AARHUS UNIVERSITY

Coversheet

This is the accepted manuscript (post-print version) of the article.

Contentwise, the post-print version is identical to the final published version, but there may be differences in typography and layout.

How to cite this publication

Please cite the final published version:

Jørgensen, N. J., Madsen, K. D., & Læssøe, J. (2017). Waste in education: the potential of materiality and practice. *Environmental Education Research*, 1-11. doi:10.1080/13504622.2017.1357801

Publication metadata

Title:	Waste in education: the potential of materiality and practice
Author(s):	Nanna Jordt Jørgensen, Katrine Dahl Madsen & Jeppe Læssøe
Journal:	Environmental Education Research
DOI/Link:	http://dx.doi.org/10.1080/13504622.2017.1357801
Document version:	Accepted manuscript (post-print)

General Rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Waste in Education: the potential of materiality and practice

Nanna Jordt Jørgensen, najo@ucc.dk

University College UCC, Humletorvet 3, 1799 Copenhagen V, Denmark, +4523986874

Katrine Dahl Madsen, kama@ucc.dk

University College UCC, Humletorvet 3, 1799 Copenhagen V, Denmark, +4560804905

Jeppe Læssøe, jepl@edu.au.dk

Danish School of Education, Aarhus University, Tuborgvej 164, 2400 Copenhagen NV, Denmark, +4524594446

Nanna Jordt Jørgensen is a social anthropologist, PhD in Education for Sustainable Development, and currently holds a position as assistant professor at the University College UCC. Her general research interest is the ways in which people cope with processes of change and uncertainty. She has been involved in research projects focused on children and youth, education, livelihoods, waste, sustainability, and immigration in Southern and Eastern Africa, and in Denmark.

Katrine Dahl Madsen, PhD in Education for Sustainable Development, currently holds a position as assistant professor at the University College UCC. Katrine's field of research is environmental and sustainability education, with a special interest in school and preschool development. Currently, she is involved in a research and development project on waste practices between homes and schools/preschools in collaboration with the municipality of Copenhagen.

Dr Jeppe Læssøe is a professor with special responsibility for research on environmental and sustainability education at the Danish School of Education, Aarhus University. His research is focused on social learning and sociocultural change related to sustainable development issues. The different types of change agents, their relations and their competences to cope with sociocultural dynamics are key topics of his research. He has also written about modern everyday life and the meaning of nature, environment and consumption, as well as the history of environmentalism in Denmark.

This work was supported by the Environmental Protection Agency of the Danish Ministry of Environment and Food, Kommunepuljen

Waste in Education: the potential of materiality and practice

This article explores how waste materials and waste practices figure in education, pointing to educational potentials of waste which have hitherto received little consideration in environmental and sustainability education practice and research. Building on empirical research on waste education in Danish schools and preschools, we discuss how an empirical and theoretical focus on waste as material and on waste practices moves beyond conventional approaches to waste in education. Seeking to overcome the shortcomings of habitual-behavioural and rational action approaches, we argue for an approach to waste education which encourages pupils to explore the socio-material aspects and trajectories of waste practices and waste materials.

Keywords: Waste education, school, preschool, materiality, practice

Introduction

Waste has a special material existence in our everyday practices. Waste comprises physical materials, which move relatively quickly in and out of our living spaces; materials which are not meant to remain in our immediate vicinity and which are considered of little value. Waste materials change hands rapidly and thus form part of various socio-material constellations and practices. In this article, we explore how waste materials and waste practices figure in education, pointing to educational potentials of waste which have hitherto received little consideration in environmental and sustainability education practice and research.

When the so-called new environmentalism emerged in the 1960s, provoked by increasing levels of pollution, waste and waste treatment became the focus of educational efforts to raise awareness and change people's practices (Jamison, 2001). As this first wave of environmental education emerged in response to growing environmental concerns, it was in many cases expert driven and oriented towards

behavioural change with little attention paid to parallel developments within the field of educational science and theory. Although behavioural change approaches have been widely criticised by educational theorists, they still form the basis of much environmental communication (Stevensen and Stirling, 2010:220). Based on a review focused on waste management and education in schools and preschools, we suggest that the majority of educational ideas and concepts characterising analytical perspectives used in research on waste education have been in line with such expert led, behavioural change oriented approaches.

In the 1980s, a second wave of environmental education developed, drawing inspiration from critical theory, which took the question of education more seriously (see e.g. Stevenson, Dillon, Wals, and Brody, 2014:513). Within this tradition, environmental and sustainability education is seen as a field for cultivating democratic culture (e.g. Carlsson and Hoffmann, 2011; Lundegård and Wickman, 2012; Mogensen and Schnack, 2010). A key concept is action competence, adding an explicitly educational objective to environmental education related to active citizenship and liberal political education (Jensen and Schnack, 1997:472). Our review suggests that this approach has had relatively little influence on waste education as a more specific field of environmental education research and practice. Furthermore, although it presents a distinct alternative to the behavioural modification approach, it tends to restrict environmental education theory through its effort to replace the environmental approach with a generic educational approach. While this 'educational turn' has provided a much needed discussion of the educational purpose of environmental education, it tends to remove focus from the environmental content, thereby overlooking that specific environmental issues may be theorised in specific ways, with implications for the ways they are addressed in environmental education.

In this article, we propose that waste has a wider educational potential than found in these two waves of environmental education. Drawing on empirical examples from waste education activities in Danish schools and preschools, we argue for an approach to environmental and sustainability education which takes environmental and sustainability issues seriously and develops educational approaches rooted in specific issues and their potentials for learning. Our analysis draws on theoretical entry points, emphasising the interwoven material, social, sensuous, practical, and intellectual aspects of waste management in everyday life, thereby overcoming the shortcomings of a habitual-behavioural approach as well as of a rational action approach. On this basis, we explore the ways in which *waste materials* and *waste practices* are integrated in educational activities in various ways and examine these empirical focus areas through theoretical perspectives on materiality and practice.

Researching waste education

We presume that waste education is an inherent part of many eco-school practices, as well as environmental and sustainability education (ESE) practices in schools and preschools in general. However, based on ERIC and Google Scholar searches for research on waste and school/day care/preschool/kindergarten, we found surprisingly few studies on waste education, other than some articles focusing on action learning projects with no attempt to apply or develop wider-reaching theoretical approaches. At the preschool level, this concurs with reviews pointing to the lack of research on ESE in preschools (Davis, 2009), the dubious quality of this research (Somerville and Williams, 2015) and ignorance regarding ESE learning processes and content among preschool children (Hedefalk, Almqvist, and Östman, 2015). The body of research literature on ESE at the primary school level is much larger; however, waste is seldom addressed. Among those studies addressing waste education, some point to a lack of

teacher competences (Cinquetti and de Carvalho, 2007; Hanish, Rank, and Seeber, 2014; Kolbe, 2015), while others focus on the relations between waste education in schools and household recycling motivations, attitudes and behaviour (Damerell, Howe, and Milner-Gulland, 2013; Grodzinska-Jurczak, Bartosiewicz, and Twardowska, 2003; Legault and Pelletier, 2000). Generally, these studies approach waste education as a behavioural change domain and view research as a matter of identifying causal effects by means of quantitative methods, without taking contextual factors into account and without referring to or adding to theoretical approaches.

Only two studies employing analytical perspectives relevant to our own research were identified during the review. The first, a study by Redman (2013), presents a model linking the outcomes of waste education and behavioural change with four key sustainability competences and three educational approaches. The educational approaches in this model are meaningful from a practice theory perspective and thus may inspire the future development of a practice-oriented model of waste education. The second, a study by Payne (2005), presents didactical reflections on the importance of linking classroom teaching and everyday practices at school, as well as in the pupils' homes. This perspective is relevant for our reflections on the educational potential of working with the trajectories and practices through which waste materials link home and school.

Methodological approach

This article draws on an empirically and theoretically explorative study of waste education practices. The empirical, qualitative exploration of waste education practices and the theoretical exploration of relevant concepts and approaches have been simultaneous and are intertwined into what Coffey and Atkinson refer to as an *abductive* process (Coffey and Atkinson, 1996). Rather than working deductively,

clarifying theory and concepts in advance of the empirical study, or inductively, letting phenomenological exploration lead to conceptualisations which are subsequently related to existing theories, in this study, empirical findings and theoretical conceptualisations have been in continuous dialogue. Reflecting this research process, in the presentation of the analysis in this article, empirical examples and theoretical reflections are interwoven.

The study was conducted as part of a research and development project carried out in 2015-2016 in collaboration between the municipality of Copenhagen and researchers from the Danish School of Education, Aarhus University. The overall aim of the project was to explore preschools and schools as learning arenas for the recycling of household waste in ten Danish municipalities, working with various educational experiments regarding waste treatment in order to identify challenges and potentials for further development of waste education practices. However, the role of research was not only to take care of the collection and analysis of empirical material, but also to provide theoretical perspectives in order to inspire dialogue and co-creation of knowledge with other agents. As part of the project, a knowledge exchange network was established involving municipal employees, teachers, trade union representatives and researchers. During network meetings, the ongoing research was presented and discussed, thereby generating new knowledge which, in turn, informed and stimulated further research. This approach is inspired by interactive research, which deviates from other types of action research by emphasising dialogical knowledge exchange and mutual feedback processes between researchers and other agents involved in the development project (Nielsen & Svensson, 2006).

On this basis, the study was designed to include two rounds of visits to ten educational institutions (schools and preschools) in the ten participating municipalities.

The purpose of the first round of visits was to explore existing understandings, knowledge, experiences, and ideas related to waste treatment among teachers, parents and children at the ten institutions, while the second round aimed to explore experiences and learning processes related to the waste education experiments that were implemented. In total, 20 semi-structured interviews with teachers/technical personnel, 8 group interviews with children and 8 interviews with parents were carried out during the research period. At the first knowledge exchange network meeting, preliminary results from the analysis of the empirical material from the first round of visits were presented and discussed. Inspired by the preliminary analyses, as well as this multi-agent discussion, we began to explore anthropological and other sociocultural theories on waste and waste management (e.g. Ekström, 2015; Higgin, 2016), but also more comprehensive theoretical contributions on materiality and practice theory (e.g. Ingold, 2011; Ingram, Shove, and Watson, 2007; Miller, 2008, 2010; Shove, Pantzar, and Watson, 2012). At the second knowledge exchange network meeting, we presented a draft for how these theories might question and inspire waste education. Based on this draft, as well as the responses we received at the meeting, we developed questions for the interview guide for the second round of visits. The final part of the project consisted of two elements: one focusing on the analysis of the empirical material from the second round of visits and targeting the waste education practitioners at the third and final knowledge exchange network meeting; the other focusing on the theoretical elaboration and contribution presented in this paper.

Before presenting the outcome of our interactive empirical and theoretical explorations, we will set the scene by briefly introducing waste education in the Danish context.

Waste education in Danish schools and preschools

Learning about waste and resources is part of the curriculum for primary and lower secondary schools in Denmark and is an optional theme in preschool institutions. In the institutions visited, special waste education had been initiated, but these activities took many different forms. Some of the institutions focused on waste management during a specific three-week period, whereas in other institutions the work was more closely integrated in their everyday practice, as was the case, for instance, in a school aiming to be 'waste free'. Some institutions worked with waste as part of a development project supported by external agents, such as the municipality or an NGO, while others had initiated the work on their own. Waste education was approached differently in schools and preschools due to, among other factors, differences between the professional backgrounds of preschool teachers (pedagogues) and teachers, and to different structural frameworks. Whereas the school day is relatively strictly structured by a series of lessons and teachers, and guided by clear learning objectives, preschool institutions in Denmark have more loosely structured days within a more open framework of learning plans.

A number of the interviewed teachers and preschool teachers suggest that waste education is about teaching children to clean up after themselves. Learning to treat waste in 'proper' ways, from this perspective, appears to be based on a behavioural change rationale in the sense that children, initially at least, are not supposed to reflect upon and think critically about waste processes, but rather to follow expert advice and incorporate this new knowledge into their behaviour. One preschool teacher thus stated that responsible waste management should be as natural as washing your hands after you have been to the toilet, pointing to the habitual dimension of waste practices: 'You just do it, without thinking.' While behavioural change might be considered in instrumental terms, as a means to solve a technical environmental problem, for the

teachers it was also seen as a question of a broader moral socialisation. Children should learn to clean up after themselves, thereby building up a more general sense of responsibility. One teacher said:

Sometimes we think we have to do something bigger and more elaborate, doing recycling and that kind of thing. But it is a good idea to start from the inside, to ask, do you know how to tidy up after yourself? Actually, it all begins with the question of whether you know how to make the waste reach the waste bin.

While we do not dispute the idea of encouraging good habits and responsibility in relation to waste management, we suggest that there is a much wider educational potential in waste and waste practices than making sure that children know ‘how to make the waste reach the waste bin’. In the following, we explore this potential, first by approaching waste, empirically and theoretically, as material, and, second, by discussing waste from a social and technical practice perspective.

The educational potential of waste as material

It has been pointed out that, until recently, environmental and sustainability education research has had relatively limited focus on the real, material aspects of, for instance, global climate changes, the physical environment and the material body (Lysgaard & Fjeldsted, 2015). Examples of engagement with the material in environmental and sustainability research include work on the relations between education and place or land (see e.g. Gruenewald, 2003; Tuck, McKenzie, and McCoy, 2014; Tuck & McKenzie, 2014), and studies which, inspired by phenomenology, call attention to embodied experiences of environment and nature in educational situations (e.g. Jørgensen, 2015; Payne, 1997, 2011; Sandell and Öhman, 2010). Other studies have discussed embodied experiences involved in environmental education encounters with reference to race (Le Grange, 2004), gender, and culture (e.g. McKenzie, 2008). In this

section, we suggest that anthropological studies of materiality may inspire environmental and sustainability education research, drawing attention to the educational potential of a focus on waste materials and the socio-material relations of which they are part.

Waste materials, creativity, and the sense of time

In a number of the preschools visited, waste education is carried out as part of more institutionalised activities addressing art and creativity. Imaginative cities and futuristic cars are created from reusable waste materials collected from local companies and private homes or found at the beach or elsewhere in the local community. In other words, artistic activities become the entry point for dealing with waste materials and thus for learning processes on waste and reuse. At some of the institutions visited, inspiration for creative waste activities is drawn from the Remida approach, which introduces artwork utilising reusable materials as part of the pedagogical practice¹. Remida aims to link reflections on ecology and pedagogy, and to support the curiosity of the child in the context of a complex and changing world in close collaboration with parents and local communities. Teachers at these Remida-inspired preschools emphasise how the work with reusable materials supports children's fantasy, ingenuity and creativity, as reusable materials do not offer predefined activities and play, but rather stimulate children's curiosity, invite playful approaches and strengthen children's ownership of the toys which they participate in making. During our visits to preschools, children excitedly showed us their artwork, pointing to the materials they had used to

¹ Remida is named after the myth of King Midas, about whom it is said that everything he touched turned to gold. It forms part of the Italian Reggio Emilia pedagogical philosophy, which is based on the idea of the child as resourceful and curious, and the role of pedagogues as listeners, posing questions rather than presenting answers (Cecchin, 1999).

produce the bus, the doll and so on: “this is made from one of those tins with ice cream in”, “this is an old sock”, “I made this one!”.

The anthropologist Daniel Miller, known for his work on materiality in relation to consumption, has pointed to the interactions between temporality and materiality, and in particular to interactions between people, things and memory (Miller, 2008). Along similar lines, ethnologist Orvar Löfgren discusses the emotions and affects which ‘coexist with and also charge material objects’ (Löfgren, 2015, p. 15), pointing to the way in which things and materials trigger emotions and memories. Inspiration from these approaches to materiality draws our attention to the ways in which waste as materiality is experienced in everyday life and to how waste materials link us to the past, as they remind us of past consumption – eating a chocolate ice cream at a birthday party, the socks that grandmother gave me last Christmas etc. However, waste also links us to the future, as waste is characterised by being in the process of becoming something else, decomposing, mixing with other substances, being taken apart and re-used (Higgin, 2016; cf. Ingold, 2011). In our empirical material, we see that processes of decay and temporal differences in the decay of different materials appear to provide an entry point for thinking about the future in more concrete terms among both younger and older children. The reuse of waste in creative activities offers waste materials the possibility of a new ‘life’; an extended period of use before becoming waste again. According to one preschool teacher: ‘Everything has the right to become something different. [The children] are very interested in this [idea]. And in how the thing feels: if it is soft or hard or smooth or...’. Notions of the future linked to the material existence of waste thus become vital to the learning processes in creative/aesthetic educational practices involving waste.

Apart from negotiating the status of waste materials, in many cases, their reuse enables children to integrate recycling in creations imagining the future. At one preschool, part of an old moped is transformed into a futuristic flying vehicle; at others, plastic boxes, cartons and old buttons become robots. Waste thus creates a link to both the past and the future, and thereby has the potential to provide educators with concrete entry points for discussions about the temporal perspective of sustainability.

Working educationally with the potentiality of waste materials thus opens up for different ways of thinking about how we use and discard things and about the temporal aspects of sustainability. The creative work with waste enters into children's imaginative and material worlds, and while the artwork with reusable materials at the institutions does not necessarily contribute directly to waste reduction, it might be a starting point for reflection alongside children (and their parents) on broader issues of consumption, and of reduction and reuse of waste from a temporal perspective. As both *art* and *nature* are core issues in preschool teaching plans in Denmark, waste might be used in exemplary ways (Negt, 1968) to combine these issues and to illustrate broader societal issues of waste and sustainability with current and future relevance.

Waste in socio-material relations

The material existence of waste is in focus when waste is included as a material in aesthetic educational practices, as discussed above, but it also plays a role in a number of other socio-material practices in educational settings. Lave and Wenger's work on situated learning provides us with a perspective on how social relations are produced and reproduced through social practice (1991), and on the role played by materials such as tools and artefacts in the production of social relations (Wenger 1999). Our empirical material shows that, in schools and preschools, waste materials figure in social practices

which are not necessarily considered ‘educational’ (i.e., not part of the teaching), and, in particular, in school-family relations and school-community relations.

In Denmark, parents are expected to be actively involved in their children’s school and preschool lives (see e.g. Dannesboe, 2013). Politically, the focus has been on partnerships with parents (*forældresamarbejde*) practised through, for instance, general parents meetings for larger groups of parents and regular dialogue meetings between teachers and parents about the individual child’s progress and situation. However, as discussed by Dannesboe, everyday socio-material practices link home and school in numerous other ways. Dannesboe suggests exploring ‘material forms which [...] move between different places, thereby becoming entangled in everyday practices which involve children and adults as well as the physical organisation of home and school’ (translated from Danish) (Dannesboe, 2009:66). Drawing inspiration from this perspective, we propose that waste is a material which becomes entangled in everyday practices of social relations linking schools with homes and with other institutions in the community.

Waste is most conspicuous in the practice of social relations involving school and family when teachers ask parents to bring waste materials to the preschool, where they are used in creative pedagogical projects, and later invite them to admire the resulting artwork. However, the movement of waste between home and school is generally most pronounced in relation to lunch practices. In most schools visited, children bring their own packed lunch; parents are thereby implicated in the generation of waste which has to be sorted and treated at school. In some schools, the teachers suggest that ‘how lunch is packed is not our department’, while in other institutions, teachers seek to actively influence the lunch packing practices of parents, for instance by discouraging the use of tin foil. In one preschool, teachers offered parents a roll of

greaseproof paper to take home. ‘We looked at their lunchboxes and then we talked about the tin foil, how bad it is. It takes years to decompose’, one preschool teacher notes. While most parents appear to have responded positively to these actions by the preschool teachers, the example draws attention to how waste becomes part of the constantly negotiated relationship between home and school, pointing to wider discussions about the interactions and relations between state and family in educational institutions (see e.g. Dannesboe 2013).

Furthermore, waste materials figure in relations between schools and a wider community. The Danish school reform of 2014 introduced the idea of the ‘open school’, encouraging schools to collaborate with other stakeholders in the local community with the aim of improving pupils’ learning processes². Such collaborations already exist in a number of communities, and some of them are social relations practised through an exchange of waste materials. In the simplest cases, waste collected at school and dumped in waste bins on school grounds will be collected by waste treatment workers from the local municipality. In some cases, schools are additionally involved in collecting waste in the community, either through clean-up campaigns or through the collection of specific types of waste which may be reused. In such activities, waste becomes the material which links pupils and teachers with stakeholders from outside the school. Furthermore, in some schools, teachers arrange visits to waste treatment facilities in order to teach children what happens to the waste when it has left the school.

Waste, in other words, figures as a material in social relations which, while not necessarily part of the teaching, receive educational and political attention at

² <https://www.uvm.dk/Uddannelser/Folkeskolen/Laering-og-laeringsmiljoe/Den-aabne-skole>

educational institutions in Denmark. However, none of the teachers interviewed mentioned the educational potential in exploring and reflecting upon the ways in which waste figures in the production and reproduction of social relations. Such reflections may serve as an entry point for discussions about wider webs of socio-material connections involving waste, and thus about the global perspectives of sustainability. Waste not only links educational institutions with families and local enterprises or waste treatment facilities, but with producers of material goods all over the globe and with the global environment.

The educational potential of waste practices

Having explored the educational potential of focusing on waste as material, we will now turn to waste practices, with theoretical inspiration from practice theory.

Practice is one of the key concepts of social science. With inspiration from Marx, a number of prominent social theorists have discussed the interplay between social reproduction and social change in everyday practices, including Bourdieu (1977), (Giddens, 1984), de Certeau (1984) and Lave & Wenger (1991). Positioning themselves as distinct from structuralism, as well as from essentialist agent perspectives, these theorists have approached practice as emerging in the tension and interplay between, on the one hand, existing historical, sociocultural and material structures and, on the other hand, human agency. In this section of the article, we are inspired by a recent strand of practice theory building on the work of Schatzki (1996) and Reckwitz (2002), who, like Giddens and Bourdieu, regard social practices as the basic ontological units for analysis. This implies, on the one hand, that individual actions are constituted by practice, and, on the other hand, that social order, structures and institutions come into being through practices (Røpke 2009).

Waste and everyday practice

One of the schools visited worked at the institutional level to minimise and sort waste as much as possible. Teachers addressed the challenge of motivating children by involving them in a process where they designed and constructed containers for paper and organic waste. Afterwards, they helped communicate information about the new recycling system to other pupils and organised the collection of the reusable everyday waste in collaboration with the school caretaker. During this practical experiment, the pupils had to cope with several challenges related to the technical design, the organization of the recycling system and the behaviour and knowledge of the other pupils at the school. In this sense, they gained experience with understanding and coping with waste as social practice, although such a view on waste was neither explicitly reflected nor applied by the teachers interviewed.

A practice, in general terms, is an organised constellation of activities. According to Shove, Pantzar and Watson (2012), a practice is an assemblage of elements, containing materials (things, technologies, stuff), competences (skills, know-how, techniques) and meanings (symbolic meanings, ideas, aspirations) that are dynamically integrated by skilled practitioners through regular and repeated performance. In contrast to research on anti- and pro-environmental behaviour focusing on individual's attitudes, values and beliefs and their contextual constraints, social practice theory shifts the focus away from the decision-making of individuals and towards an understanding of individuals as 'carriers' of various activities and tasks comprised by different everyday practices (Hargreaves, 2011). From this point of view, social practices emerge, stabilise and die out as the links between the elements are made and broken. Individuals are 'recruited' into practices; not through a process of passive compliance, but as skilled agents who actively negotiate and perform a wide range of practices (ibid). Furthermore, Shove et al. emphasise that social practices are not

isolated units, but are related to other practices through shared elements or by complementing each other (Shove et al., 2012).

From this perspective, waste management may be seen as a social practice in itself, comprised by waste materials, waste sorting systems, waste management skills, and by norms and symbolic meanings affiliated with waste. As such, it shares elements with and is influenced by other everyday practices such as cleaning, shopping, transport and home decoration. Furthermore, waste materials may be seen as elements of other social practices.

The involvement of pupils in the design, construction and communication of a waste management system at school level provides opportunities for the pupils to reflect, act and learn by experiencing the effects of their efforts to influence and improve schoolwide waste practices. As such, it can be considered a good example of democratic and educationally oriented environmental education. However, approaching waste as social practice might also open for waste education as exemplary learning about social practices (Negt, 1968); that is, generating generic knowledge from specific examples of how social practices are shaped, maintained and altered over time, and how they differ from context to context. Exploring waste as social practice by asking questions about the rationality, history, cultural specificity and challenges of different waste practices may help enhance the understanding of waste challenges and build capacity to cope with waste practices as dynamic constellations of materials, competences and meanings.

Finally, social practice theory opens for another perspective on waste education and the relation between school and home. With an individualistic approach to waste management, waste education becomes a matter of teaching pupils waste management skills at school with the expectation that they will be able to transfer this knowledge and

behaviour to their homes. From a socio-technical practice point of view, however, there is a stronger potential in studying how and why waste practices at schools and in homes are constructed in different ways, with different elements and relations to other practices, in order to strengthen pupils' competences to identify specific opportunities for sustainable change.

Conclusion

In this article, we have discussed waste education through an analysis based on an interactive empirical and theoretical exploration of how waste materials and practices figure in educational settings. This analysis, we argue, contributes to the development of a stronger theoretical approach to waste education which, rather than incorporating waste issues into more general environmental and sustainability education approaches, is based on the particular materiality and practices which relate to waste.

Our analysis proposes, firstly, that approaching waste as material offers students a sensuous entry point to temporal and relational aspects of waste issues, transcending a rational-behavioural horizon without becoming citizenship education. Secondly, exploring waste practices as broader socio-technical practices transcends the focus on individual knowledge acquisition which dominates conventional approaches to waste education.

The analysis of waste materials and practices points to several educational potentials for further exploration. Sensuous and embodied ways of working with how children imagine the future could easily be linked to sustainability discussions, and the journeys of waste materials between homes, schools and the wider community offer concrete, material entry points for creating and reinforcing social relations around waste across different settings. Approaching waste practices as part of larger socio-technical practices provides educational opportunities for reflection on how waste practices are

contextualised in different settings. Focusing on waste practices also draws our attention to the fact that waste is related to a broad spectrum of other social practices which are not focused on waste, or education for that matter. This insight may inspire an approach to waste education that shifts the focus on waste to a focus on different types of social practices, materials and products in which waste figures. Encouraging pupils to explore the socio-material trajectories of such practices and materials provides a potentially fertile basis for reflection on consumption in a temporal perspective, and for consideration and sociological imagination regarding the value of things, practices and waste.

References

- Bourdieu, P. 1977. *Outline of a Theory of Practice*. Cambridge: Cambridge University Press. <https://books.google.com/books?id=Hbw2AAAAQBAJ&pgis=1>.
- Carlsson, M. S., and B. Hoffmann. 2011. "Handlekompetence og demokratisk dannelse." [Action competence and democratic building.] In *Essays om dannelse, didaktik og handlekompetence: inspireret af Karsten Schnack* [Essays on building, didactics and action competence: inspired by Karsten Schnack], edited by K. K. B. Dahl, J. Læssøe, and V. Simovska, 119–130. København: Forskningsprogram for Miljø- og Sundhedspædagogik, Danmarks Pædagogiske Universitetsskole, Aarhus Universitet.
- Cecchin, D. 1999. "Når pædagogik sætter spor og vandrer over landegrænserne." [When pedagogies create marks and cross borders.] *VERA – Tidsskrift for Pædagoger* 9.
- de Certeau, M. 1984. *The Practice of Everyday Life*. Vol. 1. Oakland: University of California Press. https://books.google.com/books?id=-Csl_AAoUT8C&pgis=1.
- Cinquetti, H. C. S., and L. M. de Carvalho. 2007. "Teaching and Learning About Solid Waste: Aspects of Content Knowledge." *Environmental Education Research* 13 (5): 565–577.
https://wx7cf7zp2h.search.serialssolutions.com.ez.statsbiblioteket.dk:2048/?ctx_ve

r=Z39.882004&ctx_enc=info:ofi/enc:UTF8&rft_id=info:sid/ProQ%25253Aeric&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&rft.genre=article&rft.jtitle=Environmental+Education+Research.

Coffey, A., and P. Atkinson. 1996. *Making Sense of Qualitative Data: Complementary Research Strategies. The Lancet*. Vol. 42. Thousand Oaks: SAGE.
doi:10.1016/S0140-6736(03)12668-2.

Damerell, P., C. Howe, and E. J. Milner-Gulland. 2013. "Child-orientated environmental Education Influences Adult Knowledge and Household Behavior." *Environmental Research Letters* 20 (1): 1–7.

Dannesboe, K. I. 2009. "Skoletasker og skolebørn: når skole gøres fraværende og nærværende i socio-materielle sammenviklinger i børns hverdagsliv." [School bags and school children: when school is made absent and present in sociomaterial entanglements in children's everyday lives.] *Nord Nytt* 106/107: 63–76. [https://pure.au.dk/portal/en/persons/karen-ida-dannesboe\(39cf9b05-d948-4f6e-92ef-0d90311580dc\)/publications/skoletasker-og-skoleboern\(e49101d0-fafa-11de-9a72-000ea68e967b\).html](https://pure.au.dk/portal/en/persons/karen-ida-dannesboe(39cf9b05-d948-4f6e-92ef-0d90311580dc)/publications/skoletasker-og-skoleboern(e49101d0-fafa-11de-9a72-000ea68e967b).html).

Dannesboe, K. I. 2013. "Den grænseløse skole? Forhandlinger af nærvær og fravær af skole i familie." [The borderless school? Negotiations of presence and absence of school in the family.] *Barn* 4: 45–60.

Davis, J. 2009. "Revealing the Research 'Hole' of Early Childhood Education for Sustainability: A Preliminary Survey of the Literature." *Environmental Education Research* 15 (2): 227–241.
https://www.serialsolutions.com/ezstatsbiblioteket.dk/2048/?ctx_ver=Z39.882004&ctx_enc=info:ofi/enc:UTF8&rft_id=info:sid/ProQ%25253Aeric&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&rft.genre=article&rft.jtitle=Environmental+Education+Research.

Ekström, K. M. 2015. *Waste Management and Sustainable Consumption: Reflections on Consumer Waste*. Edited by Karin M. Ekström. London: Earthscan Routledge.
https://books.google.dk/books?id=KtrfBQAAQBAJ&pg=PT1&dq=waste+management+and+sustainable+consumption&hl=en&sa=X&redir_esc=y#v=onepage&q=wastemanagementandsustainableconsumption&f=false.

Feldman, M. S., and W. J. Orlikowski. 2011. "Theorizing Practice and Practicing

- Theory.” *Organization Science* 22 (5): 1240–1253.
doi:10.1287/orsc.1100.0612.Nielsen, K. A. And L. Svensson, Eds. (2006). *Action and Interactive Research - beyond practice and theory*. Maastricht: Shaker Publishing.
- Giddens, A. 1984. *The Constitution of Society: Outline of the Theory of Structuration*. Hoboken, NJ: Wiley.
<https://books.google.com/books?id=YD87I8uPvnUC&pgis=1>.
- Grodzinska-Jurczak, M., A. Bartosiewicz, and A. Twardowska. 2003. “Evaluating the Impact of a School Waste Education Programme upon Students’, Parents’ and Teachers’ Environmental Knowledge, Attitudes and Behaviour.” *International Research in Geographical and Environmental Education* 12 (2): 106.
doi:10.1080/10382040308667521.
- Gruenewald, D. A. 2003. “Foundations of Place: A Multidisciplinary Framework for Place-Conscious Education.” *American Educational Research Journal* 40 (3): 619–654. doi:10.2307/3699447.
- Hanish, A., A. Rank, and G. Seeber. 2014. “How Green are European Curricula? A Comparative Analysis of Primary School Syllabi in Five European Countries.” *European Educational Research Journal* 13 (6): 661–682.
https://wx7cf7zp2h.search.serialssolutions.com.ez.statsbiblioteket.dk:2048/?ctx_ver=Z39.882004&ctx_enc=info:ofi/enc:UTF8&rft_id=info:sid/ProQ%25253Aeric&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&rft.genre=article&rft.jtitle=European+Educational+Research+J.
- Hargreaves, T. 2011. “Practice-ing Behaviour Change: Applying Social Practice Theory to Pro-environmental Behaviour Change.” *Journal of Consumer Culture* 11 (1): 79–99. doi:10.1177/1469540510390500.
- Hedefalk, M., J. Almqvist, and L. Östman. 2015. “Education for Sustainable Development in Early Childhood Education: A Review of the Research Literature.” *Environmental Education Research* 21 (7): 916–975.
doi:10.1080/13504622.2014.971716.
- Higgin, M. 2016. “The Other Side of Society. Reflections on Waste and its Place.” *Antropologia* 3 (1 N.S). doi:10.14672/ADA2016436%P.

- Ingold, T. 2011. *Being Alive: Essays on Movement, Knowledge and Description*. London: Routledge. http://www.amazon.com/Being-Alive-Movement-Knowledge-Description/dp/0415576830/ref=sr_1_1?s=books&ie=UTF8&qid=1321121039&sr=11%5Cnhttp://books.google.com/books?hl=en&lr=&id=40yxRsE0OQUC&oi=fnd&pg=PP1&dq=Being+Alive:+Essays+on+Movement,+Knowledge+and+Descri.
- Ingram, J., E. Shove, and M. Watson. 2007. "Products and Practices: Selected Concepts from Science and Technology Studies and from Social Theories of Consumption and Practice." *Design Issues* 23 (2): 3–16. doi:10.1162/desi.2007.23.2.3.
- Jamison, A. 2001. *The Making of Green Knowledge: Environmental Politics and Cultural Transformation*. New York, NY: Cambridge University Press. <https://books.google.dk/books?id=bgc5Aal9hyMC&printsec=frontcover&dq=the+making+of+green+knowledge&hl=en&sa=X&ved=0ahUKEwjYtLGj5rXRAhWKCywKHQJhBn4Q6AEIHDA#v=onepage&q=themakingofgreenknowledge&f=false>.
- Jensen, B. B., and K. Schnack. 1997. "The Action Competence Approach in Environmental Education." *Environmental Education Research* 3 (2): 163–178. doi:10.1080/1350462970030205.
- Jørgensen, N. J. 2015. *From Herders to Hustlers: Young People's Engagements with Sand, Sustainability and Education in Northern Kenya*. Aarhus: Aarhus Universitet.
- Kolbe, K. D. 2015. "Knowledge, Attitudes and Behaviour Regarding Waste Management in a Grammar and a Comprehensive School in England-results from a School Questionnaire." *Journal of Teacher Education for Sustainability* 17 (1): 58–71. <http://search.proquest.com.ez.statsbiblioteket.dk:2048/docview/1826546467?accountid=14468>.
- Lave, J., and E. Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Edited by R. Pea and J. S. Brown. Cambridge: Cambridge University Press. doi:10.2307/2804509.
- Le Grange, L. 2004. "Embodiment, Social Praxis and Environmental Education: Some Thoughts." *Environmental Education Research* 10 (3): 387–399. doi:10.1080/1350462042000258206.

- Legault, L., and L. G. Pelletier. 2000. "Impact of an Environmental Education Program on Students' and Parents' Attitudes, Motivation, and Behaviours." *Canadian Journal of Behavioural Science/Revue Canadienne Des Sciences Du Comportement* 32 (4): 243–250. doi:10.1037/h0087121.
- Löfgren, O. 2015. "Recycling the Home: The Constant Flow of Domestic Stuff, Emotions and Routines." In *Waste Management and Sustainable Consumption: Reflections on Consumer Waste*, edited by K. M. Ekström, 13–28. New York: Routledge.
- Lundegård, I., and P.-O. Wickman. 2012. "It Takes Two to Tango: Studying How Students Constitute Political Subjects in Discourses on Sustainable Development." *Environmental Education Research* 18 (2): 153–169. doi:10.1080/13504622.2011.590895.
- Lysgaard, J. G., and K. L. Fjeldsted. 2015. "Education Between Discourse and Matter." *Nature in Education*, 158–174. Münster: LIT Verlag.
- McKenzie, M. 2008. "The Places of Pedagogy: Or, What We Can Do with culture Through Intersubjective Experiences." *Environmental Education Research* 14 (3): 361–373. http://www-tandfonline-com.ez.statsbiblioteket.dk:2048/doi/abs/10.1080/13504620802194208#.VaeRr_nCpLE.
- Miller, D. 2008. *The Comfort of Things*. Cambridge: Polity Press. <https://books.google.dk/books?id=65NMV1ZgsNgC&printsec=frontcover&dq=Daniel+Miller&hl=en&sa=X&ved=0ahUKEwj6tM7Dv7LTAhVG1iwKHRQFD1MQ6AEIKjAB#v=onepage&q=DanielMiller&f=false>.
- Miller, D. 2010. *Stuff*. Polity Press. https://books.google.dk/books/about/Stuff.html?id=wY_bFiI4MXsC&redir_esc=y.
- Mogensen, F., and K. Schnack. 2010. "The Action Competence Approach and the "New" Discourses of Education for Sustainable Development, Competence and Quality Criteria." *Environmental Education Research* 16 (1): 59–74. doi:10.1080/13504620903504032.
- Negt, O. 1968. *Sociologische Phantasie und exemplarische Lernen. Zur Theorie der Arbeiterbildung*. Frankfurt: Suhrkamp.

- Payne, P. 1997. "Embodiment and Environmental Education." *Environmental Education Research* 3 (2): 133–153. <http://www.tandfonline.com.ez.statsbiblioteket.dk:2048/doi/abs/10.1080/1350462970030203#.Vdw4EJfCpuY>.
- Payne, P. G. 2005. "Families, Homes and Environmental Education." *Australian Journal of Environmental Education* 21: 81–95. <http://search.ebscohost.com/login.aspx?direct=true&db=ehh&AN=19910632&site=ehost-live>.
- Payne, P. 2011. "Embodiment and Action Competence." In *Essays om dannelse, didaktik og handlekompetence: inspireret af Karsten Schnack*, edited by K. K. B. Dahl, J. Læssøe and V. Simovska, 185–208. København: Forskningsprogram for Miljø og Sundhedspædagogik, Danmarks Pædagogiske Universitetsskole. <https://books.google.com/books?id=BYxytwAACAAJ&pgis=1>.
- Reckwitz, A. 2002. "Toward a theory of social practices: A development in culturalist theorizing." *European Journal of Social Theory* 5 (2): 243–263.
- Redman, E. 2013. "Advancing Educational Pedagogy for Sustainability: Developing and Implementing Programs to Transform Behaviors." *International Journal of Environmental and Science Education* 8 (1): 1–34. <http://search.proquest.com.ez.statsbiblioteket.dk:2048/docview/1413414584?accountid=14468>.
- Røpke, I. 2009. "Theories of practice - New inspiration for ecological economic studies on consumption." *Ecological Economics* 68 (10): 2490–2497.
- Sandell, K., and J. Öhman. 2010. "Educational Potentials of Encounters with Nature: Reflections from a Swedish Outdoor Perspective." *Environmental Education Research* 16 (1): 113–132. doi:10.1080/13504620903504065.
- Schatzki, T. R. (1996). *Social practices: a Wittgensteinian approach to human activity and the social*. Review of Metaphysics. Vol. 52.
- Shove, E., M. Pantzar, and M. Watson. 2012. "The Dynamics of Social Practice." *The Dynamics of Social Practice. Everyday Life and How It Changes* 1–19: doi:10.4135/9781446250655.n1.
- Somerville, M., and C. Williams. 2015. "Sustainability Education in Early Childhood: An Updated Review of Research in the Field." *Contemporary Issues in Early*

Childhood 16 (2): 102–117. doi:10.1177/1463949115585658.

- Stevensen, R. B., and C. Stirling. 2010. “Environmental Learning and Agency in Diverse Educational and Cultural Contexts.” In *Engaging Environmental Education: Learning, Culture and Agency*, edited by R. B. Stevenson and J. Dillon, 219–237. Rotterdam: Sense.
- Stevenson, R. B., J. Dillon, A. E. J. Wals, and M. Brody. 2014. “The Evolving Characteristics of Environmental Education Research.” In *International Handbook of Research on Environmental Education*, edited by R. B. Stevenson, M. Brody, J. Dillon and A. E. J. Wals, 512–517. London: Routledge.
- Tuck, E., and M. McKenzie. 2014. *Place in Research: Theory, Methodology, and Methods*. London: Routledge.
<https://books.google.com/books?id=kYU9BAAQBAJ&pgis=1>.
- Tuck, E., M. McKenzie, and K. McCoy. 2014. “Land Education: Indigenous, Post-colonial, and Decolonizing Perspectives on Place and Environmental Education Research.” *Environmental Education Research* 20 (1): 1–23.
doi:10.1080/13504622.2013.877708.
- Wenger, E. 1999. *Communities of Practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press.