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Self-perceived Action Competence for Sustainability and Environmental Attitudes

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Abstract

Within environmental education research, there is an ongoing interest in trying to understand what factors might lead to pro-environmental action and pro-environmental behaviours. This study explores the relationship between environmental attitudes and self-perceived action competence for sustainability by combining a questionnaire measuring self-perceived action competence for sustainability (SPACS-Q) with a questionnaire measuring environmental attitudes, the 2 factor Model of Environmental Values (2-MEV-Q), among 236 primary school student teachers in France. Our results show that the SPACS-Q adapted to the French context is largely valid within this sample and that the factor Preservation in the 2-MEV model is a predictor for SPACS. This connection is strongest for the factor Willingness to act. Likewise, we conclude that age impacts the SPACS factor Confidence in one's own influence, whereas other variables such as training in sustainable development issues do not impact any of the SPACS factors. The study provides some insights into how self-perceived action competence and pro-environmental attitudes might be promoted through education.

Introduction

Life on Earth is facing enormous challenges when it comes to creating and sustaining a good life for all species, including human beings. Lately, climate change and its role in species extinction has become an issue not only for natural scientists but also for all people and societies (IPCC, 2021). One way to deal with these challenges is to educate citizens and politicians. Throughout the world, educational systems are expected to deal with issues regarding sustainability and to promote pro-environmental behaviours and attitudes. These expectations are stressed in the 17 goals all UN Member States adopted in 2015 as part of the 2030 Agenda for Sustainable Development, which presents a 15-year plan to achieve these goals (United Nations, 2020). Previously, the United Nations Decade of Education for Sustainable Development (2005–2014) and Agenda 21, the official document of the 1992 Earth summit, endorsed education as one of the means for creating a more sustainable future (UNESCO, 2021). However, according to the UN, the Sustainable Development Goals (SDGs) were not advancing fast enough and therefore the SDG summit in 2019 called for a Decade of Action to achieve the SDGs by 2030 (United Nations, 2021).

When it comes to individuals' willingness to act or to adopt pro-environmental behaviours, some studies have reported a decrease with age (e.g. Fortner et al. 2000; Torkar, Fabijan & Bogner 2020), whereas another found that levels of emotional connectedness to nature and pro-environmental behaviour were higher among adults than among adolescents (Anderson & Krettenauer, 2021). A study investigating possible cultural differences between Canada and China (Krettenauer, Wang, Jia & Yao 2020) showed, however, that younger people had greater pro-environmental behaviour than older people in the Canadian sample, but that age and pro-environmental behaviour were unrelated in the Chinese sample.

What is it then that shapes pro-environmental attitudes and pro-environmental behaviours? According to Quinn, Castéra, and Clément (2016) a causal relationship between nature experiences, ecocentrism, and pro-environmental attitudes and pro-environmental behaviours has been established. They state that : "[c]onstructs such as connectedness, relatedness or emotional affinity with nature as operationalised by a range of psychometric scales have been found to predict and explain pro-environmental behaviour" (pp. 897–898). In an extensive review of both quantitative and qualitative studies investigating the development of active care for the environment among children, Chawla and Derr (2012) conclude that childhood play in nature is crucial for developing "every form of care for the environment" (p. 548). However a sense of competence is also important, which is one conclusion from a review of research related to promotion of active care for the environment (Chawla & Flanders Cushing, 2007). This is in line with the concept of action competence.

The concept of action competence

Within the research field of environmental education, the concept of *action competence* has been developed and explored in several studies in a European context (e.g. Almers, 2013; Mogensen & Schnack, 2010; Sass et al. 2020). Action competence emerged from the Danish tradition of health and environmental education (Jensen & Schnack, 1997) and has been interpreted in different ways by scholars and stakeholders. Action competence as an educational goal differs from aiming at pro-environmental behaviours (Breiting, Hedegaard, Mogensen, Nielsen & Schnack 2009; Jensen & Schnack, 1997; Jensen, 2000). As action competence "expresses pupils' commitment, will and ability to take action" (Jensen, 2000, p. 149), it involves "inner decision making" (Jensen, 2000, p. 148), whereas pro-environmental behaviours might be caused by pressure from others (Jensen & Schnack, 1997). As explained by Breiting et al. (2009): "whenever we talk about modifying student behaviour as an element of environmental education, this tends to signal an education paradigm based on prescriptions and behavioural modification, rather than on democratic elements such as participation, dialogue and co-influence" (p. 54). The three co-varying central components related to action competence are knowledge of action possibilities, confidence in one's own influence and a wish to act (Breiting & Mogensen, 1999).

Almers (2013) defines action competence for sustainability as follows:

> [A] willingness and capability to influence living conditions, as well as lifestyles, in a way that involves intergenerational and global responsibility, which necessarily constitutes differently in different cultural contexts. It here includes a capability to act from a knowledge base that is always incomplete, and to be prepared to change decisions and actions when new knowledge or insights evolves. (Almers, 2013, p. 118)

In her study, she conducted a number of interviews with three young adults over a three-year period. These young adults were selected a) because of their long-term commitment to various types of sustainability activities which were not only at the individual level, but also at the societal level, b) because of their active search for knowledge about causes and possible solutions, and c) because their commitment was global and included "the well-being of future generations"

(Almers, 2013, p. 119). Out of the analysis of the different life stories based on the interviews emerged six core themes prevalent among all three of them, that concerned the development of aspects of action competence related to sustainability:

- emotions creating a desire to change conditions,
- a core of values and contrasting perspectives,
- action permeation,
- feeling competent and confident with what one can contribute,
- trust and faith from and in adults, and
- outsidership and belongingness. (Almers, 2023, p. 121)

Sass et al. (2020), however, conceptualise action competence as a competence that can be expressed both at an individual and a collective level and define an action competent person as follows:

[S]omeone who is committed and passionate about solving a societal issue, has the relevant knowledge about the issue at stake as well as about the democratic processes involved, takes a critical but positive stance toward different ways for solving it, and has confidence in their own skills and capacities for changing the conditions for the better. (Sass et al., 2020, p. 303)

Olsson, Gericke, Sass, and Boeve-de Pauw (2020) define action competence "as a latent capacity among individuals to act sustainably" (p. 742) and introduce an operationalisation of the concept of action competence through development of a questionnaire measuring self-perceived action competence for sustainability (SPACS-Q).

To conclude, there is an on-going interest in trying to understand what factors might lead to pro-environmental action and pro-environmental behaviours (e.g. Derr, 2020, p. 220). Here, we contribute to this research by employing two psychometric scales, a widely used questionnaire measuring environmental attitudes, the 2 factor Model of Environmental Values (2-MEV) (Bogner & Wiseman, 2006; Wiseman & Bogner, 2003) and a questionnaire measuring Self-perceived action competence for sustainability (SPACS-Q), developed by Olsson et al. (2020), to explore the relationship between environmental attitudes and self-perceived action competence for sustainability.

Self-perceived action competence for sustainability questionnaire (SPACS-Q)

The 12-item Likert scale questionnaire (SPACS-Q) to measure Self-perceived action competence for sustainability (SPACS), developed by Olsson et al. (2020), is based on three categories or sub-constructs of self-perceived action competence for sustainability: (1) knowledge of action possibilities; (2) confidence in one's own influence; and (3) the willingness to act (Olsson et al., 2020, p. 748). In their study, with 614 Swedish individuals 12–19 years old, the questionnaire showed strong psychometric qualities and the authors therefore encourage the use of the SPACS-Q to investigate action competence in other contexts.

The 2 factor Model of Environmental Values (2-MEV)

The 2 factor Model of Environmental Values (2-MEV) (Bogner & Wiseman, 2006; Wiseman & Bogner, 2003) is an established scale used to investigate pro-environmental attitudes. We, like others before us (e.g. Berenguer et al., 2005; Liefländer & Bogner, 2014), consider that environmental attitudes are just one aspect of the broader and more abstract concept of environmental concern, which includes attitudes, values, and other related factors. Fifteen items of

the instrument are based on a theoretical framework assuming that environmental attitudes can be represented by a two-dimensional model (2-MEV) comprising the two value-based factors Utilisation (U) and Preservation (P). Here, the Utilisation factor reflects an anthropocentric concern, and the Preservation factor reflects an ecocentric concern. An anthropocentric attitude reflects a concern for humans and society, whereas an ecocentric attitude reflects a concern for the ecosystem (Munoz et al. 2009). The 2-MEV has been extensively used and tested by various research groups in different contexts and has shown to be valid in diverse settings (Liefländer & Bogner, 2014; Quinn et al., 2016). Bogner (2018) explains that values refer to higher-order factors composed by item-set based first-order factors, which are denoted as "attitudes." Bogner also explains the concept of pro-environmental attitudes as "attitudes which may lead to actions that either prevent or reduce harm to the environment or that may even benefit the environment" (2018, p. 7).

Our approach aligns with the well-established Value-Belief-Norm Theory model (Stern et al., 1999). On the one hand, environmental values, as described in the 2-MEV approach, is a key factor influencing pro-environmental behaviours. On the other hand, SPACS is clearly linked to pro-environmental behaviour within the school context. One of the objectives of this paper is to explore the connection between environmental values and self-perceived action competence. We believe that an awareness of factors that seem to have an impact on self-perceived action competence for sustainability would assist teacher educators and others involved in environmental and sustainability education in the planning and implementation of their teaching, an issue which has been stressed by, among others, Gwekwerere (2014) and Nielsen et al. (2012).

Our hypothesis

There is an on-going interest in understanding the factors that drive pro-environmental actions and behaviours (e.g. Derr, 2020, p. 220). In this study, we contribute to this body of research by employing two different tools: the widely used 2-Factor Model of Environmental Values (2-MEV) (Bogner & Wiseman, 2006; Wiseman & Bogner, 2003) for assessing environmental attitudes, and the Self-Perceived Action Competence for Sustainability (SPACS) questionnaire introduced by Olsson et al. (2020). Our hypothesis is that there is a relationship between action competence for sustainability and environmental attitudes.

Aim of study

This study explores the relationship between the SPACS and the 2-MEV among a group of French primary school student teachers. Here, we attempt to answer three research questions:

1. To what extent can the SPACS-Q and the 2-MEV-Q be used to analyse self-perceived action competence and environmental attitudes in a sample of French primary school student teachers? (RQ1)
2. What are the links between self-perceived action competence for sustainability and environmental attitudes? (RQ2)
3. Do age and training in sustainability issues influence attitudes related to self-perceived action competence? (RQ3)

Materials and methods

Participants

The sample consisted of 236 primary school student teachers in the last year of their master's degree studies. In France, 32 Institut national supérieur du professorat et de l'éducation (INSPE) are responsible for training student teachers. Through e-mail, these institutions were asked to distribute the questionnaire to their students. All the INSPE departments are very similar in terms of student profiles and training programmes. However, some training courses are optional such as training in education for sustainable development (ESD). The average age of the sample was 28.43 year (SD = 7.29).

The questionnaire included a description of the research and its objectives. In addition, the questionnaire included a statement that informed the participants that their identity would not be revealed in any publication that used the data. All participants gave their informed consent. The respondents were volunteers, and our data are not identified, so retrieving personal information from our dataset is impossible.

The adapted SPACS-Q and the 2-MEV-Q

This study uses an adapted SPACS-Q (Olsson et al., 2020) combined with the 2 factor Model of Environmental Values questionnaire (2-MEV-Q). The 2-MEV-Q has been used in a French context, but the SPACS-Q was developed in a Swedish context with a sample of Swedish adolescents (age 12–19) and therefore needed to be translated and adapted to the context for the study – i.e. the French context and the sample of French primary school student teachers. First, the Swedish author of this paper translated the Swedish questionnaire into French. Next, the French version was validated through back-translation by three Swedish-speaking persons knowledgeable in French. The three translators made the translations on their own, independently of each other. The three back-translations were used by the research team to validate and adjust the French translation and to adapt it to the context of the study. Comparisons were also made with the English version of the questionnaire presented in Olsson et al. (2020). When there was a slight difference between the Swedish version and the English version, the Swedish version was the point of departure. The adaptations that were made are described in Table 1.

The whole questionnaire, which includes both the final French version of the SPACS-Q and the 2-MEV-Q, is found as Supplementary material for this article. See Tables 1 and 2 for the questionnaires in English. All the Likert scale answers were coded from 0 (totally disagree) to 3 (totally agree). Thus, in our study, a Likert scale with four options was used for both questionnaires to keep them consistent, whereas in the study by Olsson et al. (2020), the Likert scale had five options.

Apart from combining these two questionnaires, some supplementary closed questions were added at the end of the survey under the heading *Information sur votre profil* (Information about your profile). These questions concerned, for example, the age of the participants, whether they had received any training regarding education for sustainable development, and whether they had participated in a specific master's level course concerning education for sustainable development.

The concept of self-perceived action competence in environmental psychology and education is relatively new, and to our knowledge, at the start of our data collection, the SPACS-Q was the only instrument available for measuring this concept. To investigate environmental attitudes, we selected the 2-MEV-Q for two main reasons: (i) its clear structure, commonly used in similar studies (Bogner et al., 2015; Bogner, 2018; Munoz et al., 2009); and (ii) its strong robustness, proven across different cultural, age, and background contexts (e.g. Manoli et al., 2014; Quinn et al., 2016; Schneller et al., 2015).

Table 1. The items and sub-scales of the self-perceived action competence for sustainability questionnaire (SPACS-Q). From Olsson et al. (2020)

Code	Sub scale/Item	Adaptations made for the French version
	Knowledge of action possibilities	
SP1	I can see different points of view on issues when people think differently.	
SP2	I know how one should take action at school in order to contribute to sustainable development.	At school → In the school setting
SP3	I know how one should take action at home in order to contribute to sustainable development.	
SP4	I know how one should take action together with others in order to contribute to sustainable societal development.	Sustainable societal development → Sustainable development in the society (We considered this to be more close to the Swedish version.)
	Confidence in one's own influence	
SP5	I believe I can influence global sustainable development through my actions.	Global sustainable development → Sustainable development at the global scale
SP6	I believe I can influence sustainable development in my community.	Sustainable development in my community → Sustainable development at the local scale
SP7	I believe I have good opportunities to participate in influencing our shared future.	
SP8	I believe what each person does matters for sustainable development.	
	Willingness to act	
SP9	I want to take action for sustainable development in my community.	Sustainable development in my community → Sustainable development at the local scale
SP10	I want to take action for global sustainable development.	Global sustainable development → Sustainable development at the global scale
SP11	I want to engage in changing society towards sustainable development.	
SP12	I want schoolwork to be about how we can shape a sustainable future together.	Schoolwork → Work in the school setting

Table 2. The items from the 2 factor Model of Environmental Values questionnaire (2-MEV-Q) measuring attitudes towards nature and the environment used in the study. From Castéra et al. (2018)

Code	Item	Factor
ME1	We must set aside areas to protect endangered species.	P
ME2	If an intensive chicken farm were to be created near where you live, you would be against this because it may pollute the groundwater.	P
ME3	Humans will die out if we don't live in harmony with nature.	P
ME4	Industrial smoke from chimneys makes me angry.	P
ME5	I enjoy trips to the countryside.	P
ME6	It makes me sad to see the countryside taken over by building sites.	P
ME7	It is interesting to know what kinds of animals live in ponds or rivers.	P
ME8	All contemporary plant species should be preserved because they may help in the discovery of new medicines.	P
ME9	Nature is always able to restore itself.	U
ME10	Our planet has unlimited natural resources.	U
ME11	Society will continue to solve even the biggest environmental problems.	U
ME12	We need to clear forests to increase agricultural areas.	U
ME13	Human beings are more important than other living beings.	U
ME14	Humans have the right to change nature as they see fit.	U
ME15	Only plants and animals of economic importance need to be protected.	

Note P: Preservation/ecocentric, U: Utilisation/anthropocentric.

Sampling scheme and data collection

The questionnaire was administered online following the same protocol in all institutions. The students were invited through emails to respond to the survey. All the data were collected anonymously between April 2022 and June 2022 using Sphinx software.

Statistical analyses

The fitting of the model including SPACS and 2-MEV (RQ1) was measured with confirmatory factor analysis (CFA) using the robust maximum likelihood estimate. The classic indicators were used to evaluate the model's goodness of fit: the relative chi-square, since the sample was greater than 200 (χ^2/df < 5; Wheaton et al., 1977); the root mean square error of approximation (RMSEA < 0.08; Browne & Cudeck, 1993); the standardised root mean square residual (SRMR < 0.08; Browne & Cudeck, 1993); and the comparative fit index (CFI > 0.9; Bentler, 1990). The second and third research questions were addressed using a Structural equation model (SEM). SEM aims to investigate the relationships between the factors composing the model and the possible influence of extraneous variables (i.e. age and training in this study). Analysis and data management were performed using the Lavaan and Psych packages in R software (V.4.1.0).

Results

CFA on the 5-factor model

The KMO test revealed a value of 0.78, and Bartlett's test revealed a value of 2669.604 (df = 351, p < 0.0001). These findings indicate a good sampling adequacy and suitable structure detection for factor analyses, respectively. In other words, using CFA (and other factor analyses) to analyse our data is fully appropriate.
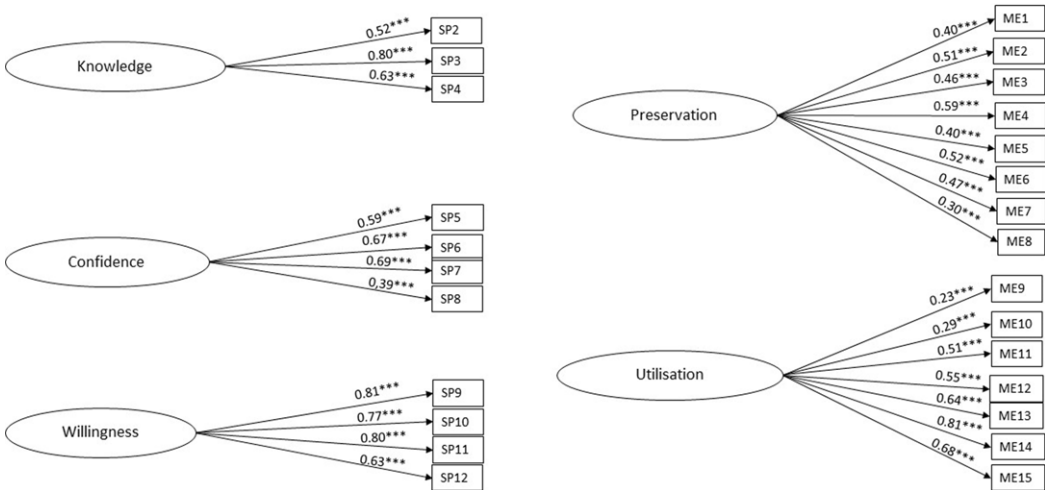

Figure 1. Confirmatory factor analysis (CFA) of the five factors with standardised factor loadings (*p*-value <0.01***, SP1 excluded).

However, the SP1 question was excluded due to its impact on the Cronbach alpha score for the factor Knowledge (alpha with SP1: 0.5). Indeed, by dropping SP1 from the model, the Cronbach alpha of the factor Knowledge increased from 0.5 to 0.68, which indicates more acceptable internal consistency. The other Cronbach's alpha coefficients (Table 4) are acceptable (Nunnally, 1978).

The CFA goodness of fit indices are reported in Table 3. The relative chi-square value (χ^2/df = 1.89) was acceptable, being below the recommended threshold of 5. The other indicators indicated good fit: RMSEA = 0.061 and SRMR = 0.075. CFI is a bit below what Bentler (1990) considers a good fit index (CFI > 0.9); however, since our baseline model's RMSEA is below 0.158 (our baseline model RMSEA = 0.141), the CFI may not be very informative (Kenny et al., 2015). In conclusion, the statistical evaluation shows that the SPACS-Q and the 2-MEV-Q are largely valid in this group (Figure 1 and Table 3; RQ1).

Table 3. Goodness of fit indices of the confirmatory factor analysis (CFA)

Chi sq	DF	*p*-Value	RMSEA	SRMR	CFI
546.832	289.000	<0.001	0.061	0.075	0.831

Table 4. Cronbach's alphas for the factors related to the self-perceived action competence for sustainability (SPACS) and 2 factor Model of Environmental Values (2-MEV)

	alpha
Knowledge	0.685
Confidence	0.672
Willingness	0.834
Preservation	0.680
Utilisation	0.695

Structural Equation Modelling (SEM) to explore link between factors

The Structural equation modelling (SEM) (Figure 2; RQ2) based on the factors of SPACS and environmental values shows that the factor Preservation (P) in the environmental attitudes (2-MEV) is a predictor for self-perceived action competence, whereas the factor Utilisation (U) in the 2-MEV has no impact (no significant path coefficients). Therefore, the weak (close to zero) links between Utilisation and the SPACS factors indicate that high scores on the Utilisation items in this sample mean no interest in taking action for the environment. In the SPACS model, however, the factor Willingness to act has a strong link to the factor Preservation in the 2-MEV (0.46, $p < 0.001$), whereas the link to the factors Knowledge of action possibilities and Confidence in one's own influence are weaker, albeit significant – 0.26 ($p < 0.05$) and 0.29 ($p < 0.05$), respectively.
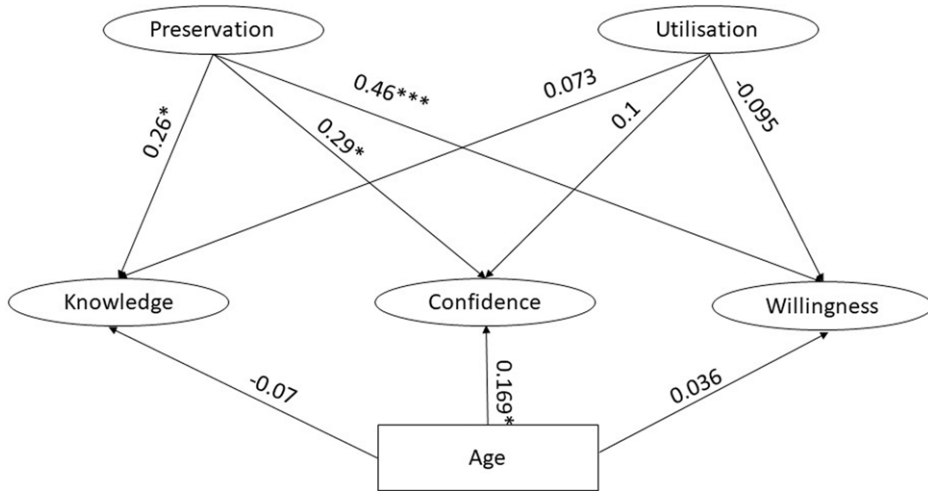
Figure 2. Representation of the structural equation model with standardised path coefficients (*p*-value <0.05*; *p*-value <0.01**; *p*-value <0.001***) between the 2 factor Model of Environmental Values (2-MEV) factors, Preservation and Utilisation, and the self-perceived action competence for sustainability (SPACS) factors Knowledge, Confidence, and Willingness.

The analysis also shows that the age of the respondents positively impacts the Confidence factor of self-perceived action competence – i.e. the older the respondents, the more likely they are to have confidence in influencing sustainable development (Figure 2). However, there is no relationship between training in education for sustainable development and the SPACS factors (RQ3). Among the 236 teacher students, 61 responded that they had received training in education for sustainable development, but based on the structural equation, receiving training in education for sustainable development does not impact the answers on SPACS and 2-MEV in our sample.

Table 5. Mean scores for the items within each factor (one sample *t*-test to test the difference with the theoretical means 1.5; *p*-value <0.05*; *p*-value <0.01**; *p*-value <0.001***)

	Mean	SD
Knowledge		
SP2	1.737***	0.611
SP3	2.292***	0.533
SP4	2.017***	0.561
Confidence		
SP5	1.161***	0.814
SP6	1.983***	0.732
SP7	1.500	0.780
SP8	2.703***	0.510
Willingness		
SP9	2.496***	0.587

(*Continued*)

Table 5. (*Continued*)

	Mean	SD
SP10	2.195***	0.729
SP11	2.360***	0.640
SP12	2.589***	0.510
Preservation		
ME1	2.729***	0.499
ME2	2.284***	0.726
ME3	2.441***	0.703
ME4	2.085***	0.762
ME5	2.763***	0.525
ME6	2.449***	0.673
ME7	2.589***	0.602
ME8	2.314***	0.711
Utilisation		
ME9	1.305***	0.788
ME10	0.398***	0.704
ME11	0.860***	0.728
ME12	0.314***	0.541
ME13	0.419***	0.676
ME14	0.191***	0.454
ME15	0.131***	0.417

The above descriptive statistics (Table 5) show that for the SPACS-factors Knowledge, Confidence and Willingness, most of the means are significantly higher (one sample t-test) than the theoretical mean (1.5), indicating that the participants tend to agree rather than disagree. One exception is SP5 ("I believe I can influence global sustainable development through my actions"), with the mean score 1.16, showing that the participants tend to disagree rather than agree, while the high mean score of SP6 ("I believe I can influence sustainable development at the local scale" – in the French version of the questionnaire) shows that the participants agree rather than disagree. This indicates that the participants more often state that they have more influence on the local level than on the global level. Within the same factor, the high mean score of the item SP8 ("I believe what each person does matters for sustainable development") shows that the participants largely believe that the individual actions are important for a sustainable development.

For the 2-MEV, there are high scores for all the items within the Preservation factor, but low scores for the items within Utilisation, meaning that the participants tend to disagree rather than agree on all the items within this factor, such as "Our planet has unlimited natural resources" and "Human beings are more important than other living beings."

Discussion

The first aim with our study was to explore to what extent the adapted SPACS-Q and the 2-MEV-Q fit for analysing action competence and environmental values in a sample of French primary

school student teachers. Our results show that the models are largely valid in this group. However, our results (Cronbach alpha score) also show that the SP1 item ("I can see different points of view on issues when people think differently") does not clearly relate to the SPAC factor Knowledge of action possibilities for this sample – i.e. French master's degree primary school student teachers. It was only after excluding this item from the model that the factor Knowledge showed a more acceptable internal consistency. However, in the study by Olsson et al. (2020) with Swedish students aged 12–19, this item fit well into the factor Knowledge. This discrepancy might be the result of differences in how sustainability issues are tackled in teacher education and in schools in Sweden and France. In the Danish-Swedish tradition, democracy and values are considered characteristics of environmental and sustainability education (Laessøe & Öhman, 2010). In fact, Rudsberg and Öhman (2010) claim that "the democratic dimension has become a key focus of evaluations, developmental projects and research" (p. 96) for environmental education and education for sustainable development in Sweden. Maybe our study indicates that this issue is not as prominent in schools and teacher education in France.

Our second aim was to explore the relationship between the adapted SPACS-Q and the 2-MEV-Q among a group of primary school student teachers in France. We hypothesised a relationship between action competence for sustainability and environmental values. The results confirm this relationship but only regarding the factor Preservation in the environmental values, indicating that someone who wants to preserve nature tends to have a high self-perceived action competence for sustainability. The connection, however, is not equally strong. In the SPACS model, only the factor Willingness to act has a strong link to the factor Preservation in the 2-MEV, whereas the links to the factors Knowledge of action possibilities and Confidence in one's own influence are weaker, albeit significant. As mentioned previously, a relationship between nature experiences, ecocentrism, pro-environmental attitudes, and pro-environmental behaviours has already been established in various studies (e.g. Chawla & Flanders, 2007; Chawla et al., 2012; Quinn et al., 2016) but not in the context of self-perceived action competence for sustainability. Surprisingly, the factor Utilisation is not connected to any action competence factor. Indeed, many studies have shown that Utilisation is negatively correlated with Knowledge (Dieser & Bogner, 2017; Schönfelder & Bogner, 2017; Raab & Bogner, 2021) or environmental affection (Boeve-de Pauw & Van Petegem, 2011). However, the strength of the link between knowledge and utilisation may weaken as knowledge increases, eventually showing no correlation at all (Schneiderhan-Opel & Bogner, 2021). These studies were however conducted with school students, while our sample consists of student teachers in the final year of their master's degree. It is highly likely that, compared to school students, they have been more exposed to environmental programmes and are more aware of environmental issues. This is indicated by the fact that the knowledge scores (SP2, SP3 and SP4) in our sample are significantly higher than the average (i.e. higher than the theoretical means) across all three items. Thus, the high knowledge level of our participants may explain, at least partly, the lack of correlation between the factor Utilisation and self-perceived action competence for sustainability. Our findings suggest that promoting action competence of student teachers would be most efficient if educational content focused on supporting preservation of the environment rather than promoting abstaining from exploitative use of the environment. This finding seems relevant also with respect to Liefländer and Bogner (2018), who state that "a person with pro-environmental attitudes often has a high Preservation score and a low Utilisation score on the 2-MEV" (Liefländer & Bogner, 2018, p. 612). However, they also note that "people with strong preservation attitudes do not necessarily have to hold weak utilisation attitudes and vice versa" (Liefländer & Bogner, 2018, p. 612). We are aware that our research may have limitations such as the high Preservation score. This could be an effect of social desirability responding (e.g. Liefländer & Bogner, 2018; Nkaizirwa, Nsanganwimana & Aurah 2022). Liefländer and Bogner (2018) conclude that "Preservation (but not Utilisation) has been found to be dependent on social desirability, especially in young children" (p. 621). Although Nkaizirwa et al. (2022) conclude that social desirability responding in their study has "limited influence over

predictors of self-reported" pro-environmental behaviours, has "marginal negative correlation with age," and might not constitute "a serious response bias" (p. 8), they argue that the effect of social desirability responding, reported from other studies - for example on older individuals' – "should not be completely neglected in self-reported surveys" (p. 8).

When it comes to our third research question (the impact of age and training on sustainability issues in relation to self-perceived action competence), the age of the respondents in our study (average age 28 years) had a positive impact on the SPACS factor Confidence in one's own influence. This is interesting as several studies have shown that a positive attitude towards the environment and pro-environmental behaviours tend to decrease with age (e.g. Fortner et al., 2000; Krettenauer et al., 2020; Torkar et al., 2020). However, some studies show the opposite results (e.g. Anderson & Krettenauer, 2021), and other studies show contradictory results, indicating the impact of cultural and contextual factors (Krettenauer et al., 2020). It is also interesting to note that training in sustainable development issues does not impact any of the SPACS factors and the 2-MEV factors in our study. Our results suggest that the training of French primary school student teachers probably does not consider action competence sufficiently. However this is based only on the 61 respondents that answered that they had received training in ESD.

The current research has the potential to assist educators in their teaching endeavours – important and urgent tasks as put forward by, for example, Kriewaldt and Lee (2023) and Sousa, Correia, Leite, and Viseu (2021). Hence, Sousa et al. (2021) conclude that Higher Education Institutions are among the most privileged settings for influencing the behaviour of young people and Kriewaldt and Lee (2023) found through a survey comprising 136 Australian teacher students that most students (21–25 years old) were ready to take personal pro-environmental actions as well as teach and advocate for sustainability within their school community. They seemed, however, less willing to engage in political activities outside the school context.

Moreover, a recent study showed that action competence plays a major role in predicting sustainable behaviour (Oinonen et al., 2024). Considering sustainable behaviour as a priority, it seems that the improvement of student teacher training may be achieved through the promotion of preservation values rather than anti-utilisation values. These results complement other recent studies exploring ways to enhance action competence for sustainability and may be valuable for stakeholders in sustainability education. Findings indicate that students' participation in school governance, such as through student councils, can help develop their action competence (Torsdottir, Olsson, Sinnes, & Wals, 2024). Furthermore, high levels of climate hope have been linked to greater self-perceived action competence (Finnegan, 2023).

Conclusion

We conclude that the adapted *Self-perceived action competence for Sustainability Questionnaire (SPACS-Q)* and the *2 factor Model of Environmental Values questionnaire (2-MEV-Q)* are largely valid in a sample of primary student teachers in a French context. We have also shown that there is a relationship between the three factor model SPACS and the 2-MEV but only regarding the Preservation factor in the environmental attitudes. Finally, we have shown that the age of the respondents in our study had a positive impact on the SPACS factor Confidence in one's own influence. However, based on the self-reported data, training in sustainable development issues appeared to have no significant effect on any of the SPACS factors.

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