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**Nature Learning –
early childhood nature experience and
sustainability education**

Christiana Glettler ^a, Franz Rauch ^b

^a*KPH Graz, Lange Gasse 2, 8010 Graz, Austria, christiana.glettler@kphgraz.at*

^b*University of Klagenfurt, Sterneckerstraße 15, 9010 Klagenfurt, Austria, franz.rauch@aau.at*

Abstract

Recent studies confirm that children profit greatly from being in contact with nature. A large body of research focuses on children's psychological development in this respect. While the social and physical aspects are also well researched, less studies focus on the relationship between early childhood nature experience and sustainability education. In this paper, the central research question is concerned with this nexus, asking how children, who spend a lot of time outdoors, a) perceive nature, b) in what ways they act towards protecting nature and c) which competences they show in relation to sustainable development. In order to answer these research questions, two case studies were conducted in an Austrian Kindergarten and a primary school. The findings show that the children in both institutions have a diverse image of nature, a close relationship with nature, are invested in protecting their environment and show several competences, which are considered vital for sustainability education. Thus, the findings indicate, that increasing the amount of time children spend outdoors could positively contribute towards a more sustainable future.

Keywords: nature experience; early childhood; primary school; sustainability education

1. Introduction

Ever since the publication of Richard Louv's Book *Last child in the woods* (Louv, 2008), international awareness surrounding the importance of nature for children's development has risen. While not all authors (Dickinson, 2013, Clarke & Mcphie, 2014, Mcphie & Clarke, 2015), agree with Louv's theory of nature-deficit-disorder, studies around the globe have addressed

the relationship between children and nature from various viewpoints in recent years. While the psychological, social and physical aspects are well researched, less studies focus on the relationship between childhood nature experience and sustainability education. However, those studies indicate that nature experience and outdoor learning can be valuable tools in order to reach the goals of sustainability education (Elliott, 2017, Lude, 2001, Stoltenberg, 2009). This study aims at exploring this notion, through investigating how children, who spend a lot of time outdoors view nature, if they show pro-environmental behaviour and which competences related to sustainability education they display.

2. Theoretical Background

2.1. *Images of Nature*

The images of nature are strongly influenced by its depiction in literature or films, as nature has always been a prominent feature in literature, from poetry to prose, fairy-tales and philosophical texts. Especially children's literature often depicts nature as something wild, slightly mysterious and full of adventure (compare Astrid Lindgren's *Ronia, the Robbers Daughter* or *Six Bullerby Children* or J.R.R. Tolkien's *The Lord of the Rings*). While reading stories such as those provides children with ideas of the relationship between humans and nature, they don't paint a full picture and children often have a very idealized image of nature as recent studies show. This might explain why many children view nature as something pristine, almost independent of human influence, also often excluding human beings from being part of nature altogether (Brämer, 2006, Brämer, Knoll & Schild, 2016, Stoltenberg, 2009). While these findings indeed suggest a necessity to re-connect children with nature and to allow them to see themselves as part of nature, Clark and Mcphie (2014, 2015, Mcphie & Clarke, 2015) go even beyond this idea. In their essays, they suggest a necessary shift in thinking, away from the re-connection discourse in order to make room to address other important issues of environmental and sustainability education. It is vital for children to understand the interdependencies between human activity and our environment. Only in understanding this, can they realize how our choices and actions shape the world. Stoltenberg (2011b) thus suggests integrating different perspectives on nature:

- Nature affects us through beauty, colours, forms and stimulating changes
- Nature is our living environment
- Nature provides us with resources for all our products and for everything we do, and that these are not unlimited

- Nature is providing basic functions for human life, without which we could not survive, such as regulating the water supply or the air quality
- Nature is functioning on a sensitive balance, which follows for its own laws, which we have to understand and handle, such as the rhythms of nature, or interdependencies in ecosystems.
- Humans are part of nature (p. 35).

2.2. *The Children-Nature-Sustainability-Nexus*

Despite different approaches to the topic and different philosophical standpoints, there is a global consensus, that being in nature is profitable for children in various ways. Firstly, children profit in their social skills (Dyment, 2005, Dyment & Bell, 2008, O'Brien & Murray, 2005, Palmberg & Kuru, 2000, Stoltenberg, 2009) and develop a more diverse, active and creative play behaviour (Chawla, 2002, Fjørtoft, 2004). O'Brien (2005) also found, that children actually prefer playing outdoors to playing indoors. Secondly, children profit in their psychological and cognitive development (Gebhard, 2013). In this respect, studies show a positive influence concerning children's motivation, independence, self-discipline and self-esteem, creativity and linguistic abilities (Raith & Lude, 2014). Thirdly, being outdoors improves children's physical abilities such as climbing, running, and balancing, which in turn is beneficial for children's general health (Bolay & Reichle 2011, Gebhard 2013, Miklitz 2005, Raith & Lude, 2014).

While the evidence for these aspects seems to be relatively clear, the matter becomes more difficult for the development of environmental awareness and pro-environmental behaviour. Many studies focus on children's environmental knowledge, but more knowledge does not necessarily correlate with more pro-environmental behaviour or even a positive attitude towards the environment (Raith & Lude, 2014). However, several factors seem to be important for children to develop a positive attitude towards nature and pro-environmental behaviour – being in direct contact with nature as early as possible (Aguirre-Bielschowsky, Freeman & Vass, 2012, Meske, 2011, Palmberg & Kuru, 2000), having social and physical experiences outdoors with family and peers (Meske, 2011), growing up with pro-environmental family values, knowledge about nature and spatial proximity to it (Cheng & Monroe, 2012).

Jung (2012) created a model of factors, which influence young people's relationship with nature, based on a survey among his students. As the model shows (compare figure 1), several factors such as early childhood experiences, family values, and the peer group's interest are

influential for a personal emotional relationship. Education and societal norms are a more unstable ingredient.

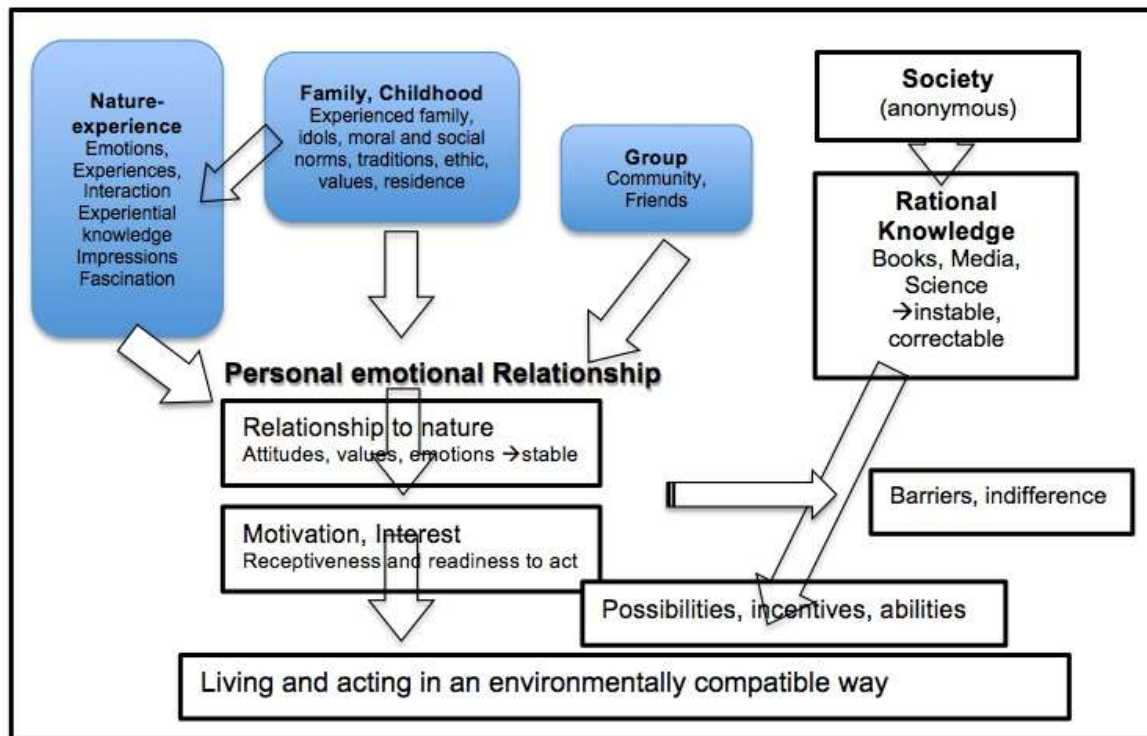


Fig. 1: The influences of different factors on nature-related values and pro-environmental action (slightly adapted and translated from Jung, 2012, p. 131)

2.3. Education for sustainable development

Education has been seen as an important aspect in the discussion surrounding sustainable development since the publication of Agenda 21 (UN, 1992). This importance has been further underscored through the Decade for Education for Sustainable Development (DESD), 2005 – 2014. The current Agenda 2030 with the 17 Sustainable Development Goals (SDGs) again stresses the importance of Education (UN General Assembly, 2015, UNESCO, 2017). The Austrian Uni-NEtZ project brings together academics from 16 Austrian universities as well as external partners. The overall aim of the project is to develop strategies to realise the UN Sustainable Development Goals (SDGs) in Austria. The group responsible for SDG 4 emphasize in their current position paper (Uni-NetZ SDG 4, 2019) the importance of education in order to reach the SDGs. The authors stress the responsibility of research and education in order to, “find solutions, which contribute to an all-encompassing transformation toward a sustainable future which is worth living” (Uni-Netz SDG 4, 2019, p.1). In an era, which is

characterized by a climate crisis, the shortening of resources and global inequalities, it is pertinent to empower people not only to change their thinking but also to drastically change their actions. Consequently, education should, “impart knowledge and competences in order to enable learners to develop strategies and lifestyles which lead to the realization of a solidary and just relationship with our fellow humans, society and the environment” (Uni-NetZ SDG 4, 2019, p.1). The authors state that subject- and action competences as well as a reflected politically-ethic attitude aligned with human rights are vital in order to be able to anticipate and evaluate the effects of one’s own decisions and actions in a global, lasting dimension, with the goal of adapting lifestyles accordingly. Additionally, the importance of cooperation and networks for the implementation of Education for Sustainable Development (ESD) is stressed (Rauch & Pfaffenwimmer, 2020).

The discussion around competences, learners should acquire takes an important position in ESD. These competences are supposed to enable learners to actively take part in shaping the world towards a more sustainable future (Rauch & Steiner, 2013). De Haan and Plesse (2008) describe the following competence areas in their adapted version of shaping competence (De Haan & Harenberg, 1999) for primary school students:

- Thinking in a forward-looking manner
- Gathering knowledge in a spirit of openness
- Acting in an interdisciplinary manner
- Communicating and cooperating
- Planning and acting
- Being just and showing solidarity
- Being motivated and being able to motivate others
- Reflecting upon one’s own lifestyle and principles

Furthermore, Rauschmayer and Oman (2012) emphasize the ability to be empathic as central in order to put oneself in someone else’s shoes, as well as being able to relate to values and associated inconsistencies.

3. Methodology and research procedure

The data for this paper was collected as part of a larger research project (Glettler, 2018). The central research questions were concerned with the children-nature-sustainability-nexus, asking:

1. How do children, who spend a lot of time outdoors, perceive nature?
2. In what ways do they act towards protecting nature?
3. Which competences do they show in relation to sustainable development?

In order to answer these research questions, the case study methodology was selected, as it was necessary to ‘capture the circumstances and conditions of an everyday situation’ (Yin, 2014, p. 52). The project can be characterized as a relativist, interpretative case study of two common cases, grounded in social constructivism (Gletler, 2018). The cases were selected based on pre-determined attributes:

- Educational institution for children between five and eight years old
- Outdoor Learning elements included in the timetable on a daily basis
- Mission statement stating the importance of outdoor learning
- Terms such as ESD environmental education or eco-literacy mentioned in the curriculum / mission statement
- Located in Austria

The selected cases were a forest kindergarten, close to a major Austrian city and a rural, private primary school.

Case 1:

The Forest Kindergarten, which was selected, was founded in 2013 and was the first Styrian childcare institution without a regular building. The children spent their mornings from 8:30 am to 1:30 pm outdoors in a woodland area surrounding a tipi, forming the centre of the institution. The focus of the data collection was on the 5-6-year olds. 15 children, the three main educators, and the children’s parents were involved in the study.

Case 2:

The primary school has a strong focus on outdoor learning and environmental education projects. The children can spend at least one hour everyday outside in the large school grounds. Additionally, regular outings with a forest educator are part of the programme. Data was collected in Primaria 1 (Years 1 & 2). 14 children aged six - eight, their class teacher, the headmistress, a forest educator, and the children’s parents were involved.

In both cases, interviews were led with the children, based on Weltzien’s (2009) dialogue-supported interviews with children under consideration of their peer-relationships. Accordingly, the children were mostly interviewed in pairs and on one occasion in a group of

three. Three children opted to be interviewed on their own. The interviews lasted between five and thirty minutes. The interviews with the educators were conducted individually. They were semi-structured interviews following an interview guide (Hancock & Algozzine, 2011) and lasted between 50 and 60 minutes. Further data sources for both cases were parent questionnaires (Glettler, 2018), observation protocols from participant observation (Cohen et al., 2007), conducted by the first author as well as media articles about the two institutions. The different data sources were converged to achieve data triangulation (Yin, 2014).

The quantitative data from the parents' questionnaires were analysed using descriptive statistics (Cohen et al., 2007) to present the data in terms of summary frequencies. The qualitative data, including the qualitative data from the questionnaires were analysed using qualitative content analysis based on Charmaz' (2006) grounded theory approach. This approach allows for the themes of the data to emerge throughout the analysis process and consists of three or more different coding approaches, leading to a comprehensive coding system. Following Charmaz' (2006) guidelines for coding, the material was first approached using line-by-line coding. In this step, a small part of the data (two interviews in this case) are read thoroughly and all elements, that are relevant for the analysis, are coded. The resulting, large number of initial codes were then compared to further data material synthesizing the data more and more. This second analysis step – focused coding (Charmaz, 2006) – led to a preliminary coding system. In the third step – axial coding (Charmaz, 2006) – the codes from the preliminary system were summarised into larger categories. This step “specifies the properties and dimensions of a category, and reassembles the data you have fractured during initial coding to give coherence to the emerging analysis” (Charmaz, 2006, p.60). The full coding system consists of 12 categories including several subcategories (Glettler, 2018). For this publication six of these categories are relevant. They are shown in table 1.

Table 1. Data analysis themes and code definitions

Code Category	Category Key	Definition
Self-Competence	C2	Passages that describe or hint at children's personal competence
Social Competence	C3	Passages that describe or hint at children's social competence

Subject Competence	C4	Passages that describe or hint at children's subject competence
Awareness of environmental protection	C9	Passages that describe or hint at children's tendencies toward pro-environmental behaviour
Emotions towards nature	C10	Passages that describe or hint at how children feel towards nature
Roles of nature	C11	Passages that describe or hint at different functions of nature

4. Findings

The findings, presented in this chapter follow the order of the outlined research questions, starting with how children perceive nature, continuing with their actions towards protecting the environment and closing with a description of their displayed competences.

4.1. *Children's perception of nature*

Categories 10 (*Emotions towards nature*) and 11 (*Roles of nature*) describe how the children perceive their natural environment, how they feel about it and which functions they ascribe it. The data here shows slight differences between the two cases. While at the kindergarten it is clear that all children love being outdoors and are extremely interested in plants animals and their surroundings in general, the situation is less clear at the case of the school. Here, one of the educators explains, that for some of the children it takes a while to get used to being outdoors so much and to learn to love it, as some of them are afraid to get dirty or show disgust towards bugs or slugs. However, this usually changes over time and the children learn to appreciate the outdoor time.

Nevertheless, the data indicate that the children in both institutions feel very strongly about their natural environment, react emotionally in situations when they experience something that they perceive as harmful to nature and also lobby for pro-environmental behaviour around their parents. The children even acted protectively towards plants while being in the middle of a soccer game, always making sure that nobody stepped in the flowerbeds when running to retrieve a lost ball. Furthermore, they also develop a strong relationship to the vegetables they

plant in their gardens, as one of the educators explains: 'I notice how good it does the children and how proud they are of their harvest. And how strongly they suddenly feel about the fact that snails are infesting their salad. Something they probably would not care about at all if it happened to their mums.' This perception is supported by the data from the participant observation. Some of the children proudly presented their vegetable beds and could explain in detail which vegetables they had planted. The educators agreed that while children might forget facts they learn, they keep an emotional connection and a positive attitude towards nature.

While the children often start out to see nature merely as a playground, their attitude mostly changes over time, when they develop a deeper connection and start to take on responsibility for protecting it. The following extract from an interview with one of the children at the kindergarten (they were asked to describe their perfect kindergarten) shows their deep appreciation of nature:

A meadow, or well, a meadow at the front. And a whole lot of wild strawberries are there. And a huge tree, which would for example be as thick as the whole area here [gestures around the area, where we are sitting; approximately five metres in diameter]. That would be like that. That all those trees would grow together. And also, like, that there would be a treehouse. And a tent. That would be it.

During the interviews and the observation time several roles became apparent, that the children attribute to nature. While nature as a playground is an obvious function, the children also saw nature as a source for food, an area of relaxation, a place to make new experiences and learn new things and a source of inspiration for games and activities (Glettler, 2018).

4.2. *Children's awareness and actions towards protecting nature*

The data from both institutions indicate, that the children have an awareness of environmental issues, which is profound for their respective age groups. The category *awareness of environmental protection* (C9) includes several passages describing the children's attitude about nature and the environment as well as actions towards protecting the environment. One of the parents describes how being outdoors at school shapes the children's awareness the following way:

Through the focus on outdoor learning, the children develop into critical little characters, who question every plastic wrapping during shopping trips, make sure that lights are not turned on too long and also question thoroughly where food is coming from and how it is produced.

This view is confirmed by parents and educators from both cases, sometimes adding that the children are generally more aware of natural resources and care greatly about recycling and

waste management. Educators from the kindergarten case especially emphasize how sensitive the children are to waste lying around in their forest as well as also in the afternoon, when they are outdoors with their parents.

In the kindergarten case another aspect was salient – the children’s relationship to water. As there is no running water directly in the area where they mostly spend the morning, children have to collect water from a nearby well. Thus, water becomes very valuable to the children and they take great care not to waste any while pumping it or carrying it back to the others.

However, one of the educators explains, the children still need guidance from educators to understand difficult relationships as they have a tendency to anthropomorphize animals and thus sometimes do more harm than good. For example, they think that insects like to be cuddled and patted like a cat or dog, harming them in their enthusiasm.

4.3. Children’s competences in relation to sustainable development

In both cases the data on the children’s competences are very rich and show that the children display abilities in different areas. The children displayed competences in the areas of subject competence, self-competence and social competence, as defined in the Curriculum for Austrian Kindergartens (*Bildungsrahmenplan*) (Ämter der Landesregierungen der österreichischen Bundesländer, Magistrat der Stadt Wien & Bundesministerium für Unterricht, Kunst und Kultur, 2009), in both cases.

4.3.1 Subject competence

The codes for this competence area are the same in both cases – *being able to identify connections / interrelationships* and *knowledge about biology / ecology*. The children in both cases show a profound knowledge about plants, animals and nature in general. This becomes more apparent in the case of the Kindergarten, as it is less expected for children of this age group. Additionally, educators in both institutions attest, that the children are well able to identify connections and interrelationships.

4.3.2 Self-competence

When comparing the codes from both cases, it becomes apparent, that the similarities are by far greater than the differences. There is only one additional code for the kindergarten data (*developing self-confidence / trust in one’s abilities*).

One of the most salient aspects of the data, was the children's great independence and self-reliance. They do not generally depend on being told what to do by the educators but find their own activities. This holds true for the kindergarten throughout the day, while at the school some children sometimes need ideas for activities when they are outside in the schoolyard after school. In relation to this aspect, the second code is also important. The children are very curious about their natural environment and show a great fascination and also perseverance, when exploring their surroundings. Here too, a slight difference can be seen between the cases as with the children at school sometimes disgust from a spider or a bug might hinder an exploration or they might want to go back indoors when it is raining, while at the forest kindergarten, the children do not seem to be affected by these issues at all.

The children are very articulate and creative in both institutions, which can be frequently observed during periods of free outdoor play. This is also the time, when the children show their ability to develop strategies in order to build something or to motivate others to join in their games. They can work very well together and find solutions for their problems mostly without help from the adults. In general, the data also show, that the children can concentrate very well on their tasks, and even in the kindergarten case listen attentively to a story for almost 30 minutes. However, at school, the educators note, that some children have a harder time concentrating when they are outdoors, getting easily distracted by the many different stimuli.

The fact that the code *developing self-confidence / trust in one's abilities* only appears in the findings on the kindergarten case might be slightly misleading. It does not mean that the children at school are not self-confident or do not trust in their abilities but rather, that here, the educators might not be aware of the fact that this is special. In contrast, the educators in the forest kindergarten are probably more aware of the children becoming more self-confident over time.

4.3.3 *Social competence*

In this competence area differences between the cases are apparent from the codes. While taking over responsibility is present in both cases, this code has an additional connotation with the school case. Here, the ability to work independently is often mentioned by the educators, an ability which is probably less looked for at the kindergarten and thus not apparent in the interviews. Similarly, the code *being able to collaborate with others* only appears for the school case. While the children at the forest kindergarten collaborate with each other regularly during

their games and building activities, this might not be in the educators' focus as a desirable competence.

However, here, the educators focussed more on the motivational aspect, mentioning the children's ability to motivate others to join in their games. This is more important at the kindergarten, as there are less activities prescribed by the educators. Additionally, *being able to communicate with each other* only appears for the data of the kindergarten. This does not imply, that the children do not talk to each other at school, but rather, that the educators do not focus on it at school, taking it for granted.

As far as the other codes are concerned, the findings are more similar for the two cases. In both institutions, the children are able to change perspective and to show empathy, they learn how to deal with conflicts, thus getting along well with the other children.

5. Discussion

The findings show that the children in both institutions have a diverse image of nature, a close relationship with nature and are invested in protecting their environment. The first aspect – the positive image and close relationship – concur with the findings of other studies (Aguirre-Bielschowsky, Freeman & Vass, 2012, Meske, 2011, Palmberg & Kuru, 2000) stating, that direct nature experience is vital for a positive image of and relationship with nature. The fact, that the children are not only aware of environmental issues, but also act in order to protect the environment is especially interesting as Raith and Lude's (2014) review of 174 international studies implies, that it is very difficult to influence environmental action. However, the situation at both institutions seems well suited to foster children's inclination towards pro-environmental action. When comparing it with Jung's (2012) model, many aspects are covered – the children have positive nature experiences, come from families who care for the environment and they spend time outside with their friends. All these factors increase interest in the environment and motivate to protect it.

The findings further showed, that the children have many competences which are relevant for sustainable development. In the following section the findings on the children's competences will be discussed making comparisons to the Model of de Haan & Plesse (2008).

5.1. Children's displayed competences in the light of ESD

The children's abilities in the areas of creativity and imagination are rated very high by parents and educators in both cases. This is an important aspect in ESD, as creativity is fundamental to find new, not-yet-tested approaches to problems and challenges of the world we live in and is considered important in de Haan and Plesse's (2008) sub-competence *thinking in a forward-looking manner*. The second sub-competence *acting in an interdisciplinary manner* calls for experiential- and inquiry-based learning approaches, which depend on children's fascination with the world around them (de Haan & Plesse, 2008). This aspect was prominent in both cases, as the children showed curiosity and were busy investigating their surroundings in order to understand their world. This aspect is also considered vital by Stoltenberg (2011a), as curiosity and an urge to explore one's surroundings is a prerequisite for learning about sustainability issues.

Similarly important for *acting in an interdisciplinary manner*, is the children's self-confidence, respectively their trust in their own abilities. Furthermore, the children's ability to understand interdependencies and their broad knowledge of nature topics seem important for this sub-competence. This aspect is also considered as important by Stoltenberg (2011b), as this kind of knowledge supports the children in gaining further insights into central life questions.

Moving on to the children's communication skills, they are considered vital as a basis in order to solve conflicts, gather knowledge, and generally to work successfully in teams. In this respect also the finding, that the children generally get along with each other very well in both cases is important. These two areas correspond with de Haan and Plesse's sub-competence *communicating and cooperating*. Similarly, Stoltenberg (2011a, b) describes that philosophizing with children on sustainability related topics is a meaningful method in ESD, demanding well developed communication skills. Furthermore, children need to be articulate in order to participate in democratic decision-making processes (Stoltenberg, 2011a).

One aspect that is linked to the sub-competence *planning and acting* is taking over responsibility, which is a very important aspect in both institutions as the children are involved in many activities and are trusted to do their part. This is seen as fundamental by many authors (de Haan, 2010, de Haan & Harenberg, 1999, Stoltenberg, 2009). Stoltenberg (2011b) claims sustainable development depends on people, who have the courage to intervene, who are

motivated to do something in terms of sustainable development, and who have made the experience, that this is meaningful and possible (p.33).

Another important aspect is the ability to develop strategies, which is well developed in the children of both cases. This aspect is generally considered vital in the ESD discussion (de Haan, 2010, Stoltenberg, 2008, 2011a, b). When viewing children as ‘pioneers of change’ (Henze, 2016, p. 35) it becomes especially clear that being able to develop strategies is vital in order to promote a change towards a more sustainable lifestyle.

For the next sub-competence – *being just and showing solidarity* -, de Haan and Plesse (2008) stress the importance of the ability to be empathic and compassionate. They continue explaining that for children to develop this competence, it is important to practise changing perspectives. Both of these abilities are very prominent in both cases, as the children learn these skills through role-play but also through the careful guidance of their educators. This ability is also important for the sub-competences *thinking in a forward-looking manner* and *gathering knowledge in a spirit of openness*. Rauschmayer and Oman (2012) also emphasize the importance of being empathic for reaching the goals of sustainable development.

Finally, it can be said that as far as the sub-competence *being motivated and being able to motivate others* is concerned, the children in both cases show a high degree of motivation to protect the environment and also regularly display their ability to motivate others.

6. Conclusion and Recommendations

The findings indicate, that increasing the amount of time children spend outdoors could positively contribute towards a more sustainable future. However, the presented case studies can only be seen as a starting point for exploring the overlap between outdoor learning and ESD. Further research into this area is necessitated to expand on the findings obtained and to offer more profound and perhaps contrasting insights into the research field. Additional studies of other cases would provide a deeper insight into the factors facilitating the effects of being outdoors shown in this study. In this respect, an interesting question would be what impact the parents’ attitudes have and how children of different backgrounds develop in settings, similar to those of the case study institutions. Furthermore, the influence of the children’s experience realm including cultural background and their family history are of great interest. In this respect,

especially migration and cultural diversity in present day societies seem worthwhile aspects of future research endeavours.

In addition, longitudinal studies would be indicated in order to see how children who spend their early childhood in an institution offering outdoor learning elements develop throughout their further education and beyond. However, despite the necessity of further research, the findings suggest that children generally profit greatly from being outdoors in various aspects of their development. Thus, implementing elements of nature experience, such as regular forest days or a more natural design of the (school-) grounds in elementary and primary education seems indicated.

In conclusion, ESD or transformative education (Bittner & Pyhel, 2016, Singer-Brodowski, 2016) are vital concepts in the current state of the planet. While new terms and definitions emerge with every new policy document, there is still a need for research on how to actually educate children and young people but also adults in order to raise their awareness of current issues and support the goals of sustainability leading to a sustainable life.

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About Authors

Christiana GLETTLER received her M. Sc. from Karl-Franzens-University Graz in 2006 and a PhD from Karl-Franzens-University Graz in 2018. She is a lecturer and researcher at KPH Graz in the elementary and primary teacher education programmes. Her areas of teaching and research include outdoor education, environmental and sustainability education and didactics of primary school science teaching.

Franz Rauch received his M. Sc. from Karl-Franzens-University Graz in 1985, a PhD from Karl-Franzens-University Graz in 1990 and holds a Habilitation in Education with a focus on Environmental Education. He is currently a Professor at the University of Klagenfurt in Austria and has been a research fellow at the University of Northumbria in Newcastle upon Tyne, England and a Fulbright Scholar at the University of Missouri - St. Louis, USA. He has been involved in research and development projects internationally and nationally for many years. He is one of the editors of *Educational Action Research Journal* and serves on editorial boards of other Journals (like *The Journal of Environmental Education* and *ARISE – Action Research in Science Education*). His areas of research, teaching and publication are environmental education and education for sustainable development, networks in education, school development, science education, continuing education for teachers and action research.