using leftover food from the school and their homes to create soil in the bokashi compost or collecting sticks from the school yard to create biocarbon. The products created during the project, such as aeroponic potatoes or plants cultivated with the help of bokashi composting, were intended to be highly visible in the school building (see Figures X.2 and X.3) to attract the attention of those who were not part of the projects. The creation of these material products also helped facilitate cooperation between the different student groups, each of which conducted their own components of the whole project. For example, the project culminated in a terrace designed and constructed by the students that hosted the plants they had cultivated. Specifically, one group studied the bokashi composting method and created do-it-yourself composts, while another group made the biocarbon; then, both were used to cultivate plants in the terrace. During the interviews, the students reported that they felt a sense of belonging to a community of practice established through this cooperation. This creative way of distributing the work across several youth groups also helped realize the utopian vision within the institutional time constraints of the school.

Figure X.2 The different groups of students created the cultivation terrace and opened it for all. The students decided to place signs from climate action demonstrations on the door.

Figure X.3 The students created biocarbon in the school yard (left). The students cultivated aeroponic potatoes, which they set up in the school dining hall.

The following excerpt from a student project plan illustrates a youth perspective on enacting the utopian vision:

Excerpt 4

> *In a world in which food waste is a huge problem and landfills are filling up with waste that clearly doesn't belong there, our group wanted to see if we could get alternative composting methods to work while also maybe learning something about microbes and how they can be used to our advantage in composting.*
>
> *Our school building also has a public library and they have been experimenting with bokashi composting for the last year or so. Our wonderful librarians were kind enough to introduce us to the world of bokashis, and we were immediately interested in this new and innovative way of turning your food scraps into nutrient-dense fertilizer that can be used, for example, in your garden. However, the bokashi composter in the library was quite pricey and, therefore, possibly something not everyone can consider buying.*
>
> *After a little research, our group decided to expand our project a little bit more and see if we could possibly also build our very own bokashi composter out of everyday materials that everyone already has somewhere lying around. We also wanted to buy an actual bokashi set that could be used outside of this project too to show people how bokashis work and how they can be stored almost anywhere—for example, in a corner of our school cafeteria!*

The project plan showed how science learning about microbes and composting was functionalized to address crucial issues of ecological sustainability through envisioning alternative ways of organizing food production. This excerpt further illustrates how the students could exercise their agency across a range of informal and formal contexts of learning: They first learned the basics of bokashi composting from the staff of the local city library and decided to save money by building their own do-it-yourself bokashi composters and re-using left-over materials from their homes. In the following interview excerpt, one of the students participating in the project explains how the idea was not to complete a school task, but to make a change in the world.

Excerpt 5

> *Yeah so one of the goals of this bokashi thing was that we wanted to spread the word— to make an impact so that this would not be a mere school project that molders away in some*

corner; so, we started to think about different alternatives of how can we push this forward. Can we advertise it on YouTube? Can we advertise this on Facebook? So, in this way, this was quite different . . . here, we had to think [about] how we can make this make a difference so that this can make an impact.

As intended by the teachers, the students viewed the material presence of their products in the school building as a form of change-making. One of the students elaborated on this idea in the following interview excerpt:

Except 6

It is very good to have the terrace for everyone's use in the school. . . . There, the other students can see what we have done and they could start to do something like that themselves. It's not very difficult, really, and the social media posts have been seen by many people and it has made them think like . . . like it makes them think how they could also make an impact. . . . [Regarding the activist signs that were laid out at the terrace entrance] They are very relevant for this topic, and, when people see them, it makes them think too and . . . hopefully, it makes them think. And, in that way, information is shared and hopefully also desired—like, hopefully for some, it engenders a desire to participate in activism. It would be the best situation.

It was a design intention of the teachers that the project would extend across informal and formal contexts of learning and that the students could exercise their agency in envisioning and building the concrete utopia in collaboration with their teachers and social actors outside of school, as reported by teacher Kirsi Haapamäki:

Excerpt 7

In this future-oriented urban gardening project, students are seen as active citizens learning new things together with adults who can be their teachers, university students or other collaborators, such as librarians from the local city library or a company related to the topic. Teachers are seen more as co-learners, providing the equipment and using their knowledge for the coordination of the project.

Both teachers reported that dilemmas arising when their work challenged the status quo of the school, as reflected on by teacher Aki Saariaho:

Excerpt 8

The role of a teacher contains many paradoxes. Our curricula give us the possibility to raise students to be empowered citizens in society, yet the school as an organizational structure is very much top-down and regulated. Teachers are given the position of societal educators of active citizens, but they are also required to be wary of what they can actually do in the tight hierarchical nature of school.

Although transformative approaches to researching and promoting learning, such as those we examined in this chapter, make the political aspects of learning more salient, learning environments—whether formal or informal—are never neutral. However, the above excerpt demonstrates that taking on a transformative activist stance in learning is a daring act that requires courage and the questioning of existing practices (see also Stetsenko, 2016).