

Sustainability – Local explorations – Global awareness

'Bildung'-making for a sustainable future in an interdisciplinary teacher education course (nature and technology/history)?

MICHAEL VOGT & MARIANNE A. LETH

ABSTRACT: Education for Sustainable Development in teacher education: Possibilities, capabilities, and dilemmas in educating teachers to handle the complexity of sustainability issues through interdisciplinary and outdoor didactics. What is the relationship between specific substantive knowledge and interdisciplinary skills and the measurable competencies and 'Bildung' processes for teachers in a sustainable future? This paper presents a course, its intentions, methodology, content, and a discussion of the dilemmas between, on the one hand, subject-specific skills in 'nature & technology' and in 'history,' as well as interdisciplinary skills, and on the other hand measurable competencies in teacher education and ideals of 'Bildung.'

KEYWORDS: Sustainability; Interdisciplinary course; Teacher Education; Case study

This presentation refers to theme2 in the conference call for papers: "Examples of concrete cases of Education for Sustainable Development (ESD) and Higher Polytechnical Education." Our case is an interdisciplinary course at the Teacher Education in Aarhus, Denmark - a collaboration between the school subjects 'nature & technology' and 'history' focusing on sustainability: Local explorations - global awareness. We had from the beginning some ideals and ideas about the relevance and societal impact of educating teachers with a consciousness of a sustainable future. Is it possible to achieve these ideals within existing educational frames? The purpose of the course is to engage and encourage student teachers to make local inquiries with a global perspective and to unfold the possibilities and capabilities for, not only developing specific competencies and skills in the school subjects but also in 'Bildung' processes for the future communities.¹

¹ Our understanding of 'Bildung' notion rests upon the critical constructivist German tradition around Wolfgang Klafki (2001) and Andreas Gruschka (2016). We combine this understanding of the North-European notion of Bildung with the pedagogical and philosophical thinking of John Dewey (2006), and a Danish version of the critical constructivist pedagogical thinking as formulated by (f.x.) Knud Illeris (2004, 2014) and Mads Hermansen (2005). We will, in the remainder of this paper, when using the word Bildung, refer to this broader set of pedagogical ideas and ideals.

When creating a collaboration between subjects from science and humanities in the frame of the concepts of sustainability issues and the development of responsible global citizenship, it seems obvious to include the skills and concepts of nature/technology and science in general. At the same time, history does not appear to be directly connected to this complex problem. However, suppose we want to explore and understand the complexity and inconsistencies of human impact on the local and global environment. In that case, the history subject is central - focusing on concepts such as human society, nature, culture, spirituality, technology, time and space, continuity and changes, development and backlash, to mention a few (Nordgren: 2019, 2021; Leth: 2020). With the interdisciplinary course we present here, we intended to challenge the specialized subject-related topics and concepts by exploring issues in sustainability in the frame of functional interdisciplinarity based on the specific substantial knowledge and skills. In the following, we present the course, the intentions, methodology, and content and discuss the coherent dilemmas between, on the one hand, subject-specific skills in 'nature & technology' and in 'history,' and the interdisciplinary skills and between the scales of measurable competencies in teacher education and on the other hand ideals of 'Bildung'.

Description of the course

The course takes place in the 5th semester of teacher education. Before that, the students have passed two modules in nature/technology or history, each of 10 ECTS credit points. This course gives an additional 10 ECTS, and the students finish both subjects after a final module of 10 ECTS. The main idea is to practice collaboration and concrete problem solving with sustainability as the overall theme to prepare student teachers to implement critical reflective sustainability thinking in schools:

- Practice project work of real sustainability issues in the real world – not only for the curriculum
- Challenge the role of teachers and schools in societal sustainable 'Bildung' processes from a local and global perspective. Is it necessary for teachers and schools as societal 'Bildung' institutions to be role models for responsible local and global citizenship in a sustainable future? How do we educate teachers with this aim and with which 'Bildung' concepts?
- Transcend - or build a bridge - between science forms of cognition and humanities through problem-based learning and project work to inquire, discuss and practice which kinds of knowledge, skills, and methods are required to make a transfer between education and the everyday world

As educators and facilitators, we present the overall concepts of sustainability and the historical background of these concepts. We offer possibilities for inquiries and exploration, and discussion of sustainable issues. The student teachers create projects that reflect responsibility and possibilities as future educators of sustainability consciousness and -citizenship. The students are introduced to the literature and modern history of the sustainability discussion and the different concept definitions of sustainability and sustainable development from the Stockholm Conference in 1972 and 'Limits to Growth' (Meadows et al. 1972), André Gorz on ecology and freedom (Gorz, 1981), The Brundtland Report (1987) to Rockströms' Planetary Boundaries' (2015). In addition, UNESCO's Sustainable Development Goals, ESD, are all fundamental, as is the ability to discuss the fourth pillar of sustainable development: culture

(Hawkes (2001). We think that culture and cultural matters are closely integrated with various concepts of historical consciousness and the multiple varieties of understandings of humans' impact on the environment and the globe when focusing on humanities and history as part of sustainable research (Nordgren, 2019, 2021) Leth, 2020). The specific subject knowledge of the two subjects is closely connected to the outlined activities, the chosen topics for the students' projects, for example, sustainable agriculture, -communities, -clothes production, -landscapes, -hunting, -gardening, -waste management.

Methodology and teaching methods

The overall methodology is framed by the concept of interdisciplinary collaboration in the form known in Denmark as 'functional interdisciplinary collaboration.' In short terms: the focus is the case rather than the subject, formulated in driving questions, and only relevant elements from the subjects are integrated and included in the inquiries. It is based on problem-based learning in study groups, working independently but targeted to solve their problem (Kristensen, 1991). In interdisciplinary study groups, the student teachers choose a sustainability issue connected with past, present, and future perspectives that can be locally explored and have a global impact. Then, they make inquiries, contacts, interviews, visits, etc., and present their projects in a portfolio for the class.

We are inspired by the Scandinavian concepts of outdoor pedagogy, especially the fundamental principles and concepts developed by prof. Arne Nicolaisen Jordet (Jordet 2010). In short terms, it is based on the idea that learning about nature takes place in nature, learning about society, in society and in collaboration with relevant partners, learning about cultural history takes place in culturally significant spaces and in collaboration with cultural partners, etc. It is problem-oriented, experience-oriented, academically- and interdisciplinary- teaching that seeks to connect the school's academic world and the students' authentic everyday world. This is done by investigating real issues such as sustainability in the real authentic world - not only problem solving to satisfy the curriculum but to be solved in the real world. This pedagogy rests upon the 'Bildung' concepts of Klafki (2001) and John Dewey (2006) with the 'Bildung' ideal of responsible democratic citizenship (Jordet 2010).

The teaching of the course is an interaction between lessons with a theoretical focus in the classroom, and outdoor activities, due to the outlined outdoor pedagogical principles:

A 3-day shelter study tour including:

1. Kalø Organic Agricultural College [Kalø Økologisk Landbrugsskole](#) : A walk and talk tour through the fields, gardens, barns, and outdoor environment for the household animals, following ensilage production fodder production, organic/conventional sustainable food production, and agricultural production in general. Discussions of collaborations with school classes and teachers...
2. Hunting and teaching [blivnaturligvis.dk](#) : A hunter who is also a teacher presents the whole process from hunting, preparation, and eating in a sustainable way and discusses ethical issues in connection with killing animals
3. Sustainable living – 'Friland - a free community' [friland.org](#): Visit a local community with sustainable building and experimenting with sustainable community building - guided tour and discussions.
4. Nature and cultural landscapes in the past and present [nationalparkmolsbjerger.dk](#) : The study tour is located in a newly established national park, a location that has been inhabited since the Stone Age.

5. The human footprint on nature and nature's prints on the different societies over time. Examples of the use of natural resources from the Stone Age to present day. What are natural landscapes and cultural landscapes - what are the relations between the landscape and its inhabitants? (Petrarcas walk on Mont Ventoux in 1336, Hastrup 2018), Laursen (2006)

Excursions at:

- Reuse Aarhus: [reuse aarhus](#) Location for recycling, upcycling, circular economy...
- Lisbjerg Forbrænding: [electricity, heating](#) Waste management, recycling, incineration

The course participants are expected to master the project work, including independent field study, portfolio management, and presentation.

Examples of projects:

- Plastic Fantastic: This project follows the history and development of the growing plastic production as packaging and plastic remains in the sea and on land. It finds different perspectives on use, reuse, and plastic disposal.
- From cotton field to t-shirt: This project follows the history of cotton production in time and space. The colonial and post-colonial production and distributive forms. Following production of a single t-shirt from the field to the consumers. Following a single product is a simple exemplary key activity in opening the complexity of sustainable matters
- Sustainable school garden: This project presents ideas for establishing sustainable school gardens and the pedagogical perspectives for the gardening project in different school subjects and as a school project in sustainability in general (the school as an example of responsible, sustainable citizenship).
- Sustainable agriculture: Variable projects present different perspectives on agricultural development over time and space. Multiple perspectives on the difference between conventional and organic agriculture locally and globally focus on sustainable food production, including urban gardening.
- Sustainable fishing: The history of fishing in the Scandinavian seas. The complexity and problems of fishing quotas and sustainable fishing.

Each chosen project topic refers to one or more of the Sustainability Goals to be explained and included in the didactical thinking and ideas for teaching projects. The study groups work with their projects and portfolios and present these for evaluation, feedback, and discussion in class. This kind of evaluation underlines the project and practice-oriented way of studying.

The above examples represent a variety of the students' engagement and different focuses and pedagogical thinking as they include didactical considerations for implementing topics in their next school internship or as future teachers. Most of the students grasp the opportunity to practice the project way of studying and problem-based learning when they have been convinced that this course intends to practice problem-solving in real society and practice experimenting with field studies in interdisciplinary study groups. The students need to be familiar with the portfolio way of working. Also it is important for them to be focused on the learning process while keeping focus on the overall theme: sustainability and 'bildung' processes as an intention for their future work as teachers.

Discussion:

In implementing this course, we find, as before mentioned, two interrelated tensions. The first tension concerns the relation between the subject-specific skills in nature & technology and history and the interdisciplinary skills. The second dilemma relates to the tension between measurable competencies in teacher education and the ideals of 'Bildung'.

This leads us to the following questions:

Which specific type of subject knowledge is required to qualify participation in the project work of this course? In history, it is required to master the fundamental concepts of historical consciousness as an interpretive process, use-of-history, and historical thinking AND to master a content repertoire enough to handle various perspectives on (at least concepts as) time and space, nature, and culture (Nordgren 2019, 2021), Schüllerquist (2014), Jensen (2017). As previously mentioned, the history subject does not seem obviously connected to teaching sustainability, climate change, and responsible global citizenship. However, history contributes with the long lines of chronologies of society making on the globe - society building in time and space. It is a matter of which kind of chosen perspective and directions or master narratives can include the human impact on planet earth and acknowledge and internalize this as part of historical consciousness (Nordgren 2019, 2021, Simon 2021). This means that the history subject in teacher education must redirect focus from the dominating national master narrative to a more multi-perspective and anthropological inspired approach. Or, more directly said: We must loosen up the agreed so-called truth that human evolution and civilization is closely connected to, and entangled in, the human/European conquest of nature - founded in the binary opposition of nature and culture/civilization from the Enlightenment (Nordgren (2019, 2021), Poulsen (2019), Latour & Chakrabarty (2020), Simon (2021) Leth (2020)). (This discussion is being conducted, for example, in Public History Weekly: <https://public-history-weekly.degruyter.com/9-2021-1/climate-of-crisis/> and in Hastrup (2013))

To be prepared for the interdisciplinary content possibilities of this course, it is recommended to master specific subject knowledge which is directed (or redirected) as mentioned above.

Which specific type of interdisciplinary knowledge and experience is required? The collaboration between a science subject and a humanity subject requires collaboration in very different methodologies and theoretical thinking and -practice. Sustainability as the overall theme is a perfect experimental example of meaningful societally significant interdisciplinary project making. Problem-solving requires expert knowledge and skills from each subject for full contribution to the project result. Therefore, it is crucial for each participant to clearly communicate their knowledge, skills, and learning processes to the group during the work process. The mixture of experimenting inquiry methods from science and analytical inquiry methods from history/humanities is an integrated part of the project work.

'Bildung' processes towards responsible citizenship in a sustainable future, in an education determined by measurable competencies? One of our didactical aims is 'to do' the principles of outdoor pedagogy as outlined above, thus combining the principle of exemplary teaching with a chance to work in-depth with one single topic (Jordet 2010) Klafki (2001). Having the history of international and local research and discussions of sustainability as a fundamental knowledge base, we wish to notify that this problem complex, and its knowledge is not new. It has to be understood in long lines in time and space. When the student teachers from nature/technology and history collaborate in creating specific projects on sustainable issues, they learn and practice multi-perspective views and problem-solving. That contributes to making the student teachers motivated and competent in initiating projects in sustainable related topics in their future work as schoolteachers. In a longer perspective, this can stimulate an

active move toward a societal impact and relevance of their study projects. That can stimulate the development of responsible global citizenship as part of 'Bildung' processes for the future.

However, there is no 'quick fix' for developing reflective and critical thinking or stimulating 'Bildung processes.' In this course, we have chosen to go beyond various websites focusing on Sustainable Development Goals with action-oriented instructions on teaching and involving students – and student teachers – in ESD here and now. Implementing and testing the prepared ESD teaching plans with a number of school classes might perhaps satisfy the teacher education's competence rating and measurable documentation. We, however, have chosen to do 'hands-on teaching.' We have invited students to create their projects from idea to presentation and make their own reflections debatable in an educational and 'Bildung' context. In the mentioned projects, the students have had to explore how, what, when, where, who, and why their specific topic can expose the human effect in a global context by following a single commodity from natural resource to consumption. We hope this might be a step towards understanding and acknowledging the irreversible human footprints and the growing opposite relations between human impact and a sustainable future as an internalized self-understanding in time and space.

We hope that through the study practice of this course, it will be evident that the concepts of the humanities (in this case, history) and the natural sciences (nature/technology) are interdependent for the inquiries and communication about and around sustainability matters.

We believe in this way of study practice: As educators, we unfold and facilitate the concepts around the complexity of sustainability through specific subject knowledge and skills. We present possibilities, relevant partners, contacts, and places. The student teachers make their own inquiries of real-world sustainability issues, field studies, etc., in practice and show the result for the class for open discussion and critical evaluation. In part for its relevance for themselves as responsible teachers, partly for the school as a 'Bildung' institution in a local and global societal context.

Literature

- Affald & Varme, Århus Kommune, Undervisning. Hentet fra <https://www.affaldvarme.dk/be-soeg-og-undervisning>
- Bliv Naturligvis – pædagogisk projekt under Jægerforbundet. Hentet fra blivnaturligvis.dk
- Bæredygtig udvikling i historisk perspektiv. Hentet fra <https://bu.dk/introduktion/baeredygtig-udviklings-historie/>
- Dewey, J. (2006). Demokrati og uddannelse. Klim
- Friland, et øko-samfund på Djursland. Hentet fra <https://start.friland.org/>
- Garsdal, J. (red) (2020). Bæredygtighed og bæredygtig udvikling: uddannelse, dannelse og fagdidaktik i skole, erhvervs- og professionsuddannelser. Center for Innovation og Entreprenørskab, VIA
- Gorz, André (1981). Økologi og frihed. Politisk Revy
- Gruschka, A. (2016). Lære at forstå. Klim
- Hastrup, K. (ed.) (2013). Anthropology and Nature. Routledge Studies in Anthropology. Routledge.
- Hastrup, K. (2015). Mennesket på kanten af mellem natur og samfund - Den humane vending i et antropologisk perspektiv. Gudmand-Høyer, M., Raffnsøe, S, og Raffnsøe-Møller, M. (red.). Den humane vending. En antologi. Aarhus Universitetsforlag
- Hastrup, K. (2018). Antropologiens landskaber. Fratrædelsesforelæsning 23. februar 2018. Tidsskriftet Antropologi nr. 7

- Hawkes, J. (2001). *The Fourth Pillar of Sustainability: culture's essential role in public planning*. Common Ground P/L, Melbourne
- Hermansen, M. (2005). *Relearning*. Samfundslitteratur
- Illeris, K. (2004). *Læring*. Samfundslitteratur
- Illeris, K. (red.) (2014). *Læring i konkurrencestaten – kapløb eller bæredygtighed?* Samfundslitteratur
- Jensen, B.E. (2017). *Historiebevidsthed/fortidsbrug – teori og empiri*, Historia
- Jordet, A. N. (2010). *Klasserommet udenfor. Tilpasset oplæring i et udvidet læringsrum*. Cap-pelen.
- Klafki, W. (2001). *Dannelsesteori og didaktik*. Klim
- Kristensen, H.J. (1991). *Pædagogik – teori og praksis: skolen i 90'erne*. Gyldendal.
- Laursen, H. H. (2006). *Strejftog i renæssancens tænkning*. Filosofi, menneske og natur. Høiris, Ole & Velle, Jens (red.). *Renæssancens Verden. Tænkning, kulturliv, dagligliv og efterliv*. Aarhus Universitetsforlag
- Latour, B., Chakrabarty, D. (2020). *Conflicts of planetary proportions - a conversation*. Tamm, M., Simon, Z.B. (eds.). *Journal of the Philosophy of History 14: Historical Thinking and the Human*.
- Leth, M.A. (2018). *Historie med udeskoledidaktik*. Radar, temanummer: historiebrug. Historielab
- Leth, M.A. (2020). *Bæredygtighed i historie*. I Garsdal, Jesper (red). *Bæredygtighed og bæredygtig udvikling: uddannelse, dannelse og fagdidaktik i skole, erhvervs- og professionsuddannelser*. Center for Innovation og Entreprenørskab, VIA
- Meadows, D.H., Meadows, D.L., Randers, J., Behrens III, W.W. (1972). *Limits to Growth*. Washington DC
- Mundu, Center for Global Dannelse. Hentet fra <https://www.mundu.dk/>
- Nationalpark Mols Bjerge. Hentet fra nationalparkmolsbjerge.dk
- Nordgren, K. (2019). *Boundaries of historical consciousness: A Western cultural achievement or an anthropological universal?* Nordgren, K. & Zanazarian, P. (red.). *Journal of Curriculum Studies* 2019, vol. 51. No. 6.
- Nordgren, K. (2021). *The Anthropocene and the Need for a Crisis in Teaching*. *Public History Weekly* 9,1: *History Education in a Climate of Crisis*. Hentet fra DOI: [dx.doi.org/10.1515/phw-2021-17397](https://doi.org/10.1515/phw-2021-17397).
- Paulsen, M. (2019). *Digging into the Anthropocene - finding way to cautious educational practice*. Paper to symposium "Global challenges - rethinking education". Hentet fra: <https://www.michaelpaulsen.dk/>
- Schüllerquist, B. (2014). *Vad finns i den historiska innehållsrepertoar? Ett bidrag til historiediaktisk teoriutveckling*. Kvande, L. (red.). *Faglig kunnskap i skole og lærerutdanning*. Fagbokforlaget
- Simon, Z.B (2021). *The Role of History in an Anthropocenic Knowledge Regime*. *Public History Weekly* 9,1: *History Education in a Climate of Crisis*. Hentet fra DOI: [dx.doi.org/10.1515/phw-2021-17407](https://doi.org/10.1515/phw-2021-17407)
- The Three Pillars of Sustainability*. Hentet fra <https://www.thwink.org/sustain/glossary/ThreePillarsOfSustainability.htm>
- Unesco Verdensmålsskoler i DK. Hentet fra <https://unesco-asp.dk/>
- Verdenstimen. Undervisningsportal. Hentet fra <https://www.verdensmaal.org/verdenstimen>