

FORGOTTEN NATURE? EXPERIENCES WITH AND KNOWLEDGE OF NATURE AMONG SCHOOLCHILDREN: A PILOT STUDY IN CENTRAL SWITZERLAND

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Abstract/Izveleček This pilot study investigates the extent of familiarity among primary school children (6th grades, n = 142, 55.6 % boys) with common local animal and plant species and whether this knowledge differs depending on selected context variables. As the analysis shows, nature is of great importance, and most children already have gathered some basic experience of nature. On average, they correctly identified 51.2 % of the animals and 36.2 % of the plants, but there were obvious gaps in their knowledge. The present results showed a clear connection between the knowledge of native animal and plant species depending on the child's nationality, whether they have a garden at home and how their parents stimulate their interest in nature.

Ključne besede:
poznavanje vrst,
osnovnošolci, osrednja
Švica.

Pozabljeno naravoslovje? Izkušnje in znanje iz naravoslovja pri šolarjih – Pilotna študija v osrednji Švici

Pilotna študija proučuje, koliko današnji osnovnošolci (6. razred, n = 142, 55.6 % dečki) poznajo običajne lokalne rastlinske in živalske vrste ter ali se to znanje razlikuje glede na izbrane kontekstualne spremenljivke. Opisna analiza je pokazala, da je naravoslovje zelo pomembno in da je večina otrok že pridobila nekaj osnovnega naravoslovnega znanja. V povprečju so pravilno prepoznali 51.2 % živali in 36.2 % prikazanih rastlin, a v njihovem znanju so bile očitne vrzeli. Predstavljeni rezultati so pokazali jasno povezavo med poznavanjem domačih živalskih in rastlinskih vrst, in sicer glede na narodnost otroka, glede na to, če imajo doma vrt in če starši spodbujajo njihovo zanimanje za naravo.

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Introduction

Regular contact and experience with nature (i.e., the animate and inanimate outdoor environment and all its interactions, D-EDK, 2016) play a central role in providing a basic understanding of nature, developing a respectful relationship and perceiving oneself as part of nature (Kahn & Weiss, 2017; Leske & Bögeholz, 2008; Louv, 2005; Raith & Lude, 2014). Without a personal connection to nature and knowledge of plants, animals and their habitats, it is difficult to develop an understanding of biodiversity and its protection (Bebbington, 2005; Lindemann-Matthies, 2002 and 2005). This importance is also emphasized in goal 15 of the 2030 Agenda for Sustainable Development (protection of terrestrial ecosystems): “The learner understands basic ecology with reference to local and global ecosystems, identifying local species and understanding the measure of biodiversity” (Rieckmann, 2018, p. 72).

However, several studies indicate that children today spend more time indoors than outdoors, and for many adolescents nature no longer seems to be a normal part of their environment (Louv, 2005; Tremblay et al., 2015; Waller et al., 2017). Because of this lack of closeness to nature, essential primary experiences essential for children’s development are threatened, while their knowledge of local animals and plants also seems to be very limited today (Balmford et al., 2002; Bebbington, 2005; Brämer et al., 2016; Lindemann-Matthies, 2002; Remmele & Lindemann-Matthies, 2018). For example, in a study from Switzerland ($n = 6725$ school children, aged 8-18 years), adolescents on average could name only five local plant and six animal species that they perceived on their way to school each day (Lindemann-Matthies, 2002); moreover, in a recent study from Germany, the 5-11 year-old children ($n = 402$) surveyed were able to identify only 17 % and 22 %, respectively, of the 24 plant and animal species presented (Remmele & Lindemann-Matthies, 2018).

The child’s family seems to be the main source for building their experiences with, attitudes towards and knowledge about nature (Bögeholz, 1999; Meske, 2011; Remmele & Lindemann-Matthies, 2018). According to research results, proximity to or distance from nature and children’s play in nearby nature are essentially determined by their parents, their supervision, ethnicity, educational and income level and model behaviour (Hunt et al., 2016; Skar et al., 2016; Späker, 2016).

This socio-economic context also includes residential areas and the associated accessibility of natural sites (Meske, 2011). Besides proximity to the nearest forest, there seems to be a positive relationship between the existence of a garden and children's experiences with as well as their knowledge of nature (Pohl, 2006).

For children to gain personal access to nature and develop an early awareness of the environment, educational institutions, alongside parents, play a central socialisation role, since all children can be reached at school. Regular experience of nature outside the classroom is also indispensable for the personal exploration of the surrounding nature intended in the current Swiss-German curriculum 'general science and social studies' (D-EDK, 2016) and the competence to recognise and categorise the biodiversity of plants and animals. Teacher education is of particular importance, since well-trained teachers are key players in this educational process (Kühnis, 2018; Lindemann-Matthies et al., 2017; Rieckmann, 2018; UNESCO, 2017).

Despite the high relevance of the topic of this research (including for teacher education), only a few studies have been conducted in Switzerland to date (Lindemann-Matthies, 2002; Lindemann-Matthies et al., 2011). Within the framework of a research project planned in Central Switzerland, the subject area will therefore be examined in greater depth (Figure 1) and in a supra-regional comparison. The aim of the project is to answer the following key questions, which were observed at the first stage in this pilot study: a) What personal connection do today's schoolchildren have with nature? b) How familiar are pupils with common animals and plants in Switzerland? and c) What correlations exist between children's relation to nature, their knowledge of species, and selected socio-demographic variables?

In addition, a supplementary survey from the teacher's point of view (containing 14 questions) will examine how close to nature today's school areas are designed, which natural spaces are available in the school environment, how these possible learning locations are actually used, or which reasons prevent teachers from using them.

Methods

Study design and sample

This pilot study was carried out in advance of a cross-regional study (Figure 1) planned for 2021 and is intended to provide an up-to-date inventory in three cantons of Central Switzerland (Schwyz, Uri and Nidwalden). Based on the intended competences in the current Swiss-German curriculum ‘general science and social studies’ (D-EDK, 2016), the level of ambition of the survey instrument, and the fact that the end of primary school marks an important transition phase in our school system, the research field is limited to the 6th primary level. This pilot study included $n = 142$ primary school children (55.6 % boys), aged 10-13 years ($M = 11.9$, $SD = .72$) from nine classes in the Canton of Schwyz.

Data collection and analysis

The prerequisite for carrying out this pilot study was approval from the cantonal authorities and the local school management. The parents were informed by the teachers. The data collection was conducted in June 2020 within a regular 45 min. lesson by using a student questionnaire and an additional questionnaire for teachers. Participation was voluntary and anonymous. The survey of the pupils and their class teachers was carried out according to a standardised procedure, under the leadership of a project member. After a short introduction, the children were guided through the questionnaire. The student questionnaire could be completed in approximately 20 minutes; the teacher questionnaire in 10 minutes. The elaboration of the children’s questionnaire and the selection of variables were primarily based on German reference studies (Brämer et al., 2016; Pohl, 2006). The teachers’ questionnaire was developed on the basis of a study by WWF Switzerland (2015). The final version of the two instruments was preceded by a pretest from April to June 2019 with a sample of $n = 104$ children (52.9 % boys), aged 10-13 years ($M = 11.2$, $SD = .57$) from six classes in the Cantons of Schwyz and Uri.

The children’s questionnaire consisted of two parts. The first part contained questions on socio-demographic variables (i.e., gender, nationality and residential area), on the children’s general attitude to nature and their parents as a source of inspiration.

In the second part, 16 common animal and plant species (Table 1) were presented, using high-resolution colour photographs. Species selection included the following criteria: the animals and plants had to be common and widespread in Switzerland and to be found in or near settlements. In addition, these species are typical representatives of forest and meadow habitats, which are thematic aspects of the subject areas of the curriculum (D-EDK, 2016). The selection was based on national fauna and flora databases (www.cscf.ch; www.infoflora.ch) and reference studies (Lindemann-Matthies, 2002; Randler, 2006; Remmele & Lindemann-Matthies, 2018; SDW, 2009).

Table 1: List of 16 plant and animal species that children had to identify

Plant species		Animal species	
Common name	Scientific name	Common name	Scientific name
Dandelion	<i>Taraxacum officinale</i>	Badger	<i>Meles meles</i>
Buttercup	<i>Ranunculus acris</i>	Mole	<i>Talpa europaea</i>
Daisy	<i>Bellis perennis</i>	Weasel	<i>Mustela erminea</i>
Maple	<i>Acer pseudoplatanus</i>	Toad	<i>Bufo bufo</i>
Oak	<i>Quercus robur</i>	Slow worm	<i>Anguis fragilis</i>
Birch	<i>Betula pendula</i>	Robin	<i>Eritacus rubecula</i>
Beech	<i>Fagus sylvatica</i>	Magpie	<i>Pica pica</i>
Hazel	<i>Corylus avellana</i>	Woodpecker	<i>Dendrocopos major</i>

Only the common names in the children's own language (typical local folk names were permitted) were asked for and were considered as correct if the common name of an animal or a plant at the species or genus level was provided. The names could be written right next to the pictures, and each correct answer was given one point. With Cronbach's α values of .75 (plants) and .80 (animals), the internal consistency of these two scales is satisfactory to good. All data collected were transferred to the SPSS statistics programme (version 24). For the description of results (significance level $p < .05$), only complete data were considered. Because the data on species knowledge were not normally distributed (based on graphic check as well as Shapiro-Wilk-Test), the Mann-Whitney U-test was performed to check group differences.

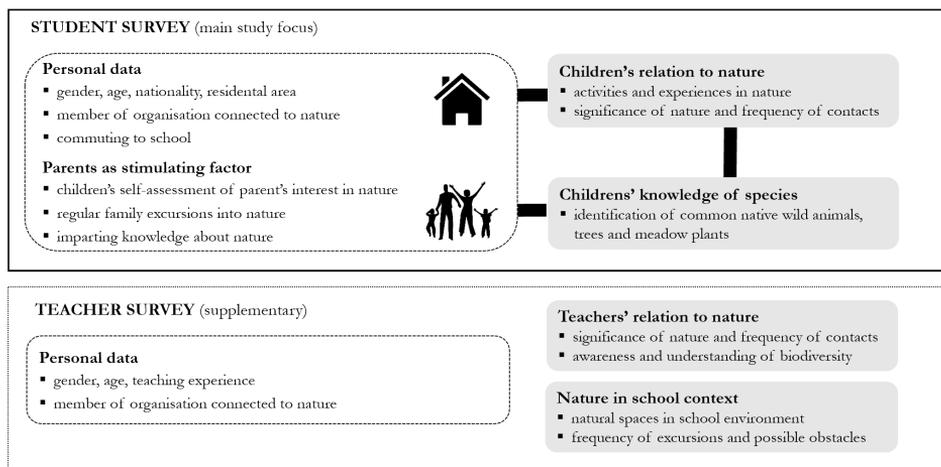


Figure 1: Overview of central dimensions and variables of the study.

Results

As the results of the pilot study show, 81 % of the children regard nature as something important, and 62.7 % also like to spend time in nature. 17.6 % are members of an organisation connected to nature (e. g. Scouts). In addition, the majority of children seem to have had some basic nature experience in their childhood: for example, 88.1 % have already held a beetle in their hands, 68.1 % have spent the night outside in a tent, 90.2 % have climbed a tree and 63.4 % have seen a fox or badger in nature. However, the knowledge of common native species is unsatisfactory. On average, children could only correctly name seven (43.7 %) out of a total of 16 animal and plant species, with a better knowledge of animals ($M_{\text{animals}} = 4.1 \pm 2.4$) than plants ($M_{\text{plants}} = 2.9 \pm 2.1$). In total, 54.9 % achieved less than 8 points and 7.7 % between 13 and 16 points. Seven children (4.9 %) could not name a single animal and 17 children (12 %) a single plant. Among the animals, mole (*Talpa europaea*), badger (*Meles meles*) and woodpecker (*Dendrocopos major*) were most identified correctly (figure 2a); common dandelion (*Taraxacum officinale*), daisy (*Bellis perennis*) and oak (*Quercus robur*) were the best-known plant species (Figure 2b).

Table 2: Analysis of children’s knowledge (n = 142) of common native species (mean±sd)

species knowledge	gender		nationality		own garden	
	boys	girls	Swiss	foreigners	yes	no
animals (8 species)	4.0±2.5	4.1±2.2	5.0±2.0*** ^a	2.1±1.8	4.8±2.1*** ^a	2.2±1.8
plants (8 species)	2.8±2.1	3.1±2.1	3.7±1.3*** ^a	1.3±1.2	3.6±2.1*** ^b	1.4±1.3
total (16 species)	6.9±4.3	7.1±4.0	8.7±3.6*** ^a	3.5±2.8	8.4±3.8*** ^a	3.7±2.8

Mann-Whitney-U-test: * p < .05, ** p < .01, *** p < .001

Pearson’s correlation coefficient: ^a r ≥ .50, ^b r = .47

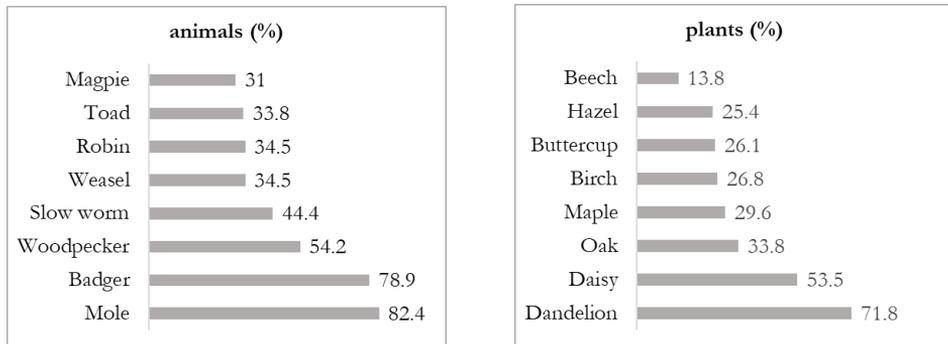


Figure 2a/b: Proportion of children (n = 142), who correctly identified the species presented.

No gender-specific differences were found, but Swiss children and children with a garden at home showed significantly better species identification than foreign children or children from families without a garden (Table 2). Moreover, parents seem to be an important stimulating factor: Regular joint nature excursions with parents were also positively associated with the children’s animal ($p < .001$, $r = .40$) and plant knowledge ($p < .001$, $r = .38$). In addition, children of parents who (from the child’s perspective) also teach them something about nature, have a better knowledge of animals ($p < .001$, $r = .41$) and plants ($p < .001$, $r = .33$) than children without such personal knowledge transfer. The children’s familiarity with species was also better when they enjoyed watching nature programmes on TV or reading books, magazines etc. about nature in their free time. However, these effect sizes ranged between small to medium ($r = .20$ to $r = .30$).

Discussion

The data from the pilot study represents only the first interim findings, and more precise statements and interpretations of possible and practice-relevant group differences will be possible only after the final survey. At least they indicate a certain tendency. In line with reference studies (Balmford et al., 2002; Bebbington, 2005; Lindemann-Matthies, 2002; Remmele & Lindemann-Matthies, 2018; Brämer et al., 2016; Gerl et al., 2018), our initial results also show that schoolchildren in Central Switzerland partly show large gaps in their knowledge about the native fauna and flora (Table 2, Figure 2a/b). These gaps seem to be more apparent in the identification of common plants than in animal knowledge: On average, children correctly identified 51.2 % of the animals and 36.2 % of the plants. In accordance with other studies, mammals were better identified than other vertebrates and meadow plants better than trees (Huxham et al., 2006; Randler, 2006; Remmele & Lindemann-Matthies, 2018). This finding could be due to the general tendency that children are more interested in animals than in plants (Gebhard, 2001, Kögel et al., 2000; Remmele & Lindemann-Matthies, 2018).

Children's familiarity with common animals and plants was positively related to their nationality, to having a garden at home as well as to being encouraged by their parents to take an interest in nature. In line with previous studies, the family environment seems to be a central source for building children's experiences with, attitudes towards and knowledge about nature (Bögeholz, 1999; Hunt et al., 2016; Meske, 2011; Pohl, 2006; Remmele & Lindemann-Matthies, 2018). Based on these findings, it is also important in the context of biodiversity education to create an appropriate awareness among parents of their function as role models and sources of knowledge. Basic species knowledge is indispensable for the understanding of biodiversity (Bebbington, 2005; Lindemann-Matthies, 2002 and 2005; Remmele & Lindemann-Matthies, 2018). In addition to the family, school is another important setting, since here all children can be sensitised at an early stage in life to the importance and sustainable use of natural diversity (Kühnis, 2018; Rieckmann, 2018). According to Lindemann-Matthies et al. 2017 (p. 32), "Familiarising pupils with local plants and animals through relevant experiences in school requires competent teachers."

However, research shows that prospective teachers often seem to finish their studies without ever having come into contact with the topic of biodiversity and are also very poorly prepared to teach taxonomy (Lindemann-Matthies et al., 2011 and 2017). There is therefore an obvious need for action in both school and teacher training. The implementation of this pilot study went according to plan, and the questionnaires used proved to be very practical in terms of saving time and comprehensibility. Because the survey data is based on information provided by the children, certain distortions (social desirability) cannot be excluded. Moreover, the data available do not permit a conclusive assessment, and it remains to be seen what results the main study planned will produce in 2021.

Conclusions

A wide variety of contacts with nature constitutes a central condition for gaining emotional access to and basic knowledge of nature (Kahn & Weiss, 2017; Leske & Bögeholz, 2008; Louv, 2005; Raith & Lude, 2014). With the changing conditions of growing up in our dynamic, individualised and technologised society, children's relationship to nature and their knowledge also seem to be changing. Preservation of global biodiversity is one of the most urgent tasks of our time, and the intensification of environmental education is considered a central measure. In this educational process, the parents and the school represent two crucial, complementary socialisation authorities. The research project planned should therefore not only provide basic information on schoolchildren in Central Switzerland, but also identify any potential need for action and derive recommendations. In addition to the global decline in biodiversity (WWF, 2018), it would be fatal if nature would also increasingly disappear from children's minds.

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