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The influence of situational emotions on the intention for sustainable consumer behaviour in a student-centred intervention

Gabriele Fröhlich[a]*, Daniela Sellmann[b] and Franz X. Bogner[a]

[a]*Department of Biology Education, University of Bayreuth, Bayreuth, Germany;* [b]*Institute for Biology Education, University of Osnabrück, Osnabrück, Germany*

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Within the curriculum guidelines for Bavaria, we designed a hands-on educational programme for teaching sustainability with regard to agriculture, food and consumerism, partly implemented on a farm as an out-of-school learning setting. The participants were fifth graders ($N = 176$). The research followed a quasi-experimental design and used the subscale *consumerism* of the *General Ecological Behaviour Scale* and situational emotions (interest, well-being, boredom) to focus data collection activities. The study monitored the students' knowledge increase and their *Inclusion of Nature in Self* (INS) scores as possible influencing factors on environmental behaviour. After participation in the programme, while we found that the students intended to consume in more environmentally friendlier ways, this intention did not persistent over a seven-week time span, nor did it relate to the INS or knowledge scores. There was, however, a high correlation with positive situational emotions like *interest* ($r = .46$, $p \leq .001$) and *well-being* ($r = .39$, $p \leq .001$), and a negative correlation with *boredom* ($r = -.42$, $p \leq .001$). We conclude that the 'effect' of the programme immediately measured after the intervention was strongly linked to situational (short-term) emotions, and should be considered in educational planning as well as the evaluation of sustainability teaching and learning.

Keywords: learning emotions; education for sustainable development (ESD); intention–behaviour gap; short-term intervention; connectedness with nature

Introduction

Education for sustainable development

While fostering sustainable development has been a clear goal of the World Conservation Strategy (IUCN/UNEP/WWF, 1980) and the Brundtland Report (1987), since the 1980s, questions of definition and pedagogical value have been engaged in education circles, centring on the needs and proper roles of teaching and learning to engage matters of environmental, economic and social issues, and their presence and balance in curriculum (e.g. Tilbury 1995). A key assumption is that for the idea of sustainable development to be manifested in societies, students need specific support through an education focused on questions related to the sustainability of everyday life and experiences (Gottlieb et al. 2012). Some environmental

*Corresponding author. Email: gabriele.froehlich@uni-bayreuth.de

educational scholars and researchers advocate the view that education, and environmental education in particular, should find ways to encourage pro-environmental attitudes and behaviours (Bogner 1998; Leeming, Dwyer, and Bracken 1995; Poudel et al. 2005; Zelezny 1999), even in short-term educational experiences (Ballantyne and Packer 2005). Equally, considerations of sustainability have been incorporated into education in both formal (Ballantyne, Fien, and Packer 2001) and informal settings (Ballantyne and Packer 2005; Knapp and Barrie 2001; Uitto et al. 2006). However, owning to ethical considerations, others have questioned whether education should 'manipulate' students and teachers to perform or model a desired behaviour (Bonnett 2002; Jensen and Schnack 1997; Jickling 2005), arguing instead for educational approaches that foster sufficient awareness and insight about the topic for students to make informed decisions and act accordingly (Boyes and Stanisstreet 2012).

Agriculture, food and consumerism as topics for sustainability

Given the above, concepts of sustainability as they relate to agriculture, food and consumerism are compelling topics appropriate for teaching young adolescents. Each is an immediate and everyday activity, yet improving food and agricultural knowledge also appears necessary: some teachers have been known to complain that students often do not know 'where their food comes from and do not care how it arrives at their table' (Trexler, Johnson, and Heinze 2000, 34). As this situation seems to exist throughout industrialised states, we also note that what conditions and constitutes one's everyday experience is no longer guaranteed to be part of the curriculum (Dillon et al. 2003; Poudel et al. 2005; Tal 2008). In fact, researchers and educators are rightly concerned by convincing evidence of the close link between severe environmental problems and agricultural production practices, and the lack of attention to this in the curriculum (Poudel et al. 2005). While modern agriculture can more than sufficiently produce and supply food for the world's peoples, inequalities in quality, distribution and access to food illustrate how it is increasingly a complex set of environmental and sustainability issues (e.g. given concerns about pollution, nutrition and health) (Leising et al. 1998). Most consumers, however, are still not aware of the close connection between environmental issues and their individual shopping decisions (Leire and Thidell 2005; Thøgersen 1999). Therefore, raising the awareness of adolescents during schooling seems particularly appropriate as they are consumers with considerable purchasing power and often have the ability to influence their families' shopping behaviour (Bisonnette and Contento 2001; Shoham and Dalakas 2003). For this reason, agriculture, food and consumerism are well regarded as suitable interdisciplinary subjects for teaching students about ongoing environmental problems and educating them towards engaging in sustainable consumer behaviour.

Contextual learning setting

Teaching methods designed to impart knowledge about sustainability require appropriate and motivating approaches to promote young people's willingness to engage with ideas intended to integrate sustainability principles into their everyday life. Theoretically based approaches may increase students' knowledge, but may not provoke an inclusion into everyday life outside classrooms (Falk and Storksdieck

2005). Student participation in experientially focused field trips is one way to overcome this discrepancy (Anderson, Reder, and Simon 1996; Knobloch, Ball, and Allen 2007), where the potential learning outcomes are based on the experience of phenomena within contextual environments (Bell, Lewenstein, Shouse, and Feder 2009 in Lin, Hong, and Huang 2011). Mitchell's (1993) study, for example, has shown that levels of interest in the pedagogical content of mathematics lessons in schools strongly correlated with its perceived level of importance in an individual's life; while active involvement in a learning process showed a similar effect. Both requirements can be easily and effectively be realised in out-of-school learning settings.

Environmental education programmes that include outdoor elements are known to shown positive, if not short-term, cognitive and affective effects (e.g. Bogner 1999; Knapp and Benton 2006; Stern, Powell, and Ardoin 2008; Smith-Sebasto and Semrau 2004; Prokop, Tuncer, and Kvasničák 2007). Long-term effects have mainly been reported for knowledge gain (Bogner 1998), while Adelman, Falk and James (2000) reported medium-term effects (six to eight weeks) on adult visitors' knowledge, understanding and interest after visiting an aquarium. Equally, analysis of sustained education effects during field trips suggests inconsistent findings regarding attitudinal and behavioural changes (Ballantyne and Packer 2002).

Learning emotions

Emotions have been shown to play an important role in achieving the objectives of environmental education and sustainability (e.g. Rickinson, Lundholm, and Hopwood 2009). A key factor here is connectedness to nature, a very affective and individual emotion, which seems to be an important impulse for environmental behaviour (Ballantyne 2005, 287, cf. Ernst and Theimer 2011, Schultz 2002a). Detailed explanations of this relationship are provided later in the text. Besides these very affective, personal emotions, there are also learning emotions, like interest, well-being or boredom, which have been identified as important in formal education and can be seen as 'play[ing] a key role in the rational process of learning' (Strike and Posner, 1992 in Linnenbrink 2006, 307), if not should also be seen as a natural part of learning (Värlander 2008) and as moderating variables (Randler et al. 2011).

In educational research, emotions are typically divided into state and trait emotions (Pekrun et al. 2010; Ulich, Mayring, and von Salisch 2003). State (or situational) emotions, provoked by situational contexts, produce a greater immediate influence on a learning process than trait emotions, which are mainly biographically generated (Ainley 2006; Ulich, Mayring, and von Salisch 2003). For instance, someone could have an interest in animals because he or she grew up around animals – this interest is considered a trait emotion. Interest in animals as a situational emotion could also be aroused, however, by a zoo trip to observe an exotic animal.

Linnenbrink (2006) claims that affective parameters like situational emotions have to be included in models of motivation and learning. Schutz and colleagues (in Linnenbrink 2006, 311) also recommend an integrated approach including motivation, affect and cognition, as they provide 'strong influences on each other and resultant behavior'.

However, emotions in learning have been disregarded for a long time in educational research (Osborne, Simon and Collins 2003) or studied with a focus on

negative learning emotions like test anxiety (Pekrun et al. 2002a). Little is known about the influences of positive emotions on learning (Derakshan and Eysenck 2010; Gläser-Zikuda et al. 2005) in comparison to negative emotions like anxiety and exam pressure (Gläser-Zikuda et al. 2005; Pekrun et al. 2011). Common sense suggests that self-regulated and constructive learning without exam pressure leads to positive emotions (Carver and Scheier 2001; Rheinberg, Vollmeyer, and Engeser 2003), while Pekrun et al. (2002a, 99) concisely summarised findings about learning emotions as: 'Self-regulating one's own learning may induce positive feelings, whereas external control may induce anger, anxiety, or boredom'.

Studies show how situational interest may motivate students with no pre-existing interest in a subject (Ainley, Hidi, and Berndorff 2002; Hidi and Harackiewicz 2000 in Palmer 2009), while some interventional studies dealing with different subjects and topics have shown that individual interest, which can also be generated by situational conditions, is a cognitive–emotional variable that has positive effects on cognitive achievement and motivation (Hidi, Berndorff, and Ainley 2002; Laukenmann et al. 2003; Randler 2009). Well-being also seems to be associated with cognitive achievement (Randler 2009), but as an emotional variable, it is more of an individual feeling related to the learning situation (Randler et al. 2011). Finally, we note Pekrun's (2002b) summary of educational research on the impact of positive learning emotions, which identifies the correlation of positive emotions with positive performance.

Our study then is an attempt to build upon this work by specifically focusing on tracing the effects of emotions on intentions for pro-environmental behaviour following a learning intervention. Food and agriculture and their link to sustainable consumerism are very complex issues requiring a high cognitive demand. So, in this study, we consider whether raising a student's interest with an educational programme that specifically elicits positive emotions can play a major role in deepening cognitive engagement and thinking (Pintrich and Schunk 1996 in Palmer 2009).

Our corresponding research questions are: (1) Can a short-term educational intervention about food and agriculture affect environmentally friendly consumerism by teaching background knowledge and alternative actions? (2) To what extent does connectedness with nature and/or the students' estimation of the intervention motivate their willingness to act in an environmentally friendly way?

Materials and methods

Background

The context for our educational programme is Bavaria (Germany), where sustainability as learning content is not well established in any of the curricula. For instance, in elementary school (first to fourth grades), Agenda 21 is listed in order to make regional activities in this field known (Bavarian Ministry of Education 2000). The curriculum of secondary schools in Bavaria is divided into detailed content and methodical guidelines for each subject, educational standards and general educational guidelines. Education for Sustainable Development (ESD) is recommended in the general educational guidelines without detailed guidelines or instructions for teachers and educators. The participants in our study were fifth graders from different secondary schools in Upper Franconia, a region of Bavaria. In this grade, ESD is only listed as a general educational aim without providing explicit instructions for the teachers on how to address these issues in everyday school life

(Bavarian Ministry of Education 2000, 2004, 2007). In the fifth grade, Bavarian secondary school students are expected to learn the following topics in biology: the human body and health, food and healthy eating habits, animal husbandry, the goals of animal breeding, the importance of economic plants as well as the classification of plants in a simple way. To address these curricular requirements, our educational programme offered the topics of food and agriculture in combination with sustainability, which can be easily addressed by teachers in schools.

Participants

Altogether, 176 fifth graders (93 girls, 83 boys, $M_{age} = 11.5$ years and age range: 11–13 years) from three different secondary schools located near each other in Upper Franconia, Bavaria participated in our programme. Using a quasi-experimental design, our control group consisted of 56 fifth graders (same age and educational level). School classes were selected when teachers were willing to participate with their students, either as part of the treatment group or as part of the control group, and parents gave their permission (opportunity sample).

Instructional design

Our educational programme entitled 'From Farm to Fork' specifically focused on sustainability topics and consisted of two separate student-centred learning circles of hands-on experiments. The first learning circle was comprised of workstations dealing with food and nutrition (to be completed in the classroom). The second one dealt with issues of food production and agriculture (to be completed at an outreach farm). The workstations were situated at thematically appropriate sites within the farm area. The learning circles were completed on two different days within a school week.

Besides facts about food, nutrition and agriculture corresponding to the curriculum described in the introduction, sustainability was a central theme of both learning units, including learning goals as follows:

The students learn about:

- transporting regional fruits in comparison to those from overseas and why that produces less carbon dioxide;
- the identification and meaning of food production certified as organic;
- the differences between traditional and environmentally friendly agriculture; and
- the reasons for and implementation of species-appropriate husbandry.

A time frame of 90 min (two school lessons) for each learning circle was set. We chose this very short intervention time since our educational programme was designed to be easy for teachers to integrate with their standard lessons. Small groups of up to five students worked together to complete the workstations of both learning circles. Every student received a workbook with tasks to be solved at the different workstations.

Research design and instruments

Our study followed a quasi-experimental design with a pre-test, post-test and retention test. The pre-test on average was administered three weeks before programme

attendance. The post-test was administered after each learning cycle. On average, the retention test was completed seven weeks after the intervention. Each questionnaire took 15–20 min to complete. The teachers were urged not to teach any related topics before and during the evaluation process. Table 1 gives an overview of the study design including the instruments used.

For the evaluation procedure, one subscale of the General Ecological Behaviour Scale (GEB) for adolescents (Kaiser, Oerke, and Bogner 2007) was applied. The GEB for adolescents is an adaptation of the GEB for adults, which is a reliable and valid instrument, tested cross-culturally in different age groups (for more details, see Kaiser 1998, Kaiser and Wilson 2000, Kaiser and Wilson 2004). The difference between the two versions is the modification of the items according to the age of the target groups. The mean age of the participants in the study of Kaiser et al. (2007) was 13.5 ± 1.8 years, with a range of 9.5–18.3 years, making their version the most appropriate choice for our participants.

The subscale on consumerism as used in our study consisted of eight items (e.g. 'I eat seasonal produce'; 'I buy certified organic foods'; all items are listed in the appendix). The response pattern followed a five-point Likert scale; four inversely formulated items required recoding before calculations. The mean of all eight items was taken to represent environmentally friendly consumer behaviour levels with higher scores representing higher 'pro-environmental consumerism'. To assess both short-term and medium-term changes, the subscale was administered in the pre-test, the second post-test and the retention test. To determine the intentions regarding pro-environmental consumerism, we changed the behavioural items of the GEB into intentional questions (e.g. 'I eat seasonal produce' to 'I will eat seasonal produce') within the post-test, as recommended by Davis, Green and Reed (2009).

According to ongoing research, we note the environmental concern, and the willingness to protect nature is partly determined by people's feeling of connectedness to nature (Nisbet, Zelenski, and Murphy 2009, Schultz, 2002a). People do not harm what they feel connected to, as it would be like harming themselves (Mayer and Frantz 2004). With this consideration in mind, some researchers claim that

Table 1. Test design and psychometric instruments.

	Number of items	T1 Pre-test	T2 Post-test I/post-test II	T3 Retention test	α
INS (Schultz et al. 2004)	1	x			–[a]
Subscale consumerism (GEB, Kaiser, Oerke, and Bogner 2007)	8	x	x	x	.85
Situational emotions (Gläser-Zikuda et al. 2005) adapted by Meissner and Bogner (2011)					
Interest	4		x / x		.91
Well-being	4		x / x		.92
Boredom	4		x / x		.87
Knowledge	13	x	x / x	x	.69
Total amount of items per measurement		21	33	21	

Note: [a]Test/retest correlations according to Schultz et al. (2004); .98 (immediate retest); .90 (1-week retest); .84 (4-week retest).

there is a relationship between connectedness with nature and environmental behaviour (Ernst and Theimer 2011).

We identified connectedness with nature by applying the Inclusion of Nature in Self (INS) scale from Schultz (2002a). The INS scale consists of a graphical representation of seven dyads of overlapping circles, one representing nature, the other representing the self. The more the circles overlap, the higher and stronger a person's relationship with nature is ('1 = two separate circles' to '7 = nearly one circle'; see appendix). The instrument distinguishes three components:

(1) Connectedness to nature, e.g. shown by including nature within the individual representation of self, as noted in the work on human relationships by Aron et al. (1991).
(2) Caring for nature, e.g. an important consideration since emotional affinity is strongly correlated with some pro-environmental behaviours and commitments (Kals, Schumacher, and Montada 1999).
(3) Commitment to protect nature, e.g. a behavioural aspect shown by a person who feels connected to nature and cares for nature, and is therefore motivated to act in a pro-environmental way. (The individual's commitment to act in a pro-environmental way can also be measured by the GEB, Schultz 2002a.)

Although the INS scale is a single-item scale, it is now a widely accepted tool for measuring connectedness with nature (Brügger, Kaiser, and Roczen, 2011; Davis 2011; Schultz et al. 2004). As it is only a single-item scale, reliability can be assessed by test-retest correlations with very good results, even up to four weeks later (Liefländer et al. 2012, Schultz et al. 2004).

Studies using this tool have shown the degree of overlapping is connected with pro-environmental attitudes and behaviour (Davis 2011; Schultz et al. 2004). Schultz et al. (2004) also demonstrated as a scale the INS indirectly measures students' attitudes and concern about environmental issues: The higher the self-reported connectedness with nature, the higher the concern about general environmental problems.

The cognitive outcomes of our programme were measured by 13 ad hoc multiple-choice questions (e.g. Which term stands for eco-certified vegetables?; How much energy does a tomato imported from Italy need for cultivation, transport and stocking in comparison to a tomato from Germany?) administered in a pre-test, a post-test and a retention test. In this article, we focus on the effect that knowledge may have on the students' behaviour to consume in a more environmentally friendly manner.

To measure the situational learning emotions of our agricultural and environmental education programme, we used three subscales from the situational learning emotions questionnaire based on Gläser-Zikuda et al. (2005) and adapted by Meissner and Bogner (2011), in each post-test. Four items were included for each subscale to measure the interest, well-being and boredom of the students (interest: e.g. 'I want to learn more about that topic', 'I found that topic important'; well-being: 'I enjoyed the lesson', 'For me it was a good lesson'; boredom: 'I felt bored', 'The lesson took ages'; all items are listed in the appendix). Situational emotions were reported on a five-point Likert scale (1 = not at all to 5 = very much), and a total mean for both modules was calculated for each learning emotion.

Randler et al. (2011) used a shorter version of this instrument (with three items instead of four per psychological construct) and found a high external validity by correlating this shortened instrument with a shortened and already validated version of the intrinsic motivation scale. In their study, Meissner and Bogner (2011) also measured high values of interest and well-being and low boredom scores along with high effort/importance and value/usefulness and low pressure/tension scores of the intrinsic motivation inventory (Deci and Ryan 2005).

All the studies, we know, that use this psychological instrument have shown strong reliabilities for each subscale/construct ($.73 \leq \alpha \geq .93$; for details see Gläser-Zikuda et al. 2005, Meissner and Bogner 2011, Randler 2009, Randler et al. 2011).

The data were analysed with PASW Statistics 18. Due to approximately normally distributed data, we chose the dependent *t*-test for intra-group comparisons of consumerism to identify the changes over time (T-1, T-2 and T-3 mean scores) of each subsample. Furthermore, we correlated (using Pearson's correlation) the post-score means of consumerism with INS, knowledge and situational learning emotions.

Results

The internal consistency for the subscale consumerism of the GEB yielded a Cronbach's α of .85. The paired sample *t*-tests for comparing the mean scores of the pre-test and post-test revealed a significant change towards increasing the intention of practising environmentally friendly consumerism with a moderate effect size ($M = 1.15$, SD = 3.25, $t(175) = 4.71$, $p \leq .001$ and $r = .36$). We rated the effect sizes according to Cohen (1988) as a small effect for $r = .10$, a medium effect for $r = .30$ and a large effect for $r = .50$.

However, after about seven weeks, the retention test revealed that this intention did not translate into corresponding behaviours ($M = 0.87$, SD = –0.25, $t(175) = -3.43$, $p \leq .001$ and $r = .25$). There was no significant difference between the retention test and the pre-test (see Table 2).

To analyse the relationship between intentional behaviour and INS, we correlated the post-test score of consumerism ($M = 3.48 \pm 0.55$; $n = 176$) and the INS score ($M = 4.89 \pm 1.25$; $n = 176$). Connectedness with nature only had a small effect (Pearson's correlation; $r = .22$, $p < .01$) on the intention to practice environmentally friendlier consumerism and explained about 5% of the distributed variance. The post-test score of consumerism (see Table 3) did not correlate at all with the post-test knowledge sum score ($r = .11$, $p = .141$), nor the knowledge increase ($T2-T1$; $r = .10$, $p = .190$).

Table 2. Results of the *t*-test comparing the subscale consumerism (GEB; $\alpha = .85$) between the measurement times.

	Change in Mean	SD	$t(175)$	p	r
T1 → T2	1.15	3.25	4.71	< .001	.34
T3 → T2	0.87	–0.25	–3.45	.001	.25
T3 → T1	0.28	3.42	1.10	n.s.	–

Note: n.s. indicates 'not significant' ; T1 = pre-test, T2 = post-test, T3 = retention test.

Table 3. Results of the *t*-test comparing the knowledge achievement scores (α = .69) between the measurement times.

	Change in Mean	SD	*t*(175)	*p*	*r*
T1 → T2	−0.75	2.36	−4.22	< 001	.18
T3 → T2	0.09	2.34	0.52	n.s.	–
T3 → T1	−0.66	2.11	−4.15	< 001	.16

Note: n.s. indicates 'not significant'; T1 = pre-test, T2 = post-test, T3 = retention test.

Mean scores were calculated for each subscale of the situational learning emotion questionnaire. Interest and well-being (see Table 4) scored relatively highly ($M > 3.50$) in comparison to Gläser-Zikuda et al. (2005) or Meissner and Bogner (2011). Accordingly, the average feeling of boredom was very low ($M < 2.5$).

Correlating the mean scores of each situational emotion with the consumerism post-test score indicated that the situational emotions seem to be associated with the intention to practise environmentally friendlier forms of consumption. The correlations between the measured situational emotions (interest, well-being, boredom) and the intentional behaviour are reasonable (see Table 4). The highest correlation was between the consumerism post-test score and the interest score ($r = .46$, $p \leq .01$), followed by the correlation with the boredom score (negatively assessed; $r = -.42$, $p \leq .01$). Also, we found a positive correlation with well-being and the consumerism post-test score ($r = .39$, $p \leq .01$). Interest had the highest input with 21%, followed by boredom with 17% and, finally, well-being with 15% of the declared variance.

Discussion

Our educational programme for sustainability-focused environmental education initially fostered an intention to consume in an environmentally friendlier way. This change, however, did not persist over time and did not lead to corresponding behaviours either. We found no relationship between students' intention to consume in an environmentally friendlier way and their connectedness with nature (INS) or with their knowledge achievement, but instead found a significant effect from the situational learning emotions (interest, well-being and boredom) provoked by the programme.

The absence of long-term behavioural effects is very consistent with other studies (e.g. Bisonnette and Contento 2001; Gabhainn and Kelleher 2000). The duration of the programme was probably too short to motivate students to turn intentions into persistent behavioural changes. To compensate for this, the contents of the pro-

Table 4. Correlations between situational emotions, knowledge and intentional eco-friendlier consumer behaviour.

		Mean	T2 (Consumerism)	T2 (Knowledge)
Situational emotions	Interest	3.7	.46**	.25**
	Well-being	3.9	.39**	.22**
	Boredom	2.1	−.42**	−.26**

Note: $N = 164$; **indicates $p \leq .001$

gramme could be repeated at regular time intervals. Bogner (1998) compared one-day and five-day educational programmes teaching the same contents and could only find effects on behaviour in the longer programme. The positive effects of the pre- and post-test activities of a field trip can be found in literature (see, for example, Davidson, Passmore, and Anderson, 2010; Smith-Sebasto and Cavern 2006; Tofield et al. 2003). We also note repeated educational lessons focusing on sustainability are considered useful for turning students' intentions into behaviour (Smith-Sebasto and Cavern 2006; Stern, Powell, and Ardoin 2008).

Besides being driven by external factors, behaviour is also driven by internal factors such as values and attitudes. The small correlation between the INS and the consumerism subscale of the GEB indicates otherwise, apparently, it did not influence pro-environmental consumption in this cohort. INS can be seen as an indicator for the amount of value that someone has for nature (Schultz 2002a). The value for nature and commitment to nature, however, is very unspecific and hence may not lead to certain environmentally friendly behaviour, like sustainable consumerism (Eagly and Chaiken 1993 in Pickett-Baker and Ozaki 2008). Although other studies could show the link between connection to nature and pro-environmental behaviour, there are still no clear findings about the 'strength and nature of this relationship' (for more details, see Ernst and Theimer 2011, 594). According to our data, there is only a small correlation between connectedness to nature and environmentally friendly consumerism. However, we did not address all the topics of the subscale consumerism of GEB in the educational intervention, like the environmental advantage of using pencils over markers, not spraying insects with pesticides and using recycled paper, as these topics did not fit our programme. By including pro-environmental alternatives related to these topics, the programme could well have enhanced the students' behavioural intention in a more pro-environmental way. It might also be possible to broaden the content of the programme to include the topics recycling, waste avoidance, water saving or other related topics, to show adolescents pro-environmental actions that everybody can do. It could be that connectedness to nature has more impact on these other areas of environmental behaviour. This should be investigated in future studies to gain better insight into the relationship between connectedness to nature and its impact on behaviour.

Cognitive knowledge as a factor influencing pro-environmental behaviour has been a controversial topic of discussion in educational and psychological research. Some studies show knowledge gain as influential in changing behaviour, although with mostly small effects (Fančovičová and Prokop 2011; Gotschi et al. 2009; Kaiser, Wölfing, and Fuhrer 1999; Steg and Vlek 2009). Others find such an influence primarily derives from attitudes, intentions and/or behaviour (Kollmuss and Agyeman 2002; Ogden and Heimlich 2009; Schultz 2002b). Our results, with a small knowledge effect on environmentally friendly consumerism, lie somewhere in the middle. Nevertheless, knowledge about these issues and environmentally friendly alternatives is of specific importance in discussing these environmental problems in the future, and in fostering an individual's position on the issues (Bisonnette and Contento 2001). Knowledge may not provide the most important parameter for behaviour, but may support the individual in discussing the ongoing problems, and finding solutions (Bogner 1998; Harms, King, and Francis 2009; Schraw and Lehman 2001; Schultz 2002b).

Situational emotions such as interest, well-being and boredom correlated with the intention to practice environmentally friendlier behaviour. We note that interest, unsurprisingly, is considered to be a very important factor for learning and motivation (Ainley 2006; Palmer 2009). In our study, situational interest was the most powerful factor influencing the intention to practice environmentally friendlier consumerism. Educational research on interest is mainly related to cognitive knowledge gain, although our results suggest that interest is also highly related to the requested and mediated behaviours since interest cannot be seen to be independent of the content or context. Therefore, by participating in our programme, the students seem to have become interested in the content. As developmental analyses have shown, at the age of 11 years, young people increase their awareness of damage to the environment (Evans et al. 2007), and thus this programme works at an appropriate age bracket for such educational interventions.

Student well-being is a complex factor which combines psychological and physical factors as well as social interaction (Hascher 2003). In our learning activities, the students worked autonomously in small groups; therefore, the well-being score was predictably fairly high. Well-being is important for academic achievement and social behaviour as students learn better when they feel comfortable (Hascher 2003), but we note it is not as strong a motivator for learning as interest is.

Finally, we note boredom is considered to be an undesired emotion in school activities. It can be a cause of over- or under-challenge (Pekrun et al. 2002a). Boredom also occurs when instruction is predictable and contains unfocused information (Small, Dodge, and Jiang 1996). Based on our low boredom scores, we assume the cognitive demand of our approach was appropriate.

Based on these considerations, we conclude that the content, the learning situation and the method motivated the students to behavioural changes.

We also conclude that there is a significant and positive correlation between a combination of high interest, high well-being and low boredom and the students' self-reported intention to practise environmentally friendlier consumerism. By activating positive emotions and simultaneously reducing boredom (as a negative emotion), the students were motivated to change their behaviour immediately after the programme. Thus, we propose that situational emotions are important considerations for educational outcomes measured immediately after interventions since they influence affective factors like behavioural intentions and attitudes. This effect, however, should be considered carefully by educational researchers and planners when interpreting post-test evaluations or results. Situational interest and situational emotions are not likely to become manifest in attitude or behaviour in the long term (Schraw and Lehman 2001). Situational emotions must, therefore, be considered when interpreting findings based on post-test results from educational interventions to ensure the correct identification of any consistent and valid effects.

In summary, our findings suggest that students at middle school age can be educated effectively about sustainability. Although situational emotions played an important part in their behavioural intentions, the students became more aware of environmentally friendlier consumer habits. Recurring educational lessons focusing on sustainability are widely considered meaningful ways of turning students' intentions into the desired behaviour (Smith-Sebasto and Cavern 2006; Stern, Powell, and Ardoin 2008). Even so, the support and education of the parents must also be considered to play an important role. The participants in our intervention were between 11 and 13-years old, and the type of food served at home is mainly

determined by their parents, as reported in studies about food and healthy eating (Bisonnette and Contento 2001; Reisch and Gwozdz 2010). Nevertheless, there are studies that show that children, especially in that age group, influence the consumer decisions of their families primarily concerning their personal needs like food (e.g. Easterling, Miller, and Weinberger 1995; Wilson and Wood 2004) or personal usage products (Mangleburg 1990) but also for other family-related products (Jensen 1995). Supported by their families, it would be easier for students to transfer their intention to practice sustainable consumerism into behaviour, based on that assumption the students' intention to consume environmentally friendlier may fail due to the parents' shopping behaviour. (Restrictions by the Bavarian Ministry of Education prohibited us from gathering any data regarding the parents for this study.) Furthermore, many studies have shown that the most important factor for adolescents' food choices is taste (e.g. Bisonnette and Contento 2001). Although the students were aware of the importance of environmentally friendlier consumerism, the taste of fast food, and thus preference or familiarity with it, for example, could be more important, and is a possible reason for this attitude–behaviour gap.

Nevertheless, it remains important to consider the effects of situational emotions on post-test results. Based on our findings, students participating in educational programmes may be motivated to change their behaviour in the future. Supported by Gardner and Stern (1996) who studied educational interventions that were successful in changing intentions and behaviour, these interventions relied on the presentation of credible environmental information and active participation. Long-term educational projects seem to be the best way to change attitudes and behaviour (Bogner 1998), but very often, it is difficult to integrate them in everyday school life. Still, we have shown that a well-designed short-term educational programme could increase the students' engagement in pro-environmental behaviour. To refine our results, we anticipate, if not invite, more studies about learning emotions and the factors influencing pro-environmental consumerism in adolescence.

Notes on contributors

Gabriele Fröhlich is a PhD student at the Department of Biology Education, University of Bayreuth, Germany.

Daniela Sellmann was a PhD student at the Department of Biology Education, University of Bayreuth, Germany and is now a post-doc and a lecturer at the Institute of Biology Education, University of Osnabrück, Germany.

Franz X. Bogner is a full professor and a director of the Centre of Math & Science Education, chair of Biology Education, University of Bayreuth, Germany.

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Appendix 1. General Ecological Behaviour GEB (Kaiser, Oerke, and Bogner 2007)

Subscale consumerism:

- I buy certified organic food.
- I eat seasonal produce.
- When shopping, I prefer products with eco-labels.
- I kill insects with a chemical insecticide.
- I eat in fast-food restaurants, such as McDonalds and Burger King.
- I use writing pads from recycled paper.
- I prefer markers to crayons for drawing.
- I order take out pizza.

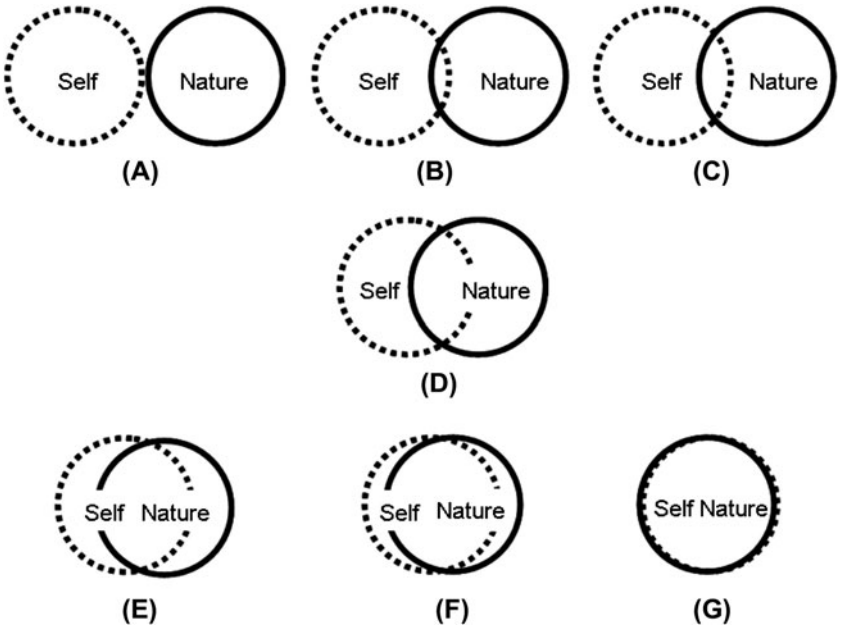
Appendix 2. Inclusion of Nature in Self scale INS scale (Schultz 2002a)

Please circle the picture below that best describes your relationship with the natural environment. How interconnected are you with nature?

Appendix 3. Learning emotions (based on Gläser-Zikuda et al. 2005, adapted by Meissner and Bogner 2011)

Subscale interest:

- I found that topic important.
- The information on that topic yields something to me.
- I want to learn more about that topic.
- The lesson of today was interesting for me.



Subscale well-being:

- I was satisfied with the lesson.
- I enjoyed the lesson.
- I was satisfied with the lesson.
- For me, it was a good lesson.

Subscale boredom:

- I felt bored.
- Today, I was sometimes absent with my thoughts.
- The lesson was to sleep in.
- The lesson took ages.