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Nature in preschool

– a part of life to be sensed, discovered or learned?

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'Nature and nature phenomena' has formed a specific curriculum theme in Danish preschool since early childhood curriculum was prescribed by law in 2004. However, recent evaluations show that the implementation of an early childhood curriculum has not produced an increased pedagogical focus on 'nature and nature phenomena' in preschools (EVA 2012). This finding, along with an increased political interest in goals and measurable outcome of early childhood curriculum (Broström 2012), will be the starting point in our ambition to carry out a more thorough qualitative investigation into links between preschool teachers' understanding and interest in teaching nature and the rather poor evaluation.

The study shows that preschool teachers are very observant of the pedagogical and didactic qualities of introducing nature as a part of life to be learned through sensed experiences. The study also indicates that introducing nature phenomena as something to be discovered and explored to some degree seem to be dependent on the children's lead and the pedagogical competence to grasp unforeseen events and uphold learning processes with new agendas. However, the most interesting finding relates to how preschool teachers understand meaning and objectives of learning processes related to nature. The overall objective of the curriculum theme related to nature had been set forth to address learning processes related to future ability to interact respectfully and responsibly with nature and our shared resources. However, the study shows some incoherence and blurriness with regards to how nature related activities in preschools stimulate emergent capabilities to ensure or address future sustainability. Existing learning activities related to nature introduces farming, planting and food in ways that no longer echo the complex challenges between sustainability and modern industrial farming and living. This paper argues that this finding indicates 'a missing link' that needs to be addressed in future discussions and research concerning content and objectives of the curriculum theme 'Nature and natural phenomena' in preschools.

Method and research question

The study has a research interest in exploring how objectives, interests and skills among preschool teachers interrelate with priority, activities and focus within the curriculum theme 'nature and nature phenomena'. Our research is guided by a rather open and explorative research question: How do preschool teachers understand and practice general objectives of early childhood curriculum related to nature and nature phenomena?

The research methods applied for the overall study of three preschools were individual semi-structured interviews (n=3) with preschool directors, focus group interviews (n=3) with preschool teachers and participatory observations of activities related to the curriculum theme (n=3) including field notes (Kvale 2008, Halkier 2010). The data from the focus group interviews serves as primary data for the analysis presented here, whereas the interviews with directors and the observations serve as a backdrop to the overall insight into strategies and practice.

Nature – a part of life to be sensed and discovered?

We asked the focus groups how they teach nature and nature phenomena and their concurrent answers address learning qualities of experiencing nature through senses. A preschool teacher explains;

Nature plays a great part in our work – it's about getting out of the house, to see, to touch, to feel and to be there. (focus group 1)

How to sense and explore nature is also described as looking for insects under stones and stumps, playing and jumping around in mud and water, holding ladybirds and watching them fly away and singing songs about animals, sun, wind and weather. The reflections on the learning qualities of these experiences are also related to nature as a learning environment;

We come closer to each other when we are out there together and explore. When we go to the beach or a park, there is a different kind of serenity. (focus group 2)

Nature itself forms a good common third, where you can have different kinds of dialogues, and there is room for children who are extroverted. (focus group 1)

These statements on the qualities of sensing and being in nature are in some ways in dialogue with a concurrent study that shows that preschool teachers do not seem to organize learning processes around the theme of 'nature and nature phenomena'. This study points out that nature activities hold little didactic reflections beyond the children's

abilities to pursue their own interests in nature and thereby assuming nature as something concrete that implicitly convey itself (Ejbye-Ernst 2012). The critique of Ejbye-Ernst is that the perception of nature as something to be sensed and discovered untouched on its own right does not necessarily lead to nature mastery or knowledge of science. This critique however, assumes objectives of nature activities that we did not find to be dominant among the preschool teachers in this study. Instead, what they stress is learning qualities of sensed experiences in and with nature that are widely coherent with experience-based learning theories that stress learning as an ongoing process based on experience. Their reflections on nature activities are generally embedded in learning theories stating that experiences and feed-back on experience form the base of how aesthetic dimensions such as impulses, feelings, lust and actions are transformed into knowledge and realization (Dewey 1916, Lewin 1948, Kolb 1984). The following example demonstrates reflections on the significance of experiences that were typical in our study;

It's not that correct answers are not important. But it is also important to find the answers yourself or together with others. It's about teaching the children to find curiosity in what they see and not just to look to the grown up as a source of information. Well, there is a small hole in the grass, and what's down there? I can tell them that it's an earthworm. But it is better if they dig it up themselves. It gives them a completely different experience that sticks as an embodied experience. (focus group 1)

One could argue that experience-based learning schemes are not necessarily opposed to didactic reflections on how to transform nature activities into what Siraj-Blatchford frame as 'emergent science education' (Siraj-Blatchford 2001). Siraj-Blatchford argues that we need to provide and develop play-based curricula that take the children beyond the assumptions of 'discovery'. This suggestion does not dismiss experience as a basis for learning but it emphasizes the need to introduce children to explanations and artefacts in order to explain scientific and technological explanations later.

We do not know what kind of explanations, if any at all, the preschool teacher offered the child after digging up the earthworm. This was not an important part of her reflections on the learning qualities of letting the child dig it up. In fact, there seems to be very different, and sometimes conflicting, ideas about the overall learning agenda for curricula in nature that might explain why these preschool teachers pay more attention to offering experiences and discovery in nature than to explain it. The narrative below was pointed out as a particularly successful nature activity by both director and focus group, and it provides us with a little more insight into why professionals seem to assign a lower priority to didactic planning and reflections in early childhood curricula;

We incubate chickens in a machine down in the basement. Each day we go and have a look. Then, all of a sudden and after 21 days, chickens come out of the eggs. Then we bring them up to our room and put them in an aquarium where the children can look at them all the time. And we pick them up and

touch them. The children help to feed them and to remove the excrements, and we talk about how excrements can be soaked in water and used to fertilize plants. But another process also took place because some of them died. First time we did the project it was a giant success but then, the second time, a lot of the chicken did not hatch. They died in the eggs. And then we had to 'catch this ball' and talk about death. Life and death and what actually takes place. This was not planned but it went really well. Some of the children are afraid to hold a live chicken because it clucks, but they were not afraid to hold a dead chicken and to examine it. (focus group 1)

The project was designed to teach children about the circle of life from egg to chicken involving reflections on the use of eggs, chickens and excrements through hands-on experiences. When the project failed in hatching live chicken a new theme about life and death intrudes with new learning opportunities for the preschool teachers to grasp. Their perception of the project as a success is just as much about the success of the original designed projects as it is about the way they succeed in making use of the unexpected turn of events when the chickens died. Actually, a lot of explanation takes place in this narrative – but it all follows the lead of the children in how they respond to what goes on with the eggs and the chickens. The pedagogical capacity to follow these leads and reframe activities is highly valued by professionals. The chicken project was considered a success because of the plasticity that allowed the preschool teachers to combine their pedagogical skills to meet a change of agenda and still uphold relevant learning processes in relation to nature and circle of life. Abilities to meet and make use of a sudden shift in preoccupation of the children, weather conditions or other external events are frequently highlighted by the preschool teachers in our study. This points to a pedagogical knowledge of how to uphold learning processes under unpredictable circumstances of everyday life in preschools that might hold different qualities than the curriculum planned for (Ahrenkiel et al. 2013).

Nature – a part of life to be learned?

Why is it important to learn about nature and nature phenomena in preschool? According to Sira-Blatchford and Ejbye-Ernst nature curriculum in preschool has to do with the importance of teaching children about the nature of science and about the processes of scientific knowledge production. Science is a game of rules, and introducing these rules through play and explanations in the early years will benefit future science education. This purpose for nature as a curriculum theme is not unfamiliar to professionals. Both interviews and curriculum plans touch upon the objective to stimulate children to become 'little emergent scientists'. But when we ask preschool teachers and preschool directors why learning about nature and nature phenomena is important, the answers point to a much broader perception of purpose.

It concerns our common earth. It's about additives in food, health and how we use nature. It's about making different choices. (director 1)

It is important because they need to know about the environment. They need to know the origin of things and that there are costs. It's an eco-system. (focus group 1)

If we are to protect our nature and our future we have to learn how from early childhood. (focus group 3)

It is important to teach them that there are all kinds of animals and plants in nature but we have to act with care and respect to it. (focus group 2)

Notions on respectful, responsible and sustainable interactions with nature are the far most consistent answer to substantiate a curriculum in nature in our study. The study indicates that preschool teachers expound upon the purpose of nature curriculum more comprehensively than emergent science. Highlighting the importance of sustainability goes beyond nature of science and touches upon societal challenges and complexity. However, substantiating a nature curriculum with the need to create learning processes that will eventually make children able to ensure future sustainable living puts an extensive responsibility on preschool teachers and raises new questions regarding content and didactics of nature activities.

The question is if and how preschool teachers are to comply with the responsibility to teach to secure a sustainable future. Most nature activities in our study were typically taking place in contexts that do not reflect the complexity of modern living. The children are taken to an old fashion farm to pat a free range cow, jump in hay and learn about farming. Or they take part in incubating chickens but at the end of the project, the chickens are handed over to a local nature school. Or the children learn how to grow their own tomatoes and beans in the garden of the preschool. What we are questioning is whether these nature and farming experiences are a sufficient basis for developing sustainable awareness as they rarely echo modern industrial processes. Cows in modern meat industry are not free range and usually not patted, chickens are incubated in quite different settings than a preschool and they are to be processed into meat and other residual products. And tomatoes and beans are rarely grown in private gardens but in large scale greenhouses with artificial regulation.

Nature activities in our study seem to overlook the bearing of emergent knowledge of challenges and choices when aiming to guide the children towards awareness of sustainability. Critical developments in the use of natural resources and modern industry as original pointed out by Meadows et al. in *The Limits to Growth* (Meadows et al 1972) continue to represent a modern challenge for societal development as addressed by the Brundtland Commission (*The World Commission on Environment and Development* 1987), Shiva (1991), Sachs (1999) and others. There are plenty of reasons to educate future generations to address these challenges. However, such an education might call for more

extensive experiences and explanations concerning processes related to nature and natural resources in preschools than seems to be case. First hand experiences of differences, challenges and qualities in relation to conventional food industry versus non-industrialized food could form one starting point. As an example we wonder if the chicken project could profit from including reflections on home reared chicken versus a visit to a chicken farm.

Preliminary conclusions

Our study indicates that early childhood curricula concerning nature and nature phenomena in preschools hold a mismatch between content and purpose. Evaluations of preschool teacher competence versus the insights gained by the children in relation to early childhood curricula attach importance to abilities to foster 'emergent science' while preschool teachers attach importance to everyday experiences in and with nature and emphasize the importance of pedagogical ability to follow the lead of the children, the weather and the unforeseen events rather than following the lead of planned activities to create relevant learning processes on the base of experiences and curiosity. Learning processes in relation to nature are seen as important experiences in educating children for future sustainability. Even with respect to experience-based learning theories, that are the far most dominant in our study, there appears to be a 'missing link' between the experiences offered in preschools and the goals to educate for future sustainability. The children are not offered experiences of sensing, discovering or explaining nature in ways that explicitly raise awareness to sustainability problems.

The blurriness between practices and goals points to the need for further and more expansive dialogues concerning how and why early childhood curricula are to address nature and nature phenomena. Is the objective to foster awareness of sustainability problems, to foster awareness of the nature of science or both? Modern analysis of a growing distance between the production of knowledge and the everyday use of knowledge in practice (Gibbons et al.1994) stresses the need for more robust and practical knowledge production that encourages bringing perspectives of science into a practical perspective for everyday use. Following this line of argument we argue that there could be educative perspectives for both preschool teachers and researchers to explore how the societal ambition to teach sustainability could integrate emergent science and be further developed and elaborated into practical activities in dialogue with modern living and production.

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