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Exploring practices of critical design literacy

A comparative study of two lower secondary school design project

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We have destabilized nature by design. The Anthropocene epoch requires a fundamental redirection of the purpose of design and design education. This empirical review explores two design projects—*Repair* and *Ecovillage*—at the level of lower secondary education in Norway. The review examines ways in which pupils are challenged to question, rethink and transform unsustainable practices of everyday living. A methodological framework consisting of four narratives is used to identify design skills and discuss the potential empowerment of critical design literacy. In the *Repair* project, pupils' question practices of the fashion industry and responsible consumption while they design kits for mending clothes. The *Ecovillage* project challenges pupils to explore how architecture can lower carbon footprint and enable shared-living. The *Repair* project empowers the pupils to transform unsustainable practices present in the roles of consumers. The *Ecovillage* project asks pupils to claim a role as redirective designers and discern the possibilities of architecture to nudge change in our modes of being in this world.
Keywords: critical design literacy, general education, empirical review, design skills

Introduction – exploring critical design literacy in a trilogy

Design holds a key agency in materializing and designing our lives, as well as what comes next (Fuad-Luke, 2009). In *Design for the real world*, design researcher Papanek (1971) critiqued contemporary design practices as harmful for the environment, and detached from the needs and lives of ordinary people. Papanek advocated for designers to adopt social responsibility and the concept of design ethics. Including design in any curricula fuels change by exploring situations and satisfying problems. Facing the complex problem of overcoming a world made unsustainable (Fry, 2009), the question of change through design and design education becomes an ethical one. What situations are worth changing? What are the socio-ecological consequences of a new product, city district or service? What problems should be left unsolved? The 2013 DRS//Cumulus-conference in Oslo framed design education for all as a game changer. To promote sustainability and address global challenges, professional designers are dependent on critical consumers, a design literate general public (OsloMet, 2013, Nielsen et al., 2015). The general public—in the roles as consumers, investors, user participants or policy makers—holds the power of transforming unsustainable patterns of living by the products they voice and opt for, and the way they use and dispose of products. How might design education empower the general public in claiming their position as a well-informed and critical mass?

Reviewing the scientific discourse on design education for a general public, one would find different and rather conflicting ideas of what design literacy is, as well as on the purpose of design literacy for society and individuals. Lerner (2018) framed design literacy as the ability to understand and make use of a canon of aesthetic form. Her focus remained on the positive aspects of visual-spatial learning for an individual's cognitive growth and their advancement to a higher-level of abstract thought and creation. Economic competitiveness and success in a globalized market is another goal of introducing design literacy to the general public. Design literacy is framed as skills of creativity and innovation (Canina et al., 2013; Martin, 2009; Vande Zande, 2013; Wright, Davis, Buccolo, 2013). Deemed meaningful in terms of business, the contribution of design education as creative capital satisfies just one out of three mutually reinforcing pillars of sustainable development (United Nations, 2002). Economic competitiveness as the purpose of design literacy echoes

Sterling's (2001) critique of education as mainly reinforcing unsustainable values and practices by educating to 'compete and consume' rather than to 'care and conserve'. In the article, 'Evolution of the Mind: A Case for Design Literacy' (Pacione 2010), a questions is raised regarding what it means to be design literate as opposed to being a design professional. Pacione (2010) named "the act of arranging how something looks" as a stereotype of design to stamp out in order to convince a majority of leaders in business and government to support design thinking both in companies and as a vital part of general education (p. 11). Pacione (2010) put forward the basic skills of inquiry, evaluation, ideation, sketching, and prototyping. He describes an iterative process of uncovering and satisfying unmet needs as core design capacities, but no attention is given to the socio-ecological consequences of satisfying needs.
Looking back at initial arguments on why design awareness represents an important area of educational development, is becomes evident that design education was not introduced as a means to shape marketable innovations or beautiful forms; in fact, it was intended to meet "urgent need for the survival as well as the happiness of mankind" (Archer, 1973/2005, p. 21). Cross (1982) promoted design as a basic way of knowing, along with the humanities and sciences. He justifies design in general education by the way in which it develops abilities to tackle ill-defined real-world problems. Baynes (1974) and Cross (1982) frame the role of design education as empowering the individual for participation in daily life and society. Educating tomorrow's problem solvers to meet the challenges created by unchecked economic growth, pollution and inequity, shortcomings can be found in design literacy as a means of mastering a canon of aesthetical form—or as mastering the designers' toolkits for innovation. This article is the third in a series (Lutnæs, 2019; 2020) exploring what it means to educate for *responsible* design literacy. The trilogy takes up on the ideas of design as a basic way of knowing to participate in society (Cross, 1982) and the ideas of the critical consumer in promoting sustainability and addressing global challenges (OsloMet, 2013; Nielsen et al., 2015). The first article explored the scientific discourse, the second article explored a curriculum text, and the third article will turn the lens towards educational practice. In the following, contributions from the first and second article will be briefly introduced, as they are vital in understanding the background and methodical framework for the current and third article.

Framing the concept design literacy – four narratives and a definition

Educating the general public in design literacy can catalyse both environmental protection and degradation, human aid and human-made disasters. This is all contingent upon how *design literacy* is defined and how the scope of design is framed. The definition of design literacy is crucial. Reviewing the scientific discourse up until 2018, no explicit definition was found in regards to design literacy for the general public to support critical innovation and a possible move towards sustainable societies. The first study (Lutnæs, 2019) in the trilogy, articulated a definition by reviewing key texts' narratives (Soini & Birkeland, 2014). Identifying and reviewing the key texts in the scientific discourse (Nielsen & Brænne, 2013; Green, 2014; Christensen et al., 2018), shared ways of explaining design literacy—what it is and how to cultivate it amongst learners—were looked into. The review derived four narratives amongst the authors that were deemed vital to educate for design literacy:

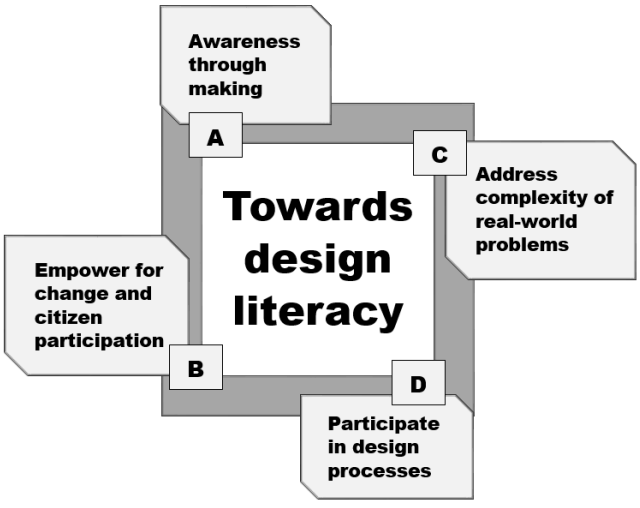

Figure 1. Four narratives on how to cultivate design literacy

The narrative (a) combines awareness and making. All authors emphasize the importance of first-hand experience with materials to educate a design literate general public. As makers, pupils learn how to transform materials and use visual elements to voice and advance ideas for the future (Green, 2014; Christensen et al., 2018). Through the mode of making in physical materials, the demand of time and energy in production becomes a first-hand experience to pupils, and further, what it takes a product to become solid, functional, and interesting to use over time (Nielsen & Brænne, 2013). The first-hand experiences provide an arena to draw pupils attention to the plural context of materiality and the socio-environmental impacts of human-made artefacts. The narrative (b) promotes design literacy as a game changer in encouraging more responsible participation from citizens. It is a shared narrative amongst the authors concerning the importance of providing pupils with a sense of agency and tools to question, rethink and transform the world. Pupils are empowered to voice their ideas and differing perspectives in the design of a garden (Green, 2014), or to criticize and change the system in how they acted as consumers and producers (Nielsen & Brænne, 2013). The narrative (c) frame the capability to address complexity of real-world problems as a key feature of design literacy. Pupils are challenged to map and navigate conflicting interests and dilemmas embedded in design practices and solutions. The capacity to embrace complexity and explore solutions that contribute to a better future is a shared goal among the three texts. The narrative (d) is endorsed by the authors as enabling pupils to adopt a designer's tools for innovation and to understand how designers think. In the 2019 article, I draw on insights provided by the four narratives to attempt a definition of design literacy empowering the general public for socio ecological responsibility:

> *Being design literate in a context of critical innovation means to be aware of both positive and negative impacts of design on people and the planet, approaching real-world problems as complex, voicing change through design processes and judging the viability of any design ideas in terms of how they support a transition towards more sustainable ways of living (Lutnæs, 2019, p. 1303).*

The definition corroborates Pacione's (2010) in terms of the ability to voice change through design processes. It also corroborates with Cross (1982) in tackling real-world problems. The crucial difference is the inclusion of awareness of the wider social and environmental impact of design and critical reflection, and this is brought about by judging how design ideas might advance more sustainable ways of living. Both the narratives and the definition will evolve as new academic texts address design literacy as part of general education. The first article in the trilogy reviewed the scientific discourse thus far and made a contribution by breaking the concept of design literacy into tangible pillars to identify and discuss design skills for the general public to claim a position as a well-informed and critical mass.

Mapping out design skills in a new national curriculum in the subject Art and Crafts

In the second article (Lutnæs, 2020), the four narratives are explored as a methodological framework to map out design skills and identify areas of curricular advancements. The real-world example for the study is the new Norwegian National Curriculum for the compulsory subject, *Art and Crafts*, in primary and lower secondary education (Ministry of Education and Research, 2019). The national curriculums serve as a regulation; competence goals describe what pupils should be able to master after completing a given year of study in each subject. As part of the national curriculum reform the definition of competence was changed to include 'the ability to reflect and think critically' (Norwegian Directorate for Education and Training, 2017). The study (Lutnæs, 2020) investigates how the competence goals in *Art and Crafts* respond to the conceptual change towards critical thinking. It maps out the potential of embedded design skills to educate responsible citizens and problem solvers of tomorrow.

The narratives (a) *Awareness through making* and (d) *Participate in design processes* are commonly tackled in the competence goals. In contrast, the narratives (b) *Empower for change and citizen participation* and (c) *Address complexity of real-world problems* are scarcely represented. The well-represented narratives (a/d) promote reflective processes in the design studios of primary and lower secondary schools. Narrative (a) calls upon the effort of the pupil to ensure minimum environmental damage and to strive for a product that becomes solid, functional, and interesting to use over time. Narrative (d) allows pupils to adopt tools for ideation and evaluation. The two scarcely represented narratives (b/c) hold the potential of shifting focus from skillful, reflective actions within the design studios to the real-world problems of society and responsible citizenship. The second article (Lutnæs, 2020) concludes with describing a need for developing educational resources to support teachers in advancing more transformative practices that recognize and challenge the dominant ideologies embedded in everyday situations. It calls for design responses that care for both people and the planet. The third article is a response to the need for educational resources and it explores two real-

world design projects from a teacher's perspective.

Method of inquiry – mapping design skills from an insider's perspective

The current study makes use of the four narratives (Lutnæs, 2019) as a methodological framework to map out potential empowerment of critical design literacy within two of my design projects at the level of lower secondary education. The two design projects, *Ecovillage* and *Repair*, were developed and integrated into educational practice in the 2020-2021 school year. I move between different modes of practices as I work both as a teacher in lower secondary education and as a professor at the university. My pupils are well aware of my double role as a teacher and an academic. In this study, the role as a teacher serves as a 'mediating component' (Dunin-Woyseth & Nilsson, 2012, p. 3) between the field of academia and the field of general education. This study reports strictly on the design of the projects from the teacher's perspective. Pupils' views, experiences or products are not part of the empirical data.

This study is situated as an empirical review from an insider's perspective and the development of educational resources is regarded as a creative practice. Riis and Groth (2020) described the value of the approach as follows: "Research through creative practice allows for experiential and embodied knowing from inside the practice to be documented, analysed and distributed in a way that an objective or distant approach will not facilitate" (p. 4). The design projects described in this study are not design researcher sketches of possible projects. They are real-world examples of a teacher from inside the practice of lower secondary education. The projects are designed with real pupils in mind. It takes into account knowledge of what motivates their learning and what is doable within the professional learning environment and conditions of a lower secondary school.

The *Ecovillage* and *Repair* projects were not planned with the four narratives in mind. Rather, they serve as a framework for a retrospect mapping of design skills. The study serves as a pilot on how the four narratives may have the potential to crack open educational practice for empirical review. A pilot, however, is only the beginning. The claim of Dunin-Woyseth & Nilsson (2012) is acknowledged regarding a double judgment of both practitioners and scholars through negotiations between connoisseurship and criticism. The double judgement points to the challenge of practice-based research and how research results must comply with the demands of both the world of academia and the world of professional practice (Dunin-Woyseth & Michl, 2001, p. 2). The key to approval comes through how the four narratives may facilitate dialogue and critique of design education among the stakeholders. In order to explore the full potential and assess research results, the methodological approach must be scaled up (e.g. by comparative review of design skills embedded in briefs across countries and levels of education or research on collaborative development of educational resources). With reference to Eisner (1975), Dunin-Woyseth & Nilsson (2012) describe the role of connoisseurship and criticism in practice-based research as follows: "to do research we could say that the competence of the connoisseur – the ability to perceive and appreciate nuances in a particular field of practice – has to be combined with the competence of the critic – the ability to disclose and communicate characteristics and qualities to a broader audience" (p. 7). Eisner (1975) explains the educational function of criticism as follows: "Its aim is to lift the veils that keep the eyes from seeing by providing the bridge needed by others to discern the qualities and relationships within some area of activity" (p. 8-9). The bridge in this study is the descriptors of the four narratives (Lutnæs, 2019), and the disclosed nuances stems from being a practitioner in lower secondary education. The four narratives are used as a shared structure to voice different design skills embedded in *Ecovillage* and *Repair*, followed by a discussion on the potential empowerment of pupils' critical design literacy.

The Ecovillage project

Since my very first year as a lower secondary teacher (school year 2015/2016), I have had the privilege of collaborating with local housing developers to design an architectural competition for the level 10 pupils (age 15-16). My drive for collaborative competitions is to showcase *Art and Crafts* relevance to society and future career opportunities for the pupils. Further, to fuel pupils' intrinsic motivation for school projects. The briefs for the competitions were always based on a case the housing developer was facing at the time. The interest of the housing developers in interacting with pupils were twofold. First, they were able to get ideas and inspiration from how youngsters approached the case. Second, there was a factor of motivating talent in pupils, potentially leading them to consider pursuing careers in carpentry, architecture, or entrepreneurship. The briefs were designed according to the competence goals in the current national curricula. They also sought to accommodate visions and terms set by the housing developer.

After a successful collaboration with the housing developer *Nordbolig* on massive wood apartments for a zero-

emission neighbourhood, *Nordbolig* initiated a new competition for the next school year based on a planned ecovillage at Møystad farm. I approved the initiative and sent a first draft for a competition on small family homes and senior apartments. The project leader at *Nordbolig* responded with a far more challenging and future-oriented idea; they wanted the pupils to design shared-living spaces for the ecovillage (Figure 2). Their vision for the shared-living spaces was to enable mixed-use, inclusive social interaction, and to lower the overall carbon footprint of the 50-60 inhabitants in the ecovillage. Furthermore, every home could be smaller—and therefore, greener—if people had access to shared facilities such as guestrooms, gyms, home offices, tool sheds and workshops.

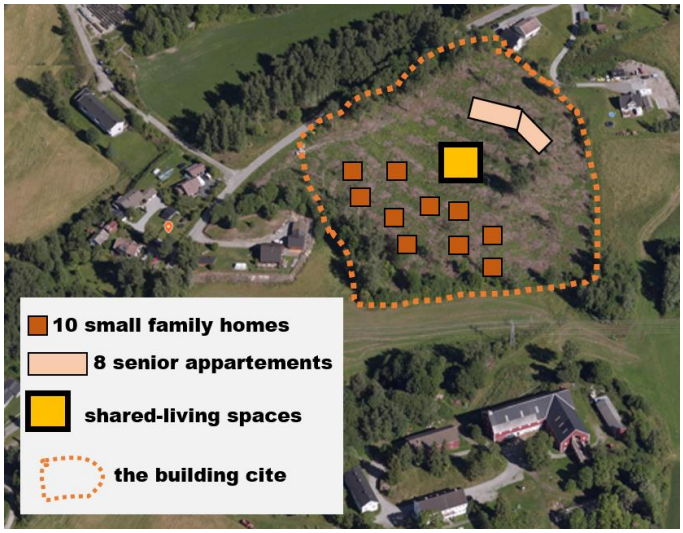

Figure 2. The building side for the Ecovillage project at Møystad farm

Nordbolig, the housing developer, provided a PowerPoint to familiarize pupils with the concept of an ecovillage, the site, criteria for the competition and a list of possible features for the pupils to combine with their own ideas. Pupils decided whether they wanted to sign up for the competition. All pupils (N: 100-120), however, were required to participate in the *Ecovillage* project as one of three compulsory 18-hour projects for their final grade in the subject *Art and Crafts*.

Reviewing the *Ecovillage* project with the four narratives as a lens, the twist from the project leader pushed it towards narrative (b), *Empower for change and citizen participation* and narrative (c), *Address complexity of real-world problems.* By making the case for the level 10 architectural project a planned ecovillage in the municipality, the pupils engaged in a real-world problem. The idea of designing shared-living spaces, however, added layers of complexity to the task. The pupils were challenged to map out how shared-living spaces could foster well-being and a sense of community, as well as contribute to combat climate change. In their design, the following conflicting interests and dilemmas emerged as pupils addressed the task: What are people capable of sharing? What conflicts might emerge with co-ownership? Should the shared-living spaces be accessible for the public or exclusively for the ecovillage community? Do the shared facilities offer something for all generations? Are the shared-living spaces making a noteworthy contribution to lowering the overall carbon footprint? The concept of shared-living challenged the pupils to fundamentally rethink ways of engaging with neighbours. It expanded on neighbour relationships, not as 'small talk over the hedge', but within the context of day-to-day living. Pupils gained experiences for change and citizen participation, and this was based on how architecture potentially enable—and disable—fellowship amongst people, as well as how it facilitates new ways of being. The shared-living spaces idea called on pupils to voice the perspectives of a whole village, not the singular individuals' visions for a home.

The narrative (a), *Awareness through making* is relevant to the ecovillage in how pupils gain first-hand experiences with scale and floorplans. Pupils connected to the physical realities of the site in terms of where the sun rises, but also what facilities the size of a room would enable. When they voiced and advanced their ideas, they needed to interconnect the interior and the exterior of the building and envision the spatial experience of the elements they put into play. The socio-environmental impacts of architecture is integrated in the *Ecovillage* project. This was evident through the ways in which by how the pupils were asked to further explore and derive suggestions on what the more environmentally-friendly choice would be (i.e., heating, materials, and interiors of the shared-living spaces), and how their suggested facilities for shared-living would

combat social isolation. The narrative (d), *Participate in design processes* is the backbone of the project; it was reflected in how pupils were led through a process of discovery, concept sketching, peer-critiquing of solutions, prototyping and refining details based on feedback from peers and teacher. This was all performed prior to the delivery of the project in the form of a digital presentation and critical review of their final design. In their critical review, they were asked to judge the viability of their own design and how their ideas for shared-living spaces could enable inclusive social interaction and lower the overall ecovillage carbon footprint.

The Repair project

The *Repair* project—designing kits for mending clothes—encompasses the fashion industry as a context to the level 8 pupils (age 13-14) learning in the *Art and Crafts* studio. The project ran for 20 hours and was one out of three compulsory projects in *Art and Crafts* for the 2020/2021 school year. The first phase of the project is exploratory, and it calls for pupils to learn basic skills of embroidery, techniques for stitching pieces of felt together and methods of making functional locking mechanisms for the repair kit. The pupils practiced a range of embroidery stiches of their choice; they used their acquired crafts skills to form a fabulous decorative creature on the repair kit. The exploratory phase culminated in the making of a paper prototype for the shape, decor and functions built into the repair kit at a 1:1 scale. The paper prototype provided the entry ticket for the pupils to cut fabric and create their repair kit. Feedback from peers and the teacher were integrated as a means of continuous improvement of craftsmanship, design ideas, user friendliness and variety in exploration of techniques.

Figure 3. My teacher sample to test the project and the old repair kit that sparked the idea for the Repair project

As a corresponding learning path to pupils' process of designing and making repair kits, a second assignment was introduced. Through this, I aimed to bring the fashion industry and the pupils' everyday life as consumers into the textile studio. The second assignment was divided into three tasks: How can you contribute to a lower negative impact on nature related to clothing? What are your pleas for the fashion industry that might change the system to take better care of nature and humans? Pupils were also asked to choose one of their own garments and visualize the garment's journey from "cotton seed to post-use". This was done by researching possible processes, peoples and countries involved. To enable the pupils to address the second assignment, I gave lectures on the environmental impact of the fashion industry, working conditions, facts on Norwegian clothing consumption and resources on how to mitigate overconsumption and textile waste in everyday living. Narrative (d), *Participate in design processes* is relevant to the *Repair project* in that pupils are led through a product design process of exploring possibilities within form, function and textile craft techniques towards a final product. The first-hand experiences with materials are a key to educate for design literacy in narrative (a), *Awareness through making*, and this key is situated within textile crafts in the *Repair project*. The pupils experienced the amount of accuracy and effort required to make even, solid stiches. Furthermore, they were able to see how the choice of materials, size and shape affects the functionality of the repair kit. In the exploratory phase, pupils were encouraged to take care of tools and materials to reduce environmental impacts in the making of the repair kit. As a teacher, I demonstrated how to place the pattern near the edge of the fabric, the appropriate length of the embroidery thread and what happens to textile scissors that have been used to cut paper. Efficient use of materials is something the pupils needed to learn, as squandering is more often than not a lack of knowhow rather than carelessness.
The second assignment expanded the *Repair* project from narrative (a)/(d) to narrative (b), *Empower for*

change and citizen participation and narrative (c), *Address complexity of real-world problems.* The pupils were challenged to embrace complexity by uncovering and documenting every possible detail regarding their own garment. They did not address the complexity of a real-world problem through this exercise. Rather, they began to scratch the surface on the complex system involved in fashion and how it relates to clothes they wear. It is worth noting that exploration of solutions is made by tasks that challenge pupils to voice ideas that might change the fashion industry for the better. When the pupils turned the lens on their own behavior as clothing consumers and suggested how they themselves could contribute, the task began to interlink with narrative (b) on responsible citizen participation.

Discussion

The project briefs are mediating artefacts that transform the studio into a learning space (Orr & Shreeve, 2018) with shared commitments. Including design in any curricula fuels change by exploring situations and satisfying problems. According to Simon (1996): "Everyone designs who devises courses of action aimed at changing existing situations to preferred ones" (p. 111). Choosing which situation to change is the concern of the design educator when planning a new brief. It would make a vast difference whether the design educator ask pupils to design products to increase sales, or to design products that improve quality of life while combating climate change. The latter asks pupils to relate to the socio-ecological consequences of design. In design education, the project briefs indicate expectations that arise in order for pupils' design ideas to be evaluated as valuable. In *Ecovillage* and *Repair* the challenges of the real-world were brought into the lower secondary education *Art and Crafts* studios. The concerns of the ecovillage brief were social isolation and the carbon footprint of housing, and the concerns of the repair brief were overconsumption and socio-ecological impact of the fashion industry. The final products consisted of repair kits for mending clothes (level 8) and concepts for shared-living facilities (level 10). These design responses hold the potential of transforming unsustainable practices of everyday living. They represent both an alternative and a critique of current socio-cultural realities. The projects explore counter-narratives related to design activism (Fuad-Luke, 2009) and designers' role as redirective practitioners (Fry, 2007; Manzini, 2009). The project briefs allow pupils to encounter two distinctly different learning spaces and roles for the in their design processes.

Empowering for redirective practices

In the *Repair* project, I have identified the situation worth changing—in this case, fashion waste—and decided on a repair kit as the design response. The outcome of the design process is predetermined, and the counter-narrative (Fuad-Luke, 2009) was a product of my decision. Accordingly, the repair kit displays the socio-ecological responsibility and a design response for sustainable consumption of a teacher, not the pupils. The pupils' design process did not address the complex real-world problem of fashion waste. Rather, it was concerned with what possible forms, functions and textile craft techniques needed to be combined to create the repair kit. In the *Repair* project, the textile studio is consciously turned into an arena for demonstrating eco-efficiency and care. It became a location that allowed pupils to adopt practices by first-hand experiences with tools and materials. The hours the pupils spent practicing embroidery and basic use of a thread and needle enabled them to mend holes and resew loose buttons, thus saving their clothes from a premature sortie. With their new repair kit, they got the tools needed to act as responsible consumers and redirect clothes from waste. The design and making of functional repair kits empowered the pupils with redirective practices and critical design literacy in their roles as consumers. The *Repair* project transformed the textile studio into a learning space for pupils to discover how small shifts in practices reduce environmental impacts, as well as newly-learned concepts of care and eco-efficiency to apply in daily tool use and resource consumption.

In the *Ecovillage* project, the design process was far more complex and open-ended (Christensen et al., 2018; Smith & Iversen, 2018). The pupils took the main role and decided which features they wanted to offer as a design response to the visions from the local housing developer. In addressing the task of shared-living spaces, the pupils engaged directly with the socio-ecological consequences of their proposed solutions. They also prioritized what situations were worth changing. In their design responses, the pupils addressed different real-world problems and confronted value conflicts such as: "What is the socio-environmental impact of shared sports facilities, compared to shared facilities for farming and processing of food?" Unlike the design response asked of level 8 pupils, the level 10 design response brought about the concept of design ethics, described by Chan (2017) as: "the broader philosophical question concerned with how one should live, or what a good human life consists in" (p. 186). The design response called for by the *Ecovillage* project challenged the pupils to claim a role as redirective practitioners in the design process, specifically concerning how we live together

as neighbours. This was done through creative compromises (Van de Poel, 2015) that combated social isolation and lowered the carbon footprint. It also discerned possibilities of architecture to nudge change in our modes of being in this world.

Empowering for critical reflection

The final products—repair kits and concepts for shared-living facilities—were not the only tasks pupils needed to perform and create within the projects. The potential empowerment of critical design literacy was reinforced by the questions embedded in the project as the pupils worked their way through the design process. A transition towards more sustainable ways of living depends on individuals with the courage to care and fundamentally rethink definitions of human needs and desires (United Nations Environment Program, 2011). Judging the viability of design ideas as a general public, and knowing what makes the more sustainable alternative, is difficult. However, there is always the availability of critical reflection through questioning consequences, beneficiaries and reasons. Critical reflection addresses the 'why' of action and the reasons and consequences of what we do. It aims to produce a profound change in our attitudes and actions, while reflection without this prefix operates towards improvements within an established field of practice, or the 'how' of action (Mezirow, 1990). Critical reflection empowers individuals to address the 'why' of design, and it is crucial in allowing large-scale changes.

In the *Repair* project, the second assignment introduced questions that required pupils to shift focus from designing and crafting to the fashion industry and their own consumer behaviours. These questions served move pupils' concerns to the wider social and environmental impacts of fashion. From this, a case for critical reflection was created. Pupils called the system into question and considered alternatives (Brookfield, 2010) towards more sustainable modes of consumption, trade and production. The pupils challenged the pre-established regimes through words, they 'named the world, to change it' (Freire, 1970). In the *Ecovillage* project, challenging questions emerged in the studio as pupils navigated conflicting interests and ethical concerns towards their final shared-living spaces concept. In the review of their own design, they were asked to judge the viability of their own design in terms of how it could support a transition towards more sustainable ways of living. In doing so, they took into concern both environmental protection and human well-being. The questions embedded in both *Repair* and *Ecovillage* challenged pupils to connect real-world problems with empathy. It provoked them to rethink our ways of being in this world as societies and as individuals.

This study explores two design projects—*Repair* and *Ecovillage*—at the level of lower secondary education in Norway. The research poses the question of how pupils are challenged to question, rethink and transform unsustainable practices of everyday living. Both projects disrupt the commonplace habits of inevitable human practices, of which concern getting dressed and building shelter. Exploring three key texts on reflective inquiry (Dewey, 1933; Freire, 1970; Schön, 1983), a structure was identified regarding four shared phases (Lutnæs, 2017). All three texts describe the experience of a temporary collapse in the ordinary script of life as the fuse of reflective inquiry. The first phase is an experience of confrontation (1) that calls a person's own habitual patterns into question. In the next phase, current sociocultural realities are explored (2) to enhance knowledge of the situation. The information provides a backdrop to evaluate (3) prevailing practices and habits of mind in an evaluative phase that aims to gain new understanding. Change is the ultimate goal of the process; it occurs when new understanding enables a creation of transformed (4) actions and habits of mind. Reviewing recent research on critical literacy, Bishop (2014) synthesized a similar cycle of moving from disruption of commonplace habits, interrogation of multiple viewpoints, identifying issues, undertaking actions, reflecting upon actions taken and creating visions for future projects.

Both design projects challenge the ordinary script of life and pupils act upon the disruption by promoting alternative visions. In the level 8 project, *Repair*, pupils use their words to express alternative visions and suggest change in both the fashion industry system and their own consumption patterns. The *Repair* project holds the potential of empowering pupils to navigate complexity and ethical concerns of fashion as consumers. Furthermore, by using their newly acquainted craft skills and repair kits to mend clothes, new potential was created to affect change and action in transforming unsustainable practices. Unlike the level 8 pupils, the level 10 pupils promoted alternative visions via a design response. Through the role as redirective design practititioners, the level 10 pupils were challenged, and navigated both complexity and ethical concerns of shared living. By gaining first-hand experiences with design as a redirective practice, the *Ecovillage* project holds the potential of empowering pupils to discover design and designers' role, coining visions and actions towards more sustainable ways of living.

Coda on the role of education empowering for critical design literacy

Transformation is a key concept in this article. The transition into a more sustainable model of society depends on citizens that act on their knowledge and design and implement large-scale changes. The favourable outcome of empowering for critical design literacy in general education is the critical citizen, or in other words: "individuals who are self-reflexive–setting themselves and their world in question–and have a deep concern for the lives of others" (Darts & Tavin, 2010, p. 241). On a note of concern, it must be added that a deep concern for nature is just as important as the concern for humanity. However, a teacher cannot prescribe new consumer habits and design activism amongst pupils, as the idea of influencing people's behaviour in a predetermined way contradicts the essence of education (Wals, 2011). Therefore, the concept of 'potential'—when interlinked with empowerment—is equally important. Another take on 'potential' is the four narratives as a methodological framework to crack open the practice of design education for empirical review. From a teacher's perspective in this study, design skills and potential empowerment for critical design literacy have been identified in two different lower secondary school projects. Other researchers and design educators are welcomed and encouraged to explore the full potential and to discuss further advancement of the framework.

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