

Natural Environment vs. Modern Technology: Development and Evaluation of Concepts for Multi- Perspective Learning Experiences in Extracurricular Contexts of ESD

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Problem

Young people grow up as digital natives, but have insufficient knowledge of their natural environments (1, 2)
Knowledge as a prerequisite for awareness, appreciation, and responsible action concerning society's core SD-challenges (3)

Theory

- multi-perspective approach (6, 11)
- transformation of learning environments (12)
- spatial analysis, spatial structures and functions (13)
- location-based mobile digital learning (14)
- learning / adventure trails (15, 16)
- digital game-based learning (17)

Method

Identification of transdisciplinary problems (4)
Transfer of knowledge and skills using integrative examples for practical applications (e.g. sensor network for investigating spatial structures and diversity) (5, 6)
Interaction in the local area under authentic conditions (e.g. the monitoring object: forest ecosystem) (7)
Consideration of balanced addressing of cognitive abilities of learners (8)
Complexity reduction while at the same time highlighting crucial content through appropriate composition of didactic approaches (9, 10)

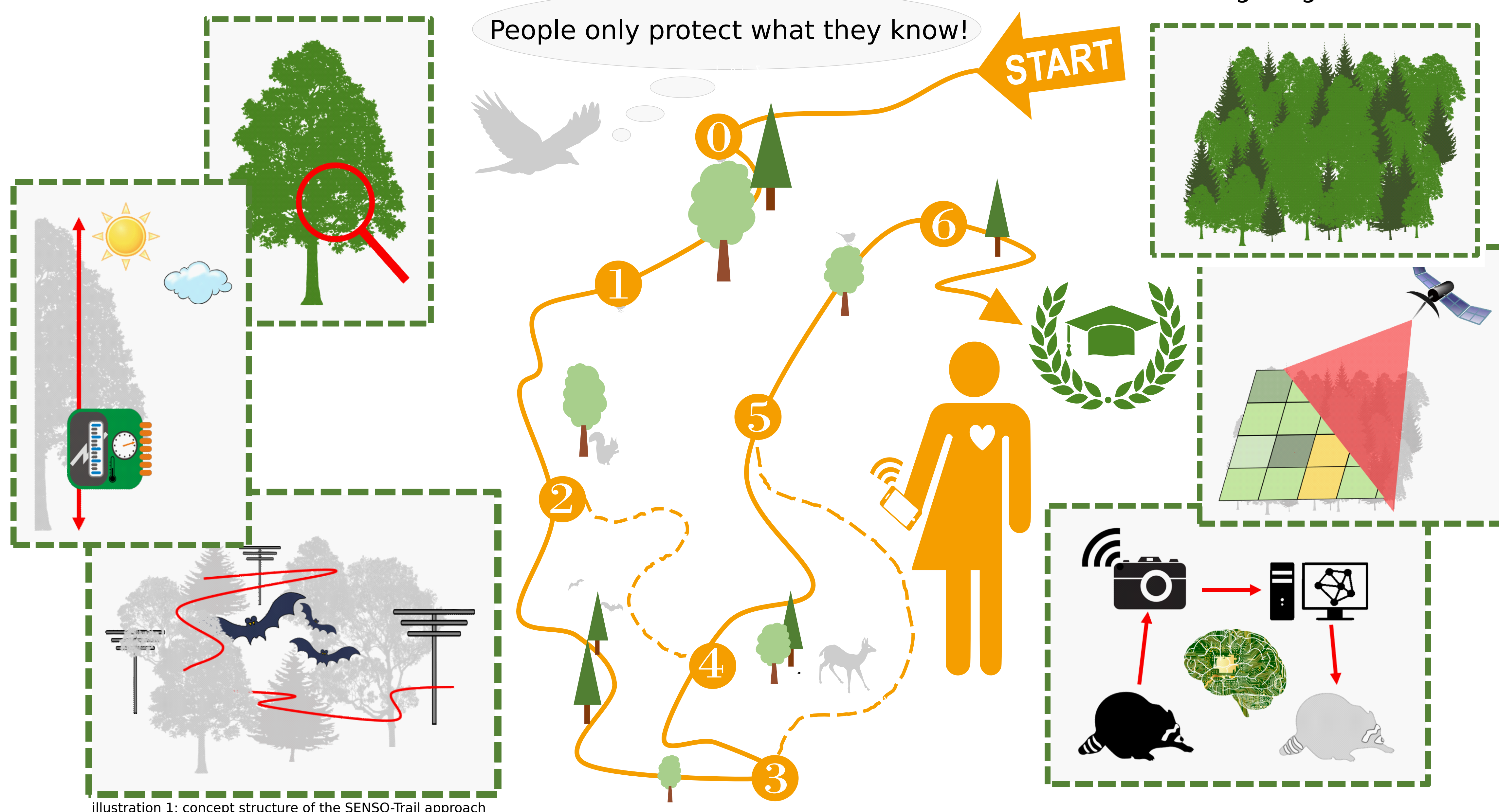


Illustration 1: concept structure of the SENSO-Trail approach

Research question (concept evaluation)

Q1: Does a multi-perspective educational concept in an extracurricular context have an influence on youth's geography knowledge*?

Q2: What role do specific attitudes (Q2.1), interests (Q2.2) and motivation (Q2.3) play in the learning success of the participants?

*including topics such as *geographic location factors, microclimatology, geocology, remote sensing, automation and sensor technology, environmental monitoring and modeling, machine learning and artificial intelligence*

Research design

randomized test groups

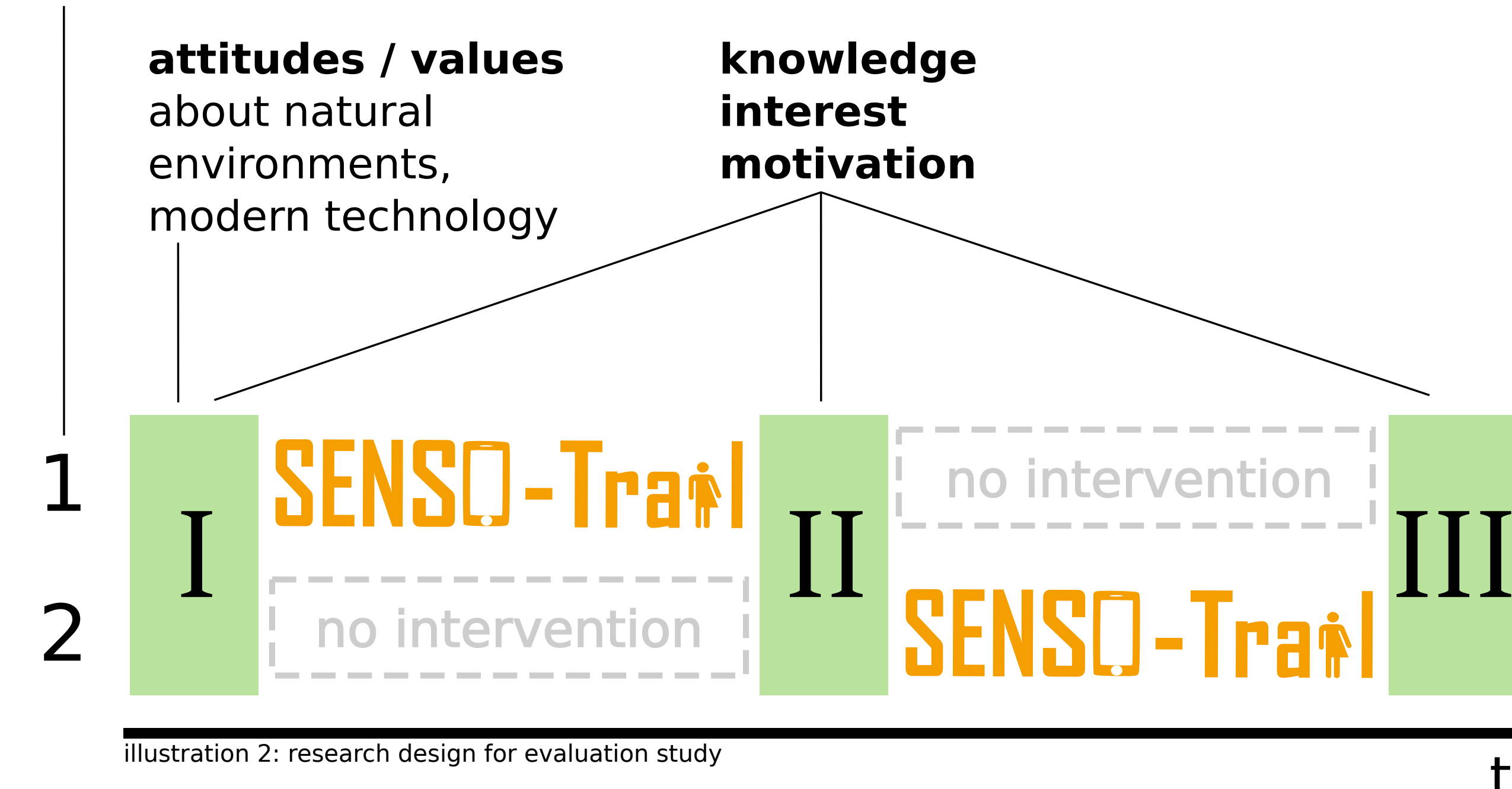


Illustration 2: research design for evaluation study

Quantitative intervention studies in the pre-post-scheme, waiting control group design with three examination times (18)

Measuring instruments: standardized questionnaire;
Survey items: Attitudes towards natural environments or modern technology as base values (one-off survey), (19, 20)
Interest, motivation and knowledge (at all three times), (21)

Test subjects:
Teenagers aged 15-17 (various school types)

Implementation

main study

pilot study

method study (pre-testing)

concept development

Literature: 1 Schell Jugendstudie (2019); 2 Brämer et al. (2016); 3 De Haan (2008); 4 Fischer et al. 2016; 5 Barth (2006); 6 Zinn (2018); 7 Bromme & Kienhues (2008); 8 Brünken & Leutner (2008); 9 Ammonet et al. (2020); 10 Anthes et al. (2021); 11 Bruckner (2017); 12 UNESCO (2020); 13 DGF (2020); 14 Hiller et al. (2019); 15 Ebers et al. (1998); 16 Megerle (2003); 17 Prensky (2003); 18 Gollwitzer et al. (2013); 19 Dunlap et al. (2000); 20 Nickell & Pinto (1986); Wilde et al. (2009)

Illustration 3: implementation time line