



Coping with cognitive dissonance in climate protection through dilemma stories in climate education

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ABSTRACT

Ambitious objectives in climate policies set high expectations not only on technological advance, but also on an education that raises each individual's awareness for sustainable developments. Psychological evidence, however, suggests that information on climate change leads to moral dilemmas and evokes cognitive dissonance that exposes an inner state of conflict. These negative experiences induce discomfort and counteract efforts of climate education, if humans do not develop coping strategies right from the beginning on. In order to address that problem, a teaching unit for children in primary school is developed and evaluated. The development of the teaching unit is part of a practice-oriented project of NaturGut Ophoven e.V., a center for environmental education. The teaching unit deals with climate change in general and in specific with climate-friendly nutrition, consumption, mobility, waste disposal behaviour and the rebound-effect. An essential component of each module is a personal confrontation with a dilemma story that the children must discuss and creatively work with. A combination of quantitative and qualitative methods is used to evaluate the effectiveness of the teaching unit's approach. This includes a focus group and a pre-post-measurement with a partly-standardized written survey, each a different survey for teachers and children. The results indicate that the children of age eight to ten learned how to cope with cognitive dissonance and can decide more easily in dilemma situations. Thus, the developed teaching unit helps children to gain capacity to judge and to decide without feeling overwhelmed or frightened. In addition, children's attitudes towards their own action on climate protection are positively affected by our modules.

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Introduction

In view of progressing climate change and the increasing emissions of greenhouse gases like CO₂, climate education has the task of raising each individual's awareness for sustainable developments. However, ambitious objectives in climate policies set high expectations not only on technological advance, but also on the behaviour of every individual. With regard to that fact, climate education is facing the challenge not to limit itself on teaching certain content or problem knowledge, but to develop effective methods which promote the capacity to judge in the presence of complex dilemma situations. Even though most people do not want to act against their moral principles [1], they must gain the ability or competence to apply these ideals in everyday life. In decision processes humans are easily drawn into an inner conflict, caused by dissonance: "Where an opinion must be formed or a decision taken, some dissonance is almost unavoidably created between the cognition of the action taken and those opinions

or knowledges which tend to point to a different action" [2].

Especially under time pressure or in rather emotional situations it is difficult to choose between moral principles that are mutually exclusive [3]. That is a dilemma, because every decision could be wrong from one moral point of view. As a result, moral intention (e.g. climate protection) and moral action (e.g. acting climate-friendly) are not the same. That can be rather problematic, because according to the concept of cognitive dissonance [2] all human beings inherently strive for internal consistency of different behavioural tendencies and cognitions. Therefore they suffer, if they are not able to handle the situation. As a consequence, a decision maker may want to actively avoid these dilemma situations as well as all information about climate change that would likely increase the dissonance [2].

While decisions on climate protection increasingly require the capacity to judge in order to con-

vert knowledge into action, in industrial countries opportunities for training these competences are too sparse [4] [5]. Learning opportunities are essential, because moral abilities, like the capacity to judge, are not inborn and must be developed during lifetime. Moreover, several studies prove the strong relation of moral development and educational processes [1]. Moral competence (or moral ability) can even regress when there are not any opportunities for practice [6]. With the project called “Klimabildung+” (climate education plus) we try to fill the gap and developed a teaching unit with six modules for children aged eight to ten. We regard primary school as a place for elementary building of values [7] and therefore chose primary school children as the target group. The Institute of Biology and its Didactics at the University of Cologne was responsible for the didactical guidance throughout the entire project. The expected outcome of the teaching unit can be summarized in the following research questions:

1. To what extent do children understand the phenomenon of climate change and show problem awareness?
2. To what extent do children experience cognitive dissonance (see and feel a dilemma) concerning climate protection and climate change before and after participating in the modules?
3. To what extent do the modules succeed in working with the dilemma and cognitive dissonance with regard to climate change?
4. To what extent do teachers consider the given material as valuable for the preparation and follow-up work?

These questions are examined with different methods which are described in the evaluation’s section.

Design of the teaching unit

Theoretical approach and content

The teaching unit consists of six theory-based and empirically tested modules. An essential component of each module is the confrontation with a dilemma story. The approach is strongly inspired by Georg Lind’s “Konstanz Method of Dilemma Discussion” (KMDD) [6, 1, 3], which is based on Blatt and Kohlberg’s theory of dilemma discussion [8]. As opposed to imparting theoretical knowledge on climate change, our method provides children a more personal approach to the topic [4]. Therefore, we selected it. Other research has shown that KMDD can be used in all educational institutions to promote

moral competences [6]. Moreover, findings suggest that it already works with pre- and primary school children [9]. Especially children learn responsible action through independent thinking [10]. In addition, we selected that theoretical background, because over the past two decades, no one has had a greater influence on theoretical considerations of moral learning and practical educational efforts to promote capacity of judgment than the psychologist and teacher Lawrence Kohlberg.

Looking into the contents of the modules, the teaching unit refers to the following topics:

- Introduction to origins and causes of climate change
- Climate-friendly waste disposal
- Climate-friendly mobility
- Rebound-Effect and climate protection
- Climate-friendly consumption
- Climate-friendly food

The first module conveys basic information about climate change. The second module deals with the production and disposal problems of plastic exemplified by a plastic bag as a climate-damaging product. The third module emphasizes the connection of our transport options and the global climate change. In the fourth module the children learn that not every energy-saving measure automatically has a positive effect on climate, but sometimes even increases the consumption of energy. The fifth module deals with climate-damaging consumption by means of exploring the production of a t-shirt. The sixth module deals with the negative effects of our eating habits on climate.

As suggested by KMDD we employed a “semi-real” dilemma in the modules. This kind of dilemma stories deals with fictive dilemmas, so that participants of such a dilemma discussion are not part of the story [16]. All stories are open ended. In the story about strawberries in winter (module climate-friendly food), for example, two friends want to try recipes from their new smoothie-book. But they remember what they have heard on the radio about long transports of fruits from all over the world. They know about the positive effects of buying seasonal and regional fruits for the climate, too. But in the new smoothie-book the girls cannot find any information about that issue. As a consequence, their knowledge makes them feel unsettled and they do not know how to decide. Shall they buy strawberries in winter, even if they are out of season products? Shall they make smoothies at all? By that semi-real dilemma story, cognitive dissonance is evoked first

and subsequently eliminated in the reflection part. Here the children have to decide for the girls in the story.

The reflection part consists of a child-oriented discussion, which means it is accompanied by different tasks, like to end the story in form of a role play. The children learn and experience that there is no "right" or "wrong" answer, but that one decision is more climate-friendly than the other one. The children are free to choose how to decide, either to adapt the behaviour to values or adapt their behaviour to values. In both cases cognitive dissonance can be eliminated (see figure 1).

However, in order to make the chosen method effective for climate education, certain didactical principles are to be observed [18]. These are explained in the next section.

Didactical principles of the dilemma discussion

In the modules of the teaching unit we take findings of moral psychology into account that show that moral behaviour cannot be "taught" directly. Therefore, our pedagogical program guides teachers to create a conducive environment to foster autonomous learning [11]. A dilemma is "educative", if it triggers enough moral emotions to stimulate learning, but is not too strong to prevent learning [16]. Critical reviews of three decades of intervention studies state that dilemma discussions and other methods of moral teaching is most effective, if two basic conditions are met [16]: First, there must be a setting of mutual respect and free moral discourse in the classroom, in which teachers do not use their authority to impose aims and pace of learning onto the students. Second, a high level of persisting attention is required [1]. Following these assumptions, we integrated several steps of dilemma discussion into the modules of the teaching unit. Each step belongs to a certain phase of motivation, either assistance or challenge (see figure 2). The recognition of a dilemma aims at making sure that the children understand the problem which the person in the story is facing and that they can point out what he or she has to decide (phase of assistance). The reference framework of the project objective refers to the relation between climate change and the actions of the person in the story. Here, the seminar leader asks if the children realize a connection (phase of challenge). Through challenges students get attentive and eager to solve a problem or to ease bad feelings [1]. The next step is to call upon the emotional level. The participating children can tell how they feel when thinking back to the story and the problem of the person involved (phase of assistance). Then the children work with strategies for dealing with the dilemma the person in the story is facing in

a playful and creative way. The children put themselves in the shoes of the person in the story and tell what they would do in that situation and why they would do so (phase of challenge). The final step is to talk about the children's own experiences with dilemmas in their daily lives.

In the first place, this is not an approach to teach climate-friendly values. The guiding principle of the teaching unit is to promote children's moral power of judgment ability (figure 3, second arrow) to make moral decisions and judgments that are based on moral principles (first arrow) and are enabled to act in accordance to these principles and judgments (third arrow) [3], without feeling overwhelmed by cognitive dissonance. Moral principles are affective, because they relate to moods, feelings and attitudes. Moral abilities, like the capacity to judge, are cognitive and can be trained [17].

As with every pedagogical method, dilemma discussions can have damaging results if they are wrongly applied. They can cause fear, feeling of helplessness, overload or avoidance, for example. Therefore, thorough training of teachers is important to ensure the effectiveness of dilemma discussions [12].

However, since that method is not applied systematically in climate education for primary school children yet, we tested the effectiveness of the teaching unit by reviewing the children's learning progress in coping with cognitive dissonance.

Evaluation of the teaching unit

Method

The evaluation of the teaching unit is conducted by "e-fect dialog evaluations consulting eG". In order to answer the research questions that are listed in the introduction part, a partly-standardized written survey with a pre-post-measurement is designed. First, in preparation for the survey and to focus on relevant questions for the questionnaire, we started the evaluation by conducting a focus group of six fourth graders. The following three questions were focused to review if the chosen approach helps the children to deal with a dilemma and which general knowledge they gain after participating in the modules:

1. To what extent do the modules succeed in helping the children experiencing and dealing with dilemmas?
2. To what extent is the target group emotionally involved in the dilemma situation?
3. To what extent do the children know about strategies for dilemma situations after participating in the modules? To what extent do the

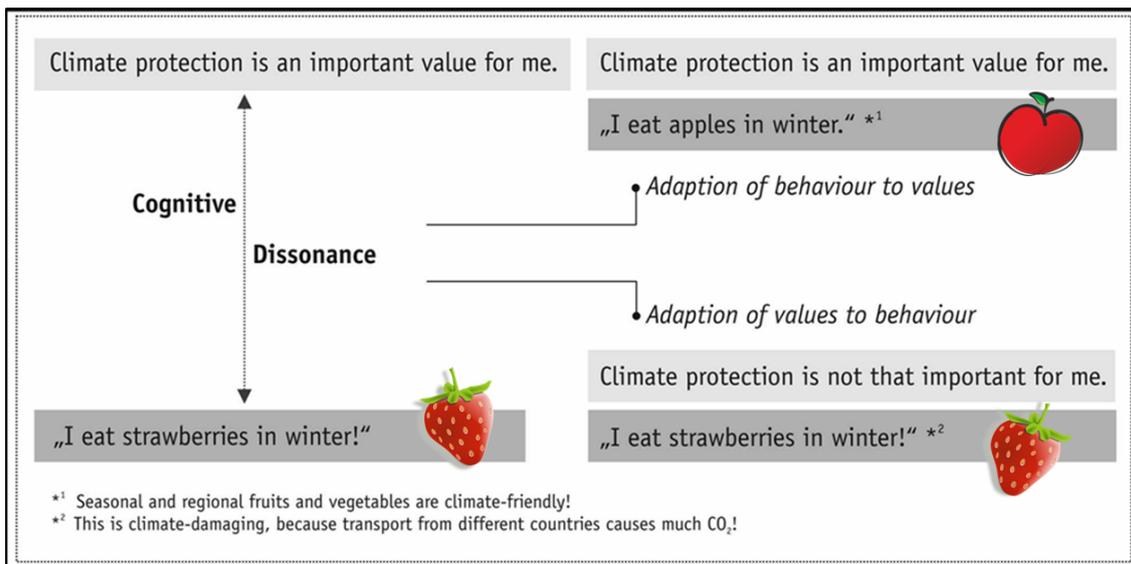


Figure 1. Ways for coping with cognitive dissonance in climate protection, source: own figure, modified and expanded version of Hamann/Baumann/Löschlinger 2016 [15].

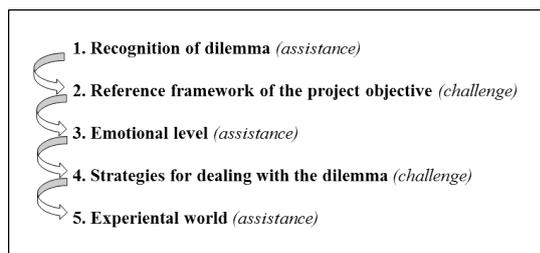


Figure 2. Method of dilemma discussion, source: Georg Lind [1], own extended figure.

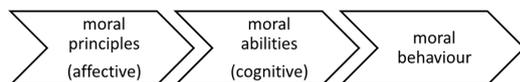


Figure 3. Two-aspect-model for moral behaviour according to Georg Lind [17].

children know about actions strategies concerning climate protection?

The focus group discussion was carried out with a topic guide that had already been prepared before. The topic guide was designed with the overall research questions in mind and was constructed to ensure that topics covered in the focus groups relate to the evaluation objectives. It included open and closed questions. During the session we used audio recording, because it allows for accurate capture of the original conversation. Afterwards the dialogue was transcribed and analyzed with a qualitative analysis and Documentary Method for interpretation following Bohnsack. With that method the text can be reflected in three stages: processes, effects and connections. Especially, it is possible to transform the interpretation from the sphere of explicit knowledge to that of tacit or atheoretical knowledge [14].

Based on the results of the focus group and along the module-extended objectives, attributes and indicators with question-items (see table 1), questions for the questionnaire were created. For the survey we used a partly standardized questionnaire, which children can easily handle. It consists of 14 questions, mostly standardized questions with a six-point scale and some open questions. Thus, quantitative and qualitative data were collected and mixed methods were used. The questionnaire had to pass a pretest. After the revision the questionnaire was handed out to the children before and after a module to review the children's learning progress. Members of the evaluation-team took care that the children answered the questions by themselves. The ques-

tionnaires were collected right after the completion. The sample consisted of 206 pupils from ten different classes (two for each module) from seven different primary schools in the greater area of Leverkusen. On average, the children were nine years old, slightly more than half of them were female.

The evaluation of the standardized questions was carried out by mainly nonparametric techniques. That technique was chosen, because the survey consisted of categorical answer formats. The open questions were assigned to the indicator-specific categories. That took place in a peer-review-process of two members of the evaluation-team.

Additionally, the teachers – which took part in the program – were asked in a post-questioning. For the teachers a different questionnaire was designed: four-sided and with twelve standardized questions, one open question about their estimation of time exposure, three about the preparatory materials, the elements of modules and suggestions for improvement. The twelve closed questions were answered with a five-tier Likert scale: do not agree at all, rather not correct, agree, totally agree and cannot assess. The evaluation technique is the same.

Results

All in all, the results show that after participating in the modules the children learned how to deal adequately with a dilemma situation. The results of the evaluation indicate that the teaching unit helps to make the children experience a dilemma connected to climate change without disturbing their well-being. After participating in the modules, the children mainly choose climate-friendly alternatives. Before and after the modules the children are aware of possible climate action. They think that all human beings together can change something, not only important persons like politicians and factory owners. Before participating in the program, 87 percent of the children think they can do things to protect the climate (t1, totally right and right). Afterwards, even 89 percent agree (t2). Thereof 63 percent agree with „total right“, while only 47 percent think so before (t1) (see figure 4, indicator 3.2.1 of table 1).

The results indicate a relation between knowledge and the experience of dilemma: The more the children know about climate protection, the more they recognize a contrast to their own interests and habits. However, after participating in the modules, for the children it is easier to decide in dilemma situations than before (t2), even if they gained more knowledge. Before 36 percent state that the decision is rather easy for them (t1), afterwards 46 percent agree (see figure 5, indicator 2.3.2 of table 1). The children do not only understand what a dilemma is at a cognitive-level, they can link it to a correspond-

ing feeling, too: 52 percent say they feel torn between two principles. Only 18 percent say they do not know and 17 percent state they feel bad. Especially, the children connect a feeling of dilemma with the story of the plastic and the nutrition module. Here they feel most torn between two options.

Furthermore, all of the ten interviewed teachers note that the topics of the modules are interesting for the children (80 percent totally agree). On average, the teachers have 19,4 years' professional experience. The majority is generally willing to carry out the teaching unit on their own. Moreover, the majority would recommend the modules to colleagues. Nonetheless, 30 percent regard the relevance of the topics for their own lessons to be lower (especially the topics nutrition, consumption and rebound effect) and point out that the amount of time might be too large.

The evaluation of the six modules of the teaching unit results in several recommendations for modification. First, the recommendations point in the direction of the module's simplification in order to demand children of class three and four in an appropriate way. For example it was recommended to use the children's previous knowledge and questions more intensively to entry in the modules and to include the children's experiences more often. The evaluation team proposed to emphasize the meaning of dilemmas more clearly: a dilemma cannot be reduced to a simple decision between two options, because it is created by two options which are equally attractive, but have different consequences for themselves and their environment. Second, it was recommended to modify all modules slightly to obtain another version of the teaching unit so that it can be used for class five and six as well. Another proposal was to create a project week out of the individual program components (modules). The revision of the teaching unit was carried out on the basis of the evaluation results.

Discussion

The overall purpose of the project was to develop an effective pedagogical program for climate education to prepare children in primary school for decision-making in the presence of cognitive dissonance, no matter whether they choose the more climate-friendly option or not.

The key point here is to promote basic decision-making skills which are important for all areas of children's (future) life. Therefore, the most important finding is that the children can decide more easily in dilemma situations after participating in the modules. The results show how capacity to judge can be considerably promoted by dealing with child-oriented dilemma scenarios in form of a story

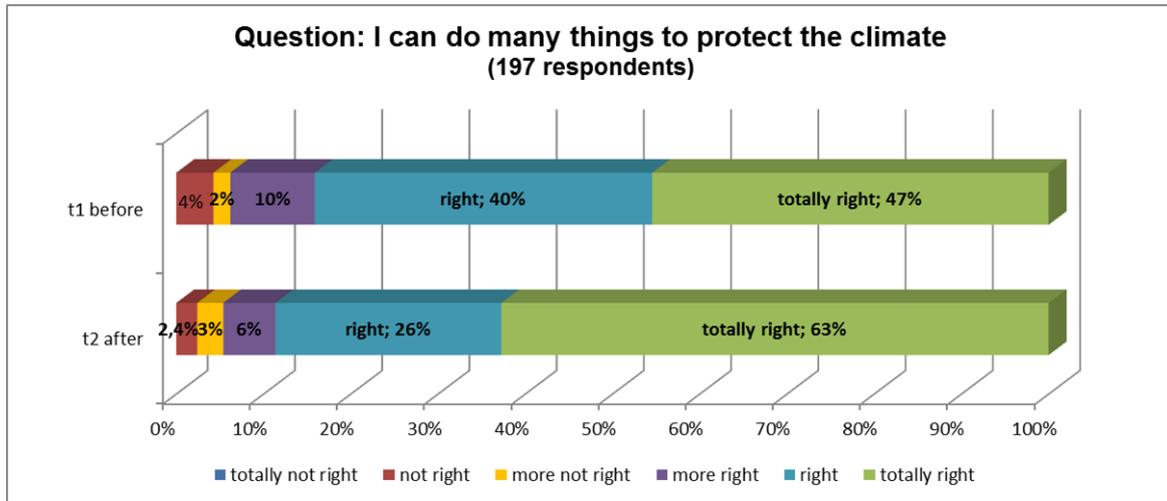


Figure 4. Children’s self-assessment of their personal possibilities to protect the climate, source: own figure, based on [13].

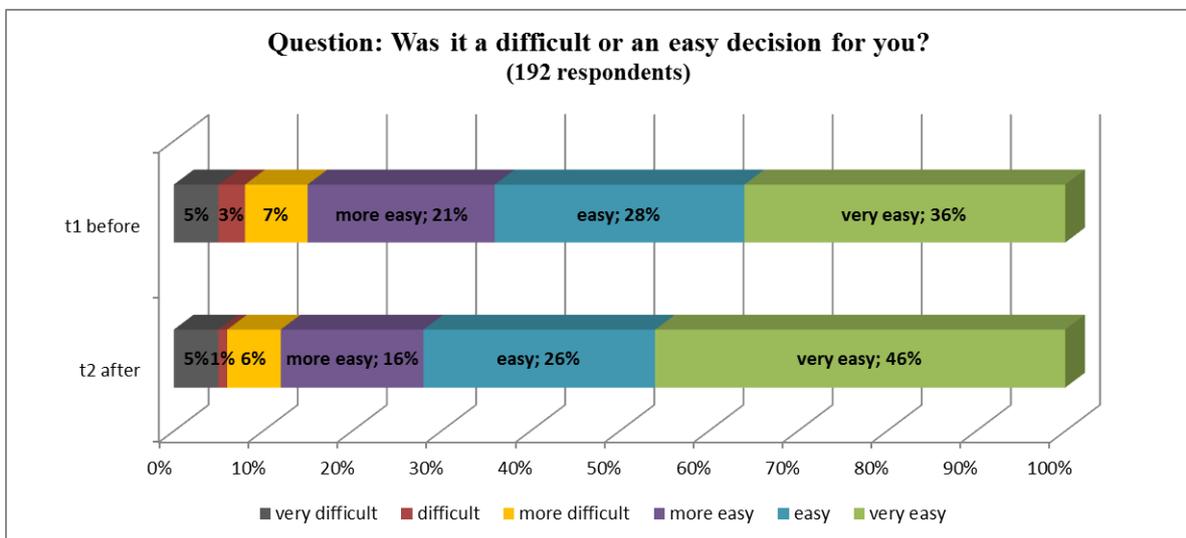


Figure 5. Difficulty of the decision about the dilemma stories before and after a module, source: own figure, based on [13].

Table 1. Overview of research questions and tested hypotheses

Attributes	Indicators with question-items
1. To what extent do children understand the phenomenon of climate change and show problem awareness?	
1.1 previous knowledge	1.1.1 The children know about climate change and greenhouse effect.
1.2 problem awareness	1.2.1 The children realize that climate change is a problem: <i>I think that climate change is a problem.</i>
2. To what extent do children experience cognitive dissonance (see and feel a dilemma) concerning climate protection and climate change before and after participating in the modules?	
2.1 knowing a feeling of dilemma	2.1.1 The children can tell about the experience of dilemma: <i>How do you feel in a dilemma?</i>
2.2 realizing a dilemma	2.2.1 The children realize divergent possibilities for action: <i>What is the problem in the dilemma story?</i> 2.2.2 The children name respective advantages and disadvantages: <i>What is the problem in the dilemma story?</i> 2.2.3 The children realize that their own interests can contrast with climate protection (realizing the dilemma): <i>What is the problem in the dilemma story?</i>
2.3 experience of a dilemma	2.3.1 The children note an uncomfortable feeling due to the dilemma situation (quality of feelings): <i>How would you feel, if you had to decide?</i> 2.3.2 The children experience that decision-making is difficult.
3. To what extent do the modules succeed in working with the dilemma and cognitive dissonance with regard to climate change?	
3.1 knowing solutions	The children know module-specifically about climate-friendly and climate-damaging behavior patterns. 3.1.1 In dilemma situations, the children choose the climate-friendly alternative. 3.1.2 The children recognize climate-friendly possibilities of action.
3.2 convictions of effectiveness	3.2.1 The children know about the impacts on climate of their own behavior (self-efficacy) and 3.2.2 of the behavior of other (important) persons.
3.3 well-being	3.3.1 Self-assessment of own well-being: <i>How do you feel right now?</i>

that involves weighing up, judging and choosing between principles, for example, self-interest versus the general welfare or comfort versus discomfort. These stories even work in a moral dilemma, which means that all possible alternatives would harm another moral principle. Thus, the results reveal the effectiveness of the method of dilemma discussion in promoting coping strategies for cognitive dissonance.

In a wider perspective the evaluation of the teaching unit aimed to obtain information about the children's awareness of possible climate action and to foster climate-friendly acting. Although the children already have slightly positive attitudes towards their own influence on climate protection, the teaching unit seems to have a positive impact. In addition, it is noteworthy that more children are not only aware about, but actually opt for the climate-friendly alternative and recognize more climate-friendly behaviours in practice.

Besides the positive results, the evaluation shows that the tested modules are quite demanding for

class three and four in primary school. Moreover, the evaluation gives a hint that it might be difficult to integrate topics of climate protection and the method into normal school lessons in primary school. It is therefore all the more important that non-profit out-of-school places like NaturGut Ophoven offer free programs for schools and conduct these modules during excursions and project days in order to relieve teachers. Even if the project "Klimabildung+" (climate education plus) represents a real pedagogical challenge, the results provide a clear sign that the didactical approach of dilemma stories is effective for climate education. The findings suggest that moral learning as coping with cognitive dissonance should not be reduced to single school subjects, but be regarded as an overall teaching principle.

However, clearly further application-orientated research is needed to adapt the method to climate education; hence our evaluation was carried out with only a few participants. Further research is all the more important given the rapid pace of climate

change and the rising complexity of issues related to climate change. That rising complexity is very likely to increase the demands on human's decision-making competence, too. Thus, promoting cognitive skills of all age groups is an ongoing issue not only for climate education in particular, but for environmental education in general. Anyway, it should always be considered and evaluated what to teach (which issues of climate change) to whom (at what age) and in what way (effective methods), because other research provide good reasons, not to confront primary school children with climate change, but to promote connectedness with nature first.

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