A Quantitative Comparison of Students' Sustainability Consciousness Between Eco-Schools and Ordinary Schools: A Finnish Context

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Abstract

Over the past decades, implementing Eco-Schools programmes as a means of Education for Sustainable Development (ESD) has gained recognition from governments worldwide. Nevertheless, the programme's impact was mainly discussed on the environmental dimension, and few were from a holistic perspective that addressed sustainable development as a whole. Therefore, this study aimed to fill the gap by investigating students' differences in sustainability consciousness between Eco-Schools and ordinary schools. Sustainability consciousness unifies sustainability knowingness, sustainability attitudes, and sustainability behaviours from the sustainability dimensions of the environment, society, and economy. In total, 104 students in sixth grade from five schools in Finland participated in this study. The Sustainability Consciousness Questionnaire (SCQ) was used to answer the research questions. The participants were selected through convenience sampling and volunteer sampling methods. The results of t-test and Mann Whitney U test revealed significant differences in students' sustainability consciousness and its subconstruct of sustainability behaviours, where students from Eco-Schools reported better scores than their counterparts in ordinary schools. The whole-school approach was highlighted as a possible explanation in the discussion. Moreover, the results also showed that compared with sustainability knowingness, sustainability attitudes were more important in bringing about behavioural changes. Several innovative pedagogies focusing on attitudes and behaviours were discussed in the implications. This study not only provides a reference for the stakeholders involved in the Eco-Schools programme but also contributes to the advancement of ESD locally.

Keywords: Eco-Schools; sustainability consciousness; sustainability knowingness; sustainability attitudes; sustainability behaviours; whole-school approach.

Abbreviations

CFA	Confirmatory Factor Analysis
CHEAKS	Children's Environmental Attitudes and Knowledge Scale
DESD	Decade of Education for Sustainable Development
EFA	Exploratory Factor Analysis
ELQ	Environmental Literacy Questionnaire
ESD	Education for Sustainable Development
FEE	Foundation for Environmental Education
GDPR	General Data Protection Regulation
GEP	Greening Education Partnership
MCAR	Missing completely at random
MSELS	Middle School Environmental Literacy Survey
PBL	Project-based Learning
PISA	Programme for International Student Assessment
SCQ	Sustainability Consciousness Questionnaire
SD	Sustainable Development
2-MEV	Two-dimensional Model of Ecological Values
UEF	University of Eastern Finland
UN	United Nations
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WWF	World Wild Fund

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1   Introduction

1.1   Background

Sustainable development (SD) is a primary concern for human beings worldwide. Although many nations have made tremendous efforts on its progress, there are still challenges such as climate crisis, biodiversity loss, inequalities, and violent conflicts that urgently call for more strong actions (Chen et al., 2022). Faced with these pressing difficulties, the young generation, as potential change agents, is required to become more conscious of SD. Sustainability consciousness, a concept coined by a Swedish research group, unifies sustainability knowingness, sustainability attitudes, and sustainability behaviours comprehensively (Berglund et al., 2014; Gan et al., 2019; Olsson et al., 2016, 2019; Suwarto et al., 2021). According to UNESCO (2019, 2022a), the three building blocks represent the three learning dimensions of cognition, socio-emotion, and behaviour. At the same time, a change in them is critical in driving the SD process (UNESCO, 2014b).

Many international policies have underscored the importance of education in addressing SD problems (e.g., UNESCO, 2006, 2022a; United Nations, 1992), which advocated for the idea of Education for Sustainable Development (ESD). In response, a growing number of ESD programmes have been established over the past two decades. These programmes are typically administered by non-governmental organizations, aiming at supporting schools' ESD strategies for teaching and learning (Olsson et al., 2016, 2019; Olsson & Gericke, 2017). Among the many programmes, the most widely spread is Eco-Schools (discussed in detail in section 2.3), which was initiated by the Foundation for Environmental Education (FEE) (Eco-Schools, 2022b). The programme provides teaching materials, teacher training, and practice instructions to the registered schools. By assessing schools' achievement based on national criteria, it also issues ESD certifications to schools that succeed in the accreditation.

This kind of accreditation system has been well-supported by international organizations. For example, in the newly launched Greening Education Partnership (GEP) programme at the UN Transforming Education Summit in September 2022, four action areas were promoted to accelerate the progress of ESD: (1) greening schools; (2) greening learning; (3) greening capacity and readiness; (4) greening communities (UNESCO, 2022b). In the area of the greening school, the target was set to have at least

50 per cent of educational institutions certified as green by 2030, which entailed the nationwide adoption of a green school certification programme. Despite the abundance of ESD-certification programmes, effective tracking and evaluation of their outcomes are still inadequate (Chen et al., 2022). To speed up the dissemination of effective practices, UNESCO (2020, 2022a) has repeatedly suggested carrying out regular evaluations of these ESD programmes at the country level, for example by conducting surveys. As Vandamme (2009) emphasized, while examining educational programmes, measuring learners' knowledge, attitudes, and behaviours should always be initially taken. For this reason, this study assesses the effectiveness of the Eco-Schools programme using the construct of sustainability consciousness. Its definition and implication will be elaborated on in section 2.2.

1.2   Education for Sustainable Development in Finland

Since the 1990s, SD has been a prominent theme in Finnish national policy (Loukola et al., 2001). Many governmental strategies and policies focused on SD (e.g., Ministry of Education (2006); Ministry of the Environment (1992; 2007), while the emphasis has shifted from Environmental Education to ESD (Páll et al., 2021). In 2004, the concept of SD made its first appearance in the National Core Curriculum for Basic Education, along with some core principles like human rights, equality, social justice, and environmental protection (Finnish National Board of Education, 2004). Remarkably, an interdisciplinary theme entitled "responsibility for the environment, well-being and sustainable development" was introduced (p.39). Its goal was to educate responsible citizens who cared about SD issues and strived for sustainable lifestyles.

In the 2014 National Core Curriculum for Basic Education, an "Eco-social approach" has been presented and applied as the value basis (Finnish National Board of Education, 2016). This approach defined a hierarchical relationship where the environment was considered the fundamental base and provided natural resources for all social and economic activities (Salonen & Konkka, 2015). According to the Finnish National Board of Education (2016), this approach should guide the operation of schools and the transformation of core values, which required trust, respect, and participatory communication across school communities. Lehtonen et al. (2019) have proposed that people educated in this approach will better understand that they are part of the ecosystem, will respect the boundaries of the planet and value non-material capital to enhance well-being. In their opinion, the best

experience of life can be pursued through intangible assets such as knowledge, affection, and engagement, without causing ecological damage.

According to the Finnish National Board of Education (2016), the 2014 curriculum addressed SD as a a fundamental goal. In a study by Wolff et al. (2017), the researchers quantified the frequency of SD-related concepts in the revised curriculum, summarizing that "a sustainable future" was brought up 42 times, "a sustainable lifestyle" 45 times, and "sustainable development" 40 times (p.6). Notably, the 2014 curriculum proposed seven transversal competencies involving a full integration of knowledge, values, attitudes, and skills. One of them was "participation, active citizenship and building a sustainable future" (p.24), which aspired to encourage individuals to actively participate in democratic processes and take charge of a shared future. Moreover, as a core principle, a sustainable lifestyle was also embedded in most school subjects such as environmental studies, social studies, religion, and visual arts as well as the organizational management of the schools (Páll et al., 2021).

However, although the national curriculum articulated a desirable ESD goal, the actual implementation of ESD in Finland was problematic (Páll et al., 2021; Wolff et al., 2017, 2022). For Páll et al. (2021), the definitions of SD and ESD were never sufficiently clarified despite their repetitions in the 2014 national curriculum. Consequently, teachers and officials at local levels had to figure out how to describe them on their own, thus resulting in divergent interpretations (Páll et al., 2021). Moreover, Wolff et al. (2017; 2022) reinforced that ESD was more a rhetoric than a practical approach in Finland, as they discovered that SD issues were marginalized and never adequately acknowledged in Finnish teacher training programmes. For Olsson et al. (2016), these barriers may be the reasons why schools depended extensively on external organizations and networks for supplementary support.

1.3 Objectives

This research aims to evaluate the implementation of the Eco-Schools programme by exploring students' sustainability consciousness between Eco-Schools and ordinary schools in Finland. Sustainability consciousness has been considered the primary outcome of ESD (Berglund et al., 2014; Pauw et al., 2015); therefore, it is suitable to be used to examine the Eco-Schools programme for this study.

Previous research on Eco-Schools mainly investigated the programme's outcome from an environmental perspective (e.g., Boeve-de Pauw & Van Petegem, 2011; Goldman et al., 2018; Krnel & Naglič, 2009; Nurwidodo et al., 2020), and few was from a holistic viewpoint that integrated social and economic domains (Gericke et al., 2019; Olsson et al., 2016). Regarding the ESD implementation in Finland, much of the research focused on the higher educational level (e.g., Holm et al., 2015; Singer-Brodowski et al., 2019; Tolppanen et al., 2021; Wolff et al., 2017), with only a few addressing on the basic education level (Wolff et al., 2017), or at least written in English. Without sufficient research in basic education, it is challenging for educators and programme developers to make informed decisions about ESD strategies.

To address the current gaps, two specific research objectives have been developed: (1) to compare sixth graders' sustainability consciousness and its three subconstructs between Eco-Schools and ordinary schools; (2) to identify the relationship between sustainability knowingness, sustainability attitudes, and sustainability behaviours.

This study has its significance in three respects. First and foremost, it provides a reference for all the stakeholders engaged in the Eco-Schools programme, including the programme's funders, partners, providers, as well as participants. To what extent students' sustainability consciousness varies between different types of schools is an important question for every one of them. Second, it presents a Finnish version of a validated instrument that addresses the full breadth of ESD, making it possible to evaluate ESD programmes comprehensively in the Finnish context. Thirdly, by looking into sixth graders' sustainability consciousness, this study not only fills a research gap in the ESD implementation in Finnish basic education but also contributes to the advancement of ESD locally.

1.4   Research questions and hypotheses

Under the research aim and objectives, this study established two research questions to guide the investigation:

1. Are there any differences in students' sustainability knowingness, sustainability attitudes, and sustainability behaviours between Eco-schools and ordinary schools?

2. What are the relationships between sustainability knowingness, sustainability attitudes, and sustainability behaviours?

Although early studies mainly observed the Eco-Schools' impact on knowledge (e.g., Boeve-de Pauw & Van Petegem, 2011; Krnel & Naglič, 2009), as the programme advanced, however, most recent research reported its significant impact on behaviours, as well as other outcomes like knowledge, attitudes, and belief (e.g., Astuti & Aminatun, 2020; Gan et al., 2019; Nurwidodo et al., 2020). Moreover, given the difficulties experienced in establishing ESD in Finnish schools (Hofman-Bergholm, 2018; Páll et al., 2021; Saloranta, 2017; Wolff et al., 2017, 2022), one may expect some disparities in students' sustainability consciousness between schools supported by external ESD organizations and schools that are not. Hence, the following hypotheses were proposed:

H1. Eco-Schools students report higher sustainability consciousness than their peers in ordinary schools.
H1a. Eco-Schools students report higher sustainability knowingness than their peers in ordinary schools.
H1b. Eco-Schools students report higher sustainability attitudes than their peers in ordinary schools.
H1c. Eco-Schools students report higher sustainability behaviours than their peers in ordinary schools.

Regarding the relationship between knowledge, attitudes, and behaviours, most research was conducted from an environmental perspective, with knowledge and attitudes being among the most frequently studied factors influencing behaviours (e.g., Fietkau & Kessel, 1981; Lee et al., 2015; Liu et al., 2020). Based on the existing literature and the theory of planned behaviour (Ajzen, 1991, 2019) (explained in section 2.2.2), we may anticipate that as individuals acquire more understanding of sustainability, their sustainability attitudes are more likely to improve, contributing to sustainability behaviours in some way. Four specific hypotheses were put forward to be tested:

H2a. Sustainability knowingness is a positive predictor of sustainability attitudes.
H2b. A sustainability attitude is a positive predictor of sustainability behaviours.
H2c. Sustainability knowingness is a positive predictor of sustainability behaviours.
H2d. Sustainability attitudes impact sustainability behaviours more than sustainability knowingness.

1.5   Research structure

The overall structure of the study takes the form of five chapters. The first chapter provides an introduction to this research, including the background, the context of Eco-Schools and ESD in Finland, the research objectives and questions, and a brief overview of the study structure. The second chapter is concerned with the theoretical framework and literature review. It begins with a description of the features of SD and ESD. It then describes the definition of sustainability consciousness, followed by how its three subconstructs (knowingness/knowledge, attitudes, and behaviours) are interrelated, as well as a literature review on sustainability consciousness. Ultimately, it presents the Eco-Schools' Seven Step Framework and some key research on Eco-Schools programme.

Chapter Three deals with the methodology used for this study. The main focuses are on the participants, the survey instrument, the data collection, and data analysis. In addition, the research's validity, reliability, and ethical issues are also included in this chapter. In the fourth chapter, results are presented in the order of the research questions and hypotheses. Right after the results is the discussion in Chapter Five, which primarily interprets the meaning of the research findings and relates them to previous studies and research theory. It is worth noting that the study's contribution, limitations, and recommendations for future research are also mentioned in this chapter.

2 Theoretical framework and literature review

2.1 Sustainable development and Education for Sustainable Development

2.1.1 Sustainable development

SD was generally defined as "meeting the needs of current generations without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p.8). In the 1992 Rio De Janeiro Earth Summit, Agenda 21 was developed to imply a trend toward equal recognition of economic, social as well as environmental dimensions of SD (Gericke et al., 2019). This tripartite description of SD was often illustrated by three crossing circles (Figure 1. a) representing the components of environment, society, and economy in equal size (Barton, 2000). However, Kopnina (2014) claimed that an even distribution of the three dimensions tended to degrade the underlying role of the environment in SD issues. For Giddings et al. (2002), the conception of SD was manifested in three nested circles as shown in Figure 1 (b), which conveyed that the environment and society were both important to the economy, and society itself was also relying on the environment.
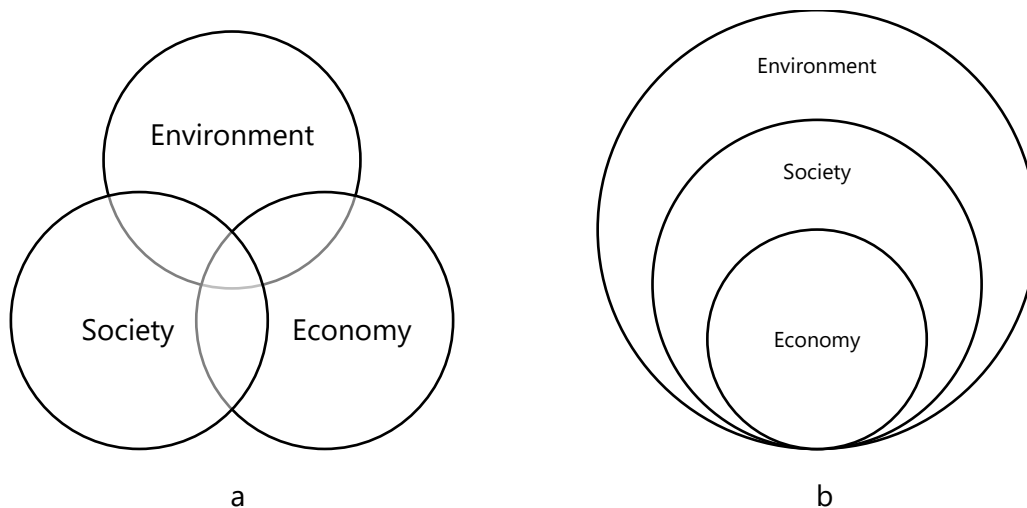
Figure 1. Illustrations of the three components of SD (a: intersecting circle of SD; b: nested circle of SD)

Despite these contested relationships among these components, SD's general feature as an integration of environment, society and economy was commonly acknowledged and widely accepted (Giddings et al., 2002; Summers & Childs, 2007). Since breaking SD into three dimensions may run the risk of focusing on a separate perspective rather than on SD as a whole (Giddings et al., 2002), the current study perceives SD as a holistic entity throughout the whole research.

2.1.2   Education for Sustainable Development

The idea of introducing SD issues into education originated in the 1970s (Scott, 2013), and gained prominence since the publication of Agenda 21 at the Rio Conference (Wolff et al., 2017). Many other relevant terms have been coined, including Sustainability Education, Sustainable Education, Education for Sustainability, and ESD. This study chose to be consistent in using the term ESD, as it was the most widely recognized internationally, especially within the framework of the United Nations (Agbedahin, 2019).

ESD considered education to be inextricably linked to SD in all aspects (Lozano et al., 2017). Within the definition of UNESCO (2012), ESD incorporated a wide variety of SD topics like climate change, waste management, poverty alleviation, and sustainable consumption into teaching and learning. Education under this principle implied an analysis or synthesis of the potential impacts of different viewpoints to enhance a comprehensive understanding of SD problems (Berglund et al., 2014). Furthermore, another essential feature of ESD was its focus on individuals' knowledge, values, attitudes, and skills for SD (UNESCO, 2012). In this vein, ESD strived to increase students' knowledge regarding SD and enable attitude and behavioural change at the same time (Murray et al., 2014). For Agbedahin (2019), ESD was interdisciplinary and transdisciplinary, which required participatory learning where learners were actively involved in real-life problems and ultimately took action for SD.

On the other hand, ESD was also subject to a great deal of criticism and questioning (Sandell et al., 2005). One of the claims was that the multiple perspectives embedded in ESD might end up confusing the teachers and students, resulting in a counter-effect on the achievement (Kopnina, 2014). In fact, it was ESD's complexity that fostered individuals' critical thinking and systems thinking (Agbedahin, 2019), leading numerous interest groups to advocate for its implementation (Páll et al., 2021; Pauw et

al., 2015). Accordingly, understanding the intricate attributes of ESD was readily employed as the starting point of this study.

2.2 Sustainability consciousness

2.2.1 Definition of sustainability consciousness

Sustainability consciousness has been implicated as the outcome of ESD in the literature over the past several years (Berglund et al., 2014; Pauw et al., 2015). According to Chen et al. (2022), a development in sustainability consciousness was critical to achieving the long-term SD goals. Sustainability consciousness has two areas of interest, sustainability, and consciousness. In the previous section, we brought up the conceptual model for the SD dimensions (environment, society, and economy) and its importance as a whole. This section is to elaborate on the concept of consciousness.

As a psychological construct, consciousness can be defined as the experience itself, which is also the embodiment of all that we perceive or experience (Velmans, 2009). In this regard, sustainability consciousness can be denoted as the experiencing or understanding of sustainability concerns. For Sharma and Bansal (2013), sustainability consciousness was an expansion of the notion of environmental consciousness by integrating social and economic elements of SD. As Kollmuss and Agyeman (2002) defined, pro-environmental consciousness was a composite of environmental knowledge, values, attitudes and emotional engagement. Similarly, in the concept outlined by Sánchez and Lafuente (2010), environmental consciousness was interpreted from a comprehensive and behaviour-oriented perspective, which incorporated the affective (beliefs and values), dispositional (attitudes), cognitive (knowledge), and active (behaviour) domains. In addition, they pointed out that environmental consciousness was associated with environmentally friendly behaviours and was largely influenced by attitudes towards actions. Gericke et al. (2019) concluded that regardless of the various subdivisions like awareness, willingness, and actions, the different operationalizations of environmental consciousness mainly contained three building blocks: knowledge, attitudes, and behaviours. Thereby, this interpretation served as the analytical framework for the "consciousness" dimension in this study.

In this way, sustainability consciousness encompassed the main components of consciousness relating to the three dimensions of SD. A Swedish study group formulated a structure that encompassed the overall breadth of sustainability consciousness (Berglund et al., 2014; Chen et al., 2022; Gericke et al., 2019; Olsson et al., 2016). As depicted in Figure 2, the structure was built from a holistic viewpoint which unified sustainability knowingness, sustainability attitudes, and sustainability behaviours in environmental, social, and economic aspects of SD (Gericke et al., 2019).
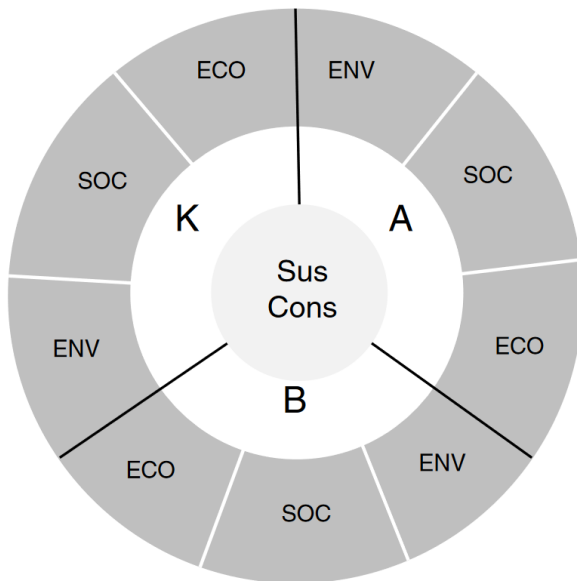
Figure 2. An illustration of the structure of sustainability consciousness.

Note: K=knowingness; A=attitudes; B=behaviours; Env=environment; Soc=society; Eco=economy; Sus Cons=sustainability consciousness (Gericke et al., 2019, Figure 1)

According to their explanation, sustainability knowingness was acknowledged as having an understanding of the basic principles behind SD, especially the 15 subthemes (Figure 3) outlined in the UN DESD framework (UNESCO, 2006). Alternatively, they preferred "knowingness" to "knowledge" on account that knowledge was associated with objective truth, while knowingness had both the characteristics of cognition and affection (Von Glasersfeld, 1990), and it would be impossible to predict what knowledge would be useful in the future and in what specific contexts (Stables & Scott, 2002). Besides, Pauw et al.(2015) indicated that ESD was more related to a pluralistic and holistic approach than it was to memorizing facts. Hence, knowingness corresponded more closely to the complexity of SD challenges (Olsson et al., 2016).

Environment	Society	Economy
• natural resources (water, energy, agriculture, and biodiversity) • climate change • rural development • sustainable urbanization • disaster prevention and mitigation	• human rights • peace and human security • gender equality • cultural diversity and intercultural understanding, • health • HIV/AIDS • governance	• poverty reduction • corporate responsibility and accountability • market economy

Figure 3. 15 subthemes of SD in the UN DESD framework (UNESCO, 2006).

Ajzen (2001) stated that attitude served as a summative assessment of a psychological item in terms of attributes as good-bad, favourable-unfavourable, satisfying-unsatisfying, and like-dislike. For Kollmuss and Agyeman (2002), the attitude was "the enduring positive or negative feeling about some person, object, or issue" (p.252). Based on this definition, sustainability attitudes refer to positive or negative feelings about SD concerns. A measurable attitude was often more general and broader than the scope of a measurable behaviour (Kollmuss & Agyeman, 2002). But behaviours were crucial, because only through behavioural changes can the goal of SD be truly accomplished (Chen et al., 2022). The existing literature had no clear definition of sustainability behaviours. In the study of Kollmuss and Agyeman (2002), the authors described pro-environmental behaviour as any activity or practice that intentionally aimed to reduce how negatively one's behaviour affected the environment. Coherently, sustainability behaviours can be understood as the behaviours that diminished the negative effects on the areas of SD. Notably, the assessment of self-reported behaviours did not necessarily reflect actual behaviours, but rather the willingness or readiness to engage in practices (Eagly & Chaiken, 1993). Hence, sustainability behaviours mainly dealt with the intention to take sustainable actions (Olsson et al., 2016).

Overall, sustainability consciousness was an extended notion of environmental consciousness from a more comprehensive viewpoint (Gericke et al., 2019). Since this study considered SD as an integral entity, its main attention fell on the knowingness, attitudes, and behaviour domains of consciousness. The relationship between them is explicitly described in the following section.

2.2.2   Relationship between knowingness/knowledge, attitude, and behaviour

Numerous models have illustrated the relationships between knowingness/knowledge, attitude, and behaviour and revealed different patterns among different scholars. According to Kollmuss and Agyeman (2002), the earliest investigation can be traced back to a linear causal relationship between the three constructs, where environmental knowledge led to environmental attitudes, and environmental attitudes led to pro-environmental behaviours. However, this model was soon proven inadequate or even wrong, as a large number of subsequent studies discovered that an improvement in knowledge and attitudes did not necessarily result in behavioural changes. Thus, it was preferable to interpret their link as correlational as opposed to causal (Chen et al., 2022).

In the famous study of Hines et al. (1987), environmental knowledge was one of the most effective indicators of pro-environmental behaviours. Moreover, Gifford and Nilsson (2014) agreed that without proper knowledge, one would find it difficult to behave pro-environmentally. However, according to the ecological behaviour model proposed by Fietkau and Kessel (1981), knowledge was not a direct indicator of behaviours. Still, it acted as one of the predictors of attitudes, and attitudes, in turn, affected behaviours. This model has been well supported by succeeding studies (e.g., Flamm, 2009; Lee et al., 2015; Liu et al., 2020), which demonstrated the intermediary role of attitudes between knowledge and behaviours. According to Carmi et al. (2015), only when knowledge is internalised and stimulates effective change can it bring about behavioural changes.

Among the theories addressing the relationship between knowledge, attitude, and behaviour, the theory of planned behaviour proposed by Ajzen (1991) was the most widely applied. According to the theory, attitudes, along with subjective norms and perceived behaviour control, impacted behaviour intentions, and it was through behaviour intentions that behaviours were changed (see Figure 4). Subjective norms were perceived as the degree to which individuals felt pressure from others to behave in a certain way, and perceived behaviour control was more related to how well individuals believed they can perform a specific behaviour. As the theory denoted, to generate behavioural changes, all three factors in the framework must be supportive. In addition, Ajzen (2019) further demonstrated that attitudes were established on beliefs derived from prior experience and knowledge. This statement broadly supported many studies that showed the impact of knowledge on one's attitudes (e.g., Fietkau & Kessel, 1981; Lacy et al., 2009; Lee et al., 2015) and behaviours (e.g., Grant, 2010; Hines et al., 1987).

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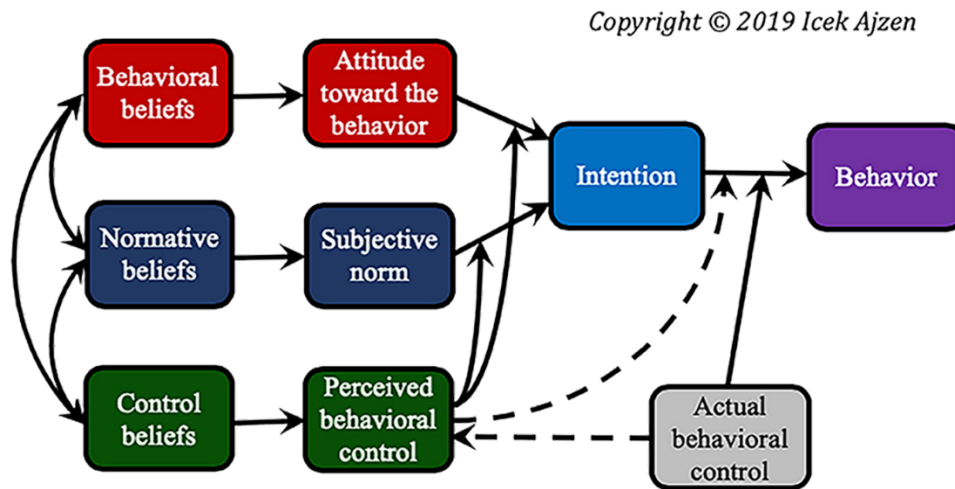
Figure 4. Theory of planned behaviour diagram (Ajzen, 2019)

Note: permission for using this figure in a thesis was granted by the author.

The above models and theories demonstrate that the relationship between knowingness/knowledge, attitudes, and behaviour is complicated. Instead of applying one single framework, this study intended to integrate different models to produce a variety of insights that were then used to explain our results in the discussion (Cairney, 2013).

2.2.3   Previous research on sustainability consciousness

As a fairly recent notion emerging in ESD studies (Kalsoom & Khanam, 2017), sustainability consciousness has been dealt with in a relatively small body of literature. The first discussions and analyses of sustainability consciousness were conducted in Swedish formal education settings, where Berglund et al. (2014) and Olsson et al. (2016) explored the sustainability consciousness among Grade 6, Grade 9, and Grade 12 students in two nationwide studies. By using the Sustainability Consciousness Questionnaire (SCQ), the researchers compared the schools with and without an ESD profile and concluded that the ESD profile had different impacts on the students depending on grades. For sixth graders and 12th graders, attending ESD programmes had affected them positively in terms of sustainability consciousness, but the impacts were extremely limited (Berglund et al., 2014; Olsson et al., 2016). While for ninth graders, surprisingly, the programme's impact was negative (Olsson et al., 2016). When it came to the subconstructs of sustainability consciousness, a significant difference was only identified

in the environmental dimension for the Grade six group, suggesting that primary schools' ESD implementation might mainly focus on the environment (Olsson et al., 2016).

Since the work of Berglund et al. (2014) and Olsson et al. (2016), the study of sustainability consciousness has received increased interest in academia. Olsson et al. (2019) duplicated their study in Taiwan, involving 1741 students from Grades 6, 9, and 12 in total. Through the SCQ, they investigated students' sustainability consciousness and used structural equation modelling in data analysis. Different from the findings in Sweden, there were no significant differences between ESD schools and non-ESD schools in the overall sustainability consciousness as well as sustainability knowingness, sustainability attitudes, and sustainability behaviours. In other words, an ESD certification system didn't contribute to the development of sustainability consciousness (Olsson et al., 2019). Furthermore, they pointed out that the mean scores for sustainability behaviours were lower than those for sustainability knowingness and sustainability attitudes for both groups of students.

Different from the comparative studies above, another group of research mainly measured the level of sustainability consciousness and investigated the relationship between sustainability knowingness/knowledge, sustainability attitudes, and sustainability behaviours. For example, a study conducted among Spanish pre-service primary teachers reported a positive correlation between sustainability knowingness and sustainability attitudes, whereas it did not necessarily follow that those who scored highly on both dimensions exhibited better sustainability behaviours (Marcos-Merino et al., 2020). On the contrary, by administrating a survey to Chinese primary and secondary school students, Chen et al. (2022) discovered that sustainability knowingness and sustainability attitudes were positively associated with sustainability behaviours. Likewise, a positive correlation was also observed in the study of Michalos et al. (2012), who used a sample of Grade 10 students in Canada. Their findings identified the highest association between knowledge and attitudes ($r=.62$) and the lowest association between knowledge and behaviours ($r=.39$). Furthermore, the results from the multivariate regression showed that compared with knowledge, attitudes had a greater influence on behaviour prediction. This finding was also reported by Ovais (2023), who used a sample of 205 students from Indian higher educational institutions and indicated the more important role of sustainability attitudes in behavioural changes.

Considering all this evidence, sustainability consciousness has been evaluated among different age groups across diverse settings. It seemed that people's sustainability consciousness, and the relationship between its subconstructs, varied a lot in different contexts. To my knowledge, sustainability consciousness has not been reviewed in Finland's basic education. Given the renowned fame in education worldwide (Niemi et al., 2012), the Finnish context is worthwhile to be further explored.

2.3 Eco-Schools programme

2.3.1 Eco-Schools programme and its Seven Steps Framework

The Eco-Schools programme is one of the five educational programmes of the Foundation for Environmental Education (FEE). It has been recognized by the UN Decade of Education for Sustainable Development (DESD; 2005-2014) and by UN Environmental Programme (UNEP) as a model programme for ESD (Eco-Schools, 2022c). Starting from a focus on environmental problems, the programme has now incorporated economic and social problems in its 12 themes, aiming to promote participants' sustainable engagement in the communities worldwide (Gough et al., 2020). So far, the programme has reached 74 countries, involving 59, 000 schools and 19 million students overall (Eco-Schools, 2022b).

In Finland, the Eco-Schools programme was launched by the non-governmental Foundation for Environmental Education Suomi (FEE Finland) under the name of Vihreä lippu (Green Flag) in 1998 (FEE Finland, 2022a). By 2022, there have been more than 350 schools in Finland registered in this programme, accounting for 11 per cent of all the schools nationwide (FEE Finland, 2022b). To better adapt to the local context, the officials modified the programme to the needs of the national educational system (FEE Finland, 2022a). In practice, FEE Finland provided teaching materials on the nine themes (i.e., Biodiversity & Nature, Climate Change, Energy, Global Citizenship, Health & Well-being, Litter, School Grounds, Waste, and Water) regarding SD as well as detailed instructions on how to run a successful Eco-Schools project. Apart from that, according to the officials of FEE Finland, the organization also offered ESD training for teachers, together with World Wild Fund Finland (WWF Finland), universities and other similar organizations. Every one or two years, the registered schools need to submit a written report to assess whether they have met the national criteria for accreditation.

One of the core structural elements of Eco-Schools is the Seven Steps Framework (Figure 5). According to Eco-Schools (2022c), the first step in the framework is to form an eco-committee, which is led by students and composed of many stakeholders including teachers, administrative staff, parents, and community members. The committee is the initiative behind the programme and speaks for the entire school's ideas. Then, by reviewing schools' SD issues, the committee identifies priority areas for improvement before making action plans with specific activities, timeframe, and targets. In the next step, the committee keeps track of the progress to evaluate the action plans. After that, the issues will be integrated into the curriculum so that students can learn how these problems are linked to real-life concerns. To increase its impact, schools afterwards disseminate their work to a broader community to engage more people to participate in the initiatives. Finally, the schools create an Eco Code conveying their commitment to sustainability. And the code also serves as a reminder to maintain the project's progress.

Figure 5. Seven Steps Framework in Eco-Schools programme (Eco-Schools, 2022d).

The Seven Steps Framework was built on the notion of a whole-school approach (Andreou, 2020). By infusing SD concerns into every aspect of school life, from school governance to the curriculum, the whole school approach aimed to inspire all the stakeholders in the community to embark on the journey toward SD goals. And in this way, students enhanced their reflective thinking and problem-solving skills, and ultimately developed into agents of change (Andreou, 2020). According to Eco-Schools (2022a), the programme had a long-lasting effect on the lives of the participants. Specifically speaking,

it improved their comprehension of sustainability, fostered sustainability attitudes, and cultivated behavioural changes toward SD. The three main outcomes, as mentioned earlier, constituted the building blocks for sustainability consciousness.

2.3.2 Previous research on Eco-Schools programme

As the main setting of this thesis, the Eco-Schools programme has been investigated in an increasing amount of literature. These studies mainly focused on the programme's impact on students in terms of knowledge, attitudes, behaviours and other outcomes (Cincera et al., 2019). Based on the research design, these studies can be categorized into two groups.

The first set of research usually compared between Eco-Schools and non-Eco-Schools via different survey instruments. For example, Boeve-de Pauw and Van Petegem (2011, 2013) used the Children's Environmental Attitudes and Knowledge Scale (CHEAKS) and the Two-dimensional Model of Ecological values (2-MEV) to survey 1287 students from 59 schools in Belgium. Multivariate multilevel regression analyses showed that Eco-Schools only reported moderate differences in students' environmental knowledge and no difference in environmental behaviour. Likewise, in Slovenia, by using a self-developed questionnaire, the researchers indicated that a significant difference between Eco-Schools students and non-Eco-Schools students was only found in environmental knowledge, not in awareness and behaviour (Krnel & Naglič, 2009).

In contrast, Özsoy et al. (2012) conducted a study via Environmental Literacy Questionnaire (ELQ) among Turkish elementary school students, and their findings revealed that the effectiveness of the Eco-Schools programme was embodied in all aspects of environmental literacy, namely environmental knowledge, attitudes, uses and concerns. In a recent study in Indonesia, Middle School Environmental Literacy Survey (MSELS) was applied to evaluate high school students' environmental literacy (Nurwidodo et al., 2020). As the results indicated, compared to non-Eco-Schools students, Eco-Schools students had considerably superior outcomes in terms of knowledge, behaviour, and cognitive skills. However, surprisingly, their environmental affective scores were much lower than those of non-Eco-Schools students. Another research group in Indonesia investigated the same problem using a sample of 1568 students from nine senior high schools, but they combined the interview, observation, and

survey questionnaire and conducted a more comprehensive analysis (Astuti & Aminatun, 2020). Their findings suggested that Eco-Schools students exhibited a significantly greater level of environmental knowledge, attitude, and behaviour than their peers from non-Eco-Schools.

In the second group of studies, research was generally carried out within the Eco-Schools context. The earliest research can date back to the study of Pirrie et al. (2006), who assessed how the Eco-Schools initiative had effectively increased students' environmental awareness and shaped their behaviours in Scotland. By collecting survey data from 655 registered Eco-Schools and interviewing students, teachers, and parents, they highlighted the programme's favourable impact on students' environmental behaviour as well as the value of responsible citizenship. Furthermore, they identified the role of opinion leaders as critical to the programme's implementation.

After the study of Boeve-de Pauw and Van Petegem (2011, 2013), the same research group continued to explore the performance of the Eco-Schools programme with different research questions (Boeve-de Pauw & Van Petegem, 2018). This time, they conducted surveys among 2152 students and 1374 teachers in 101 elementary and secondary schools. They found that as the schools proceeded in the programme, students' environmental outcomes in terms of knowledge and values also changed. This aligned with the research of Goldman et al. (2018), who selected 403 pupils in Grade Six from eight Israeli schools representing four different stages of Eco-schools. The findings indicated a significant relationship between students' environmental literacy and the length of the programme implementation.

Overall, all the studies so far seem to suggest that participating in the Eco-Schools programme may bring about some differences. Even though the differences varied a lot across different countries, what they had in common was that they all focused on the impacts from the environmental perspective but neglected the holistic nature of SD. Based on the fact that Eco-Schools has transformed from Environmental Education into ESD (Eco-Schools, 2022b), our evaluation of its performance should also be updated from a more comprehensive view, integrating the social and economic impacts. That is why the programme needs to be further explored.

3 Methodology

This study employed a quantitative approach to investigate the research questions. Different from the qualitative research method, quantitative research operates with numerable data from a large sample size, and it transforms abstract constructs into measurable scales to provide more reliable results (Martella et al., 2013a). In addition, because data is collected via a standardised questionnaire, this research method makes it possible for researchers to compare the outcomes from various groups in an objective manner (Mat Roni et al., 2020). The sampling, questionnaire, data collection, data analysis, research validity and reliability, together with the ethical issues are described in detail in this chapter.

3.1 Participants

To investigate the research questions, the sampling consisted of students from schools participating in the Eco-Schools programme (denoted as ECO group of students) and comparable schools not in the programme (denoted as ORD group of students). The target students were from the last year of primary school (Grade Six) in Finland, allowing for a long enough exposure to the programme. Some criteria in school selection included: public day schools, mixed genders, instruction in Finnish, and being located in Helsinki. With the help of officers from FEE Finland, six Eco-Schools were identified, all of which had been in the programme for more than three years and had a systematic implementation of the Eco-Schools programme; therefore, they can be considered representatives of Eco-Schools. The schools were first approached by the researcher via email in August 2022, and three of them agreed to join the study. The selection of ordinary schools was to match the Eco-Schools concerning the school's nature, language instruction, and location, so as not to bias the comparisons. By exploring information on the schools' websites and consulting with one of the supervisors who have lived in Helsinki for many years, the researcher finally identified 38 ordinary schools. Finally, two ordinary schools agreed to participate. Unfortunately, one of them withdrew from the research mid-way, and a substitute school located in the central part of Finland was replaced. The substitute school met all the school selection criteria except for the location. As a result, the sample consisted of three Eco-Schools and two ordinary schools.

Based on the intended sample size of each school (approximately 50), principals of all the participating schools reported that all sixth graders (ranging from 42 to 74) in their schools were recruited to the study, so there was no screening of class students. However, not many parents gave their consent permitting their children to participate in this research. Overall, 104 students from the five schools responded to the questionnaire. Two cases with all the items marked as "I don't know" were excluded from further analysis since they represented a low statistical power (Leiner, 2019). As a result, 102 cases were left in the dataset for data analysis. The sample comprised 49 (48%) Eco-School students and 53 (52%) ordinary school students. All the students were in Grade 6, and their ages ranged from 11 to 13 years (M=12.0, SD=0.33). Altogether, 43.2% of students were female (N=41), 52.9% were male (N=54), and 6.9% preferred not to tell their gender (N=7). Table 1 illustrates the demographics of the participants.

Table 1. Demographics of survey participants.

School	Number of students	Gender		
		Male	Female	Not known
ECO total	**49**	**21**	**24**	**4**
ECO1	12	5	6	1
ECO2	14	4	10	0
ECO3	23	12	8	3
ORD total	**53**	**33**	**17**	**3**
ORD1	37	23	13	1
ORD2	16	10	4	2
Total	**102**	**54**	**41**	**7**

3.2 Survey instrument

According to Robson (2002), it is preferable to use a verified tool instead of creating a new one from scratch. After evaluating several survey instruments, the researcher decided to use the SCQ to investigate the research questions. This instrument was developed by a Swedish research group to examine the performance of ESD in Swedish schools (Olsson et al., 2016). It has then been tested empirically in

the context of Taiwan (Olsson et al., 2019), mainland China (Chen et al., 2022), Spain (Ariza et al., 2021), Belgium (Ariza et al., 2021) and Indonesia (Astuti & Aminatun, 2020). The SCQ was operationalized under the definition of sustainability consciousness, and its topic domains covered 15 subthemes (Figure 3) except the rural development recommended by UNESCO in 2006, which enabled the assessment of individuals' ESD learning outcomes (Gericke et al., 2019). By integrating the SD dimensions of the environment, society, and economy into three constructs of knowingness, attitudes, and behaviours, the SCQ generated nine subfactors as depicted in Figure 2 (Gericke et al., 2019). According to Gericke et al. (2019), the SCQ instrument can be employed to assess the concept of sustainability consciousness as a whole, as well as to investigate sustainability knowingness, sustainability attitudes, and sustainability behaviours separately. At the same time, it was possible to explore knowingness, attitudes, and behaviours pertaining to environmental sustainability, social sustainability, and economic sustainability specifically. The current study focused on sustainability knowingness, sustainability attitudes, and sustainability behaviours, rather than on the environmental, social, and economic dimensions. Recently, a short version of 27 items was crafted, and it demonstrated adequate validity and reliability (Gericke et al., 2019). Considering the age of the participants, the researcher chose to use the short version since answering fewer questions can increase the respondents' concentration in the survey (Gericke et al., 2019).

The questionnaire was first translated from English into Finnish by a native Finnish master's degree student in Educational Science from the University of Eastern Finland (UEF). To ensure the correct translation, it was back translated into English by DeepL Translate. After that, the questionnaire was checked for context appropriateness and content validity by an official from FEE Finland and a professional in ESD at UEF. In September 2022, a pilot test was conducted among a group of eight students in Grade Six from a school similar to the sampling schools in the Eastern part of Finland. The pilot test was followed by a group discussion where some abstract concepts and improper items were identified. According to the suggestions of the class teacher, language was simplified to improve comprehensibility. For example, item 2, "Preserving the variety of living creatures is necessary for sustainable development (preserving biological diversity)" was changed into "The conservation of many plant and animal species is essential for sustainable development". Besides, three items concerning sustainable consumption were removed to better suit students' practicalities.

The final version of the questionnaire (see Appendix 1) encompassed 28 items. The first 24 items centred around sustainability consciousness by using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Specifically, sustainability knowingness covered nine items, and each item included a choice of "I don't know" in addition to the five-point Likert scale. Sustainability attitudes included nine items, and sustainability behaviours covered six items. In addition, on the last page of the questionnaire, demographic information like name, gender, age, and school was also collected (items 25 to 28).

3.3 Data collection and data preparation

3.3.1 Data collection

The data collection process took place from October 2022 to January 2023. In the first step, the researcher met with the principals or the responsible teachers separately from the participating schools in Zoom meetings, where the research background, objectives, and details about data collection were communicated and discussed. Based on sample size requirements, schools participating in the study expressed that all sixth graders in their schools would be invited to the study; therefore, no student screening was needed. Thereafter, the researcher sent out the survey link generated by a professional online survey platform, "Webropol" by email. All the questions in the survey were marked as "mandatory", and only when students answered every single of them could they submit the questionnaire. As a result, the final data contained no system-missing values.

On the data collection day, the researcher participated online. To ensure the consistency of information delivered to different schools, the researcher first read the introduction to the study, and the student's rights in English, and then the class teachers helped translate it into Finnish. For the classes the researcher was not available on the day, teachers played an introduction video recorded by the researcher beforehand (see Appendix 2). The data collection process took about four months, and it was carried out in compliance with the ethical standards and legal requirements of both Europe and Finland, which will be elaborated on in section 3.6.

3.3.2 Data preparation

The researcher entered the data into SPSS Statistics (version 27) and coded the variables. Details about variable coding are shown in Table 2. Values for item No.10, "I think that using more natural resources than we need does not threaten the health and well-being of people in the future", were reversed due to negative wording to correspond to the rest of the items (Pallant, 2016). Two responses that had all the questions in sustainability knowingness circled as "I don't know" were discarded as "invalid" answers (Leiner, 2019).

Table 2. Variable coding.

Variable Name	Variable Coding	Variable Details
Age	N/A	Metric variable
Gender	1=girl, 2=boy	Independent nominal variable
	999=I prefer not to tell	
School profile	1=Eco schools, 0=Ordinary schools	Independent nominal variable

Even though there were no system-missing values because of the questionnaire's setup, user-missing values were defined by the researcher. For example, responses like "I don't know" under the scale of sustainability knowingness (items 1 to 9) were signified as missing observations and were coded as "999". The percentage of missing data for the nine items in sustainability knowingness ranged from 2.9% to 24.5% (see Table 3). Although missing data were frequently encountered in survey-based studies in education (Cheema, 2014), much of the literature underlined the importance of managing missing data properly, as incorrect treatments may result in misleading conclusions (Cheema, 2014; Graham, 2009; Young et al., 2011). For this reason, this study considered missing data cautiously.

Before choosing methods to deal with missing data, the researcher checked if the data were missing completely at random (MCAR). Little's MCAR test indicated that the missing was completely random (Chi-Square = 288.350, DF = 286, Sig. = .450). According to Tabachnick (2014), if missing values occurred at random and the number was small, deleting the cases is a good solution to tackle the situation. In this study, however, deleting the cases was not appropriate. As Wilkinson & the Task Force on Statistical Inference (1999) pointed out, discarding the entire case simply due to one or more missing

values in a few items rendered all data collection efforts in vain, and it may largely reduce the statistical power for a small sample size. Thereby, the researcher decided to use the Multiple Imputation method to replace the missing data.

Multiple Imputation, as an advanced imputation method, was preferable in handling large missing data (Cheema, 2014; Howell, 2007). By modelling the natural variations of the data and repeatedly imputing them, it produced more reliable and relatively unbiased parameter estimates when compared with other imputation methods (Cheema, 2014; Rubin, 1987; Young et al., 2011). On this account, Multiple Imputation was suitable to replace the missing data across all the variables under sustainability knowingness.

Table 3. Missing data distribution.

Item No.	N	Missing Count	Per cent
K1	77	25	24.5
K2	99	3	2.90
K3	83	19	18.6
K4	79	23	22.5
K5	91	11	10.8
K6	97	5	4.90
K7	89	13	12.7
K8	78	24	23.5
K9	88	14	13.7

3.4 Data analysis

IBM SPSS (version 27) and Jamovi statistical software were used to analyse the data, and a p-value of .05 was set as the cut-off for statistical significance. Although SCQ had been validated in several other countries, since it was used for the first time in the Finnish context, Confirmatory Factor Analysis (CFA) was performed to examine how well the model fits the data (Bandalos, 1996). According to Levine (2005), when conducting a CFA, researchers must have an established hypothesis about the underlying factor structure. In this study, sustainability knowingness, sustainability attitudes, and

sustainability behaviours had been identified, hence, it was unnecessary to explore the latent factors as that was what Exploratory Factor Analysis (EFA) aimed to do (Matsunaga, 2010). Unfortunately, the CFA result showed a poor model fit (CFI=.709; SRMR=.097; RMSEA=.078). According to Hu & Bentler (1998), an excellent model fit should have a CFI value close to .95 or higher, an SRMR value of .08 or lower, and an RMSEA value of .06 or lower. However, Sun (2005) suggested that in most cases, a CFI value of .90 was also acceptable.

One of the explanations for the poor model fit in this study may be that when the questionnaire was translated into Finnish, some items were not measuring what it was intended to measure. Consequently, the researcher evaluated the items and deleted those with poor factor loadings. As Matsunaga (2010) noted, a factor loading of .40 had been widely recognized as the minimum acceptable value. Thus, six items with factor loadings below that level were eliminated. Besides, the remaining items were re-examined to determine whether they made theoretical sense and should be kept (Bornstein, 1996). In the end, 15 items were retained in the dataset, and their factor loadings, together with means and standard deviations, were illustrated in Table 4. The reconstructed model was then tested by performing another round of CFA (using the maximum likelihood method), and it indicated an appropriate model fit (CFI=.907; SRMR=.079; RMSEA=.060) for subsequent analysis.

Table 4. Factor loadings, means, and standard deviation for the 15 items used in the analysis.

Dimensions and items	Factor loading	M	SD
Sustainability knowingness (SK)			
SK2. The conservation of many plant and animal species is essential for sustainable development.	0.458	4.30	0.830
SK4. A culture where conflicts are resolved peacefully through discussion is necessary for sustainable development.	0.493	3.77	1.062
SK5. Respecting human rights is necessary for sustainable development.	0.460	4.01	1.051
SK6. To achieve sustainable development, all the people in the world must have access to good education.	0.536	4.37	1.014
SK7. Sustainable development requires that companies act responsibly towards their employees, customers, and suppliers.	0.641	3.91	1.035
SK8. Sustainable development requires a fair distribution of goods and services among people in the world.	0.642	3.67	1.066

Dimensions and items	Factor loading	M	SD
Sustainability attitudes (SA)			
SA3. I think that it is important to take measures against problems which have to do with climate change.	0.539	4.20	0.955
SA4. I think that everyone ought to be given the opportunity to acquire the knowledge, values and skills that are necessary to live sustainably.	0.694	4.21	0.948
SA5. I think that we who are living now should make sure that people in the future enjoy the same quality of life as we do today.	0.554	4.09	0.976
SA6. I think that women and men throughout the world must be given the same opportunities for education and employment.	0.478	4.59	0.848
SA9. I think that companies in rich countries should give employees in poor nations the same conditions as in rich countries.	0.530	4.05	1.093
Sustainability behaviours (SB)			
SB1. I recycle as much as I can.	0.673	3.78	1.021
SB2. I always separate food waste before putting out the rubbish when I have the chance.	0.782	3.60	1.171
SB3. I have changed my personal lifestyle in order to reduce waste (e.g., throwing away less food or not wasting materials).	0.827	3.42	1.238
SB6. I do things which help poor people.	0.718	3.04	1.080

After that, the coefficient of internal consistency was reviewed by calculating Cronbach's α. As a general rule, Cronbach's α value of .70 or above was defined as desirable reliability (Field, 2018; Martella et al., 2013c). Overall, when treated as a one-factor structure, Cronbach's α for sustainability consciousness was at .815, demonstrating good reliability by the rule of thumb. Since sustainability consciousness was interpreted as a combination of sustainability knowingness, sustainability attitudes and sustainability behaviours, Cronbach's α for each scale were also computed, with the value of .706, .713, and .761 respectively. Details regarding the reliability of the scale are presented in Table 5.

Table 5. Reliability results of sustainability consciousness and its subconstructs.

Construct	Whole sample	ECO group	ORD group	No. of items
SC	.815	.836	.765	15

Construct	Whole sample	ECO group	ORD group	No. of items
SK	.706	.768	.599	6
SA	.713	.730	.687	5
SB	.761	.700	.768	4

Note: SC=sustainability consciousness; SK=sustainability knowingness; SA=sustainability attitudes; SB=sustainability behaviours.

The following analytical process involved descriptive statistics analysis and inferential statistical analysis. In a strict sense, mathematical functions like calculating means for ordinal data are inappropriate. However, for most educators in social science, interpreting rank order numbers like cardinals had the benefit of making it possible to conduct statistical tests (Michalos et al., 2015; Sullivan & Artino, 2013). In this sense, the overall score of sustainability consciousness, as well as the score of sustainability knowingness, sustainability attitudes, and sustainability behaviours, were obtained by computing means for the scale items. In addition, the percentage of favourable responses (including "Strongly Agree" and "Agree") for each item was also presented in the descriptive analysis.

In inferential statistics analysis, normality was checked first to identify whether to use a parametric test or a non-parametric test (Field, 2018). According to Field (2018), the former was employed when the tested variable had a normal distribution, whereas the latter was used in the case of non-normal distribution. Given the results detected by Shapiro-Wilk tests (Table 6), the group differences in sustainability consciousness were examined using the parametric t-test, whereas a nonparametric test Mann-Whitney U was employed to investigate group differences in sustainability knowingness, sustainability attitudes, and sustainability behaviours. A Mann-Whitney U test, which was equivalent to the parametric independent t-test, looked for differences between the medians of two independent variables rather than the means, as t-tests did (Field, 2018). By ranking the scores on the variable, it explored whether there were significant differences between the two groups. Although some researchers argued that non-parametric tests might have less statistical power than their counterparts in parametric tests, it was true only if the sampling data were normally distributed (Field, 2018). Therefore, an independent t-test was appropriate for assessing the variable of sustainability consciousness within two groups, and a Mann-Whitney U test was suitable for analyzing the variables of sustainability knowingness, sustainability attitudes, and sustainability behaviours.

Table 6. Shapiro-Wilk test of Normality results.

Construct	Group	Statistic	df	Sig.
SC	ECO group	.974	49	.349
	ORD group	.970	53	.203
SK	ECO group	.935	49	.010
	ORD group	.959	53	.068
SA	ECO group	.884	49	<.001
	ORD group	.932	53	.005
SB	ECO group	.966	49	.169
	ORD group	.945	53	.017

Note: SC=sustainability consciousness; SK=sustainability knowingness; SA=sustainability attitudes; SB=sustainability behaviours.

To identify the relationship between sustainability knowingness, sustainability attitudes, and sustainability behaviours, Spearman's correlation test and regression analyses were performed one after another. Spearman's correlation test is a non-parametric test that works by ranking data and can be used to detect the correlations between two variables (Spearman, 1910). Before conducting regression analysis, assumptions such as linearity, homoscedasticity, and normality of residuals were checked. A simple linear regression analysis was run to examine if one variable predicted another, and a multiple regression analysis was performed to see if sustainability knowingness and sustainability attitudes together predicted sustainability behaviours (Field, 2018). The results are presented in section 4.2.

3.5   Validity and reliability

3.5.1   Validity

In quantitative research, validity mainly addresses the issue of whether a measurement device is suitable to assess the precise construct under study (Martella et al., 2013c). External validity discusses the generalizability of the results, and internal validity involves content validity, construct validity, and criterion validity.

Although this study only involved a small sample, it was carefully conducted to increase external validity. First, all the participants were voluntarily recruited and free to withdraw at any stage of the research. Second, the survey was carried out in the respondents' native language during break time in class, which happened naturally in a comfortable way. Third, before data collection, there was always a class teacher who translated the researcher's briefing about the research purpose and students' rights into clear Finnish.

Regarding internal validity, several measures were taken to develop credibility. Procedures to ensure content validity like questionnaire translation and check for comprehensibility were described in section 3.2. As Tytler (2014) stated, construct validity is a crucial concern when employing an instrument that contains attitudinal components. In this study, the construct validity was verified by CFA, which was an analytic method to evaluate whether the findings corresponded with the anticipated structure of the target construct, and thus determined whether the measures were effective in measuring what they were designed to (Matsunaga, 2010). By conducting several rounds of CFA, the researcher identified items with poor loading ($<.40$) and deleted them one by one until a good model fit was obtained. The whole process was explained in detail in section 3.4.

3.5.2 Reliability

In quantitative research, reliability refers to the consistency of the results across different observations (Martella et al., 2013c). There are three most commonly used ways to assess the reliability of measurement instruments, including the coefficient of stability, the coefficient of equivalence, and the coefficient of internal consistency (Ponterotto & Ruckdeschel, 2007).

Based on the research design for this study, evaluating the coefficient of internal consistency was appropriate. A popular method used to check internal consistency was calculating Cronbach's alpha, which indicated desirable reliability if the value was .70 or above (Martella et al., 2013c). Sometimes, lower values can also be accepted even though they may affect the confidence level in the findings. Overall, when treated as a one-factor structure, Cronbach's alpha for sustainability consciousness was at .836 for the ECO group, and at .765 for the ORD group, demonstrating excellent reliability by the rule of thumb. Since sustainability consciousness was interpreted as a combination of sustainability

knowingness, sustainability attitudes, and sustainability behaviours, Cronbach's alpha for each scale was also computed for both groups. Details regarding the reliability of the scale are presented in Table 5.

3.6   Ethical issues

This study followed the ethical instructions of the European Union's General Data Protection Regulation (GDPR) and the Finnish National Board on Research Integrity (TENK, 2019) for ethical principles of research. The research permit (Appendix 3) was issued by the Education Division in the city of Helsinki on October 4th, 2022, and the permit for supplementary samples (Appendix 4) arrived on October 27th, 2022. The two research permits guaranteed that the study complied with Finnish national ethical guidelines and regulations. Regarding the substitute school in the central part of Finland, permission was obtained from the school principal and the local civil board on December 13th, 2022.

Since the respondents were below the age of 18, consent from parents/guardians was required before data collection. Notice was sent out by the school principals on Wilma (a Finnish educational institution's administration platform). After that, consent forms (Appendix 5), together with participant information sheets (Appendix 6) were printed out and brought by students to their homes for written signatures. The participant information sheets outlined the research purposes, procedures, assurance of confidentiality, voluntary participation, and further contact information, making sure everyone was notified about the implementation and progress of the research. According to the schools' principals, the collected consent forms were kept securely in their schools' archives and would be destroyed through shredding after three years.

Additionally, on the data collection day, consent forms were explained verbally to remind students that withdrawing from the survey at any time would not have any adverse effect (Creswell, 2018). Thereafter, the data were stored in the researcher's laptop behind a password, as well as in a local drive which was for personal use only. The information system was protected by the normal technical protection methods used by the UEF. Furthermore, all information collected was handled confidently, and individual participants were not identified in the research findings.

4 Results

4.1 Differences in sustainability consciousness between the ECO group and the ORD group

4.1.1 Descriptive analysis results

In response to the first research question, "Are there any differences in students' sustainability know-ingness, sustainability attitudes, and sustainability behaviours between Eco-schools and ordinary schools?", descriptive statistics are presented first. Table 7 shows the means, medians, and standard deviation based on the raw data with a focus on sustainability consciousness and its three subconstructs. As is presented, the mean values of both groups were all higher than the middle point (3) of the Likert scale, and the mean values for the ECO group were higher than the means for the ORD group across all the dependent variables. The largest difference between the two groups was found in sustainability behaviours with a gap of 0.5, which was a substantial difference on a 5-point scale. Comparing the means scores of the three subconstructs, sustainability knowingness and sustainability attitudes displayed relatively higher values than sustainability behaviours, regardless of whether the samples were treated as a whole or separately.

Table 7. Means, medians, and standard deviations describing sustainability consciousness and its three subconstructs.

	SC	SK	SA	SB	N
Whole sample					102
Mean	3.93	4.01	4.23	3.46	
Median	3.93	4.00	4.40	3.50	
SD	0.544	0.644	0.660	0.863	
ECO group					49
Mean	4.08	4.10	4.32	3.72	
Median	4.07	4.17	4.40	3.75	
SD	0.566	0.717	0.658	0.784	

	SC	SK	SA	SB	N
ORD group					53
Mean	3.80	3.92	4.14	3.22	
Median	3.87	3.83	4.40	3.25	
SD	0.493	0.560	0.655	0.867	

Note: SC=sustainability consciousness; SK=sustainability knowingness; SA=sustainability attitudes; SB=sustainability behaviours.

To supplement the findings of the first research question, descriptive statistics of individual items across the two groups are provided in Table 8. In addition to means and standard deviation, the overall proportions of favourable responses ("Strongly Agree" and "Agree") are also presented. Of all the 15 items, item SA6 "I think that women and men throughout the world must be given the same opportunities for education and employment" had the highest mean value, and correspondingly, received the highest percentage of favourable responses (89.8% for the ECO group; 86.8% for the ORD group). By contrast, item SB6 "I do things which help poor people" displayed the lowest mean values, and only 32.7% of the ECO group and 20.8% of the ORD group strongly agreed or agreed with the statement. For all the items, students from the ECO group assigned higher mean values than their counterparts in the ORD group, except item SK7 "Sustainable development requires that companies act responsibly towards their employees, customers, and suppliers". Although the ECO group's mean score was only 0.02 lower than that of the ORD group, its standard deviation was almost 24% higher than that of the ORD group. If we turned to the percentage of favourable responses, 59.2% of the students in the ECO group chose the positive options while in the ORD group, the percentage was 71.7%. In general, both groups obtained higher scores for items in sustainability attitudes (means between 3.94 and 4.65) and sustainability knowingness (means between 3.53 and 4.47), while they marked lower values in sustainability behaviours (means between 2.75 and 4.02).

Table 8. Descriptive statistics of individual items for the ECO group and the ORD group

	ECO group (N=49)			**ORD group** (N=53)		
Item	Mean	SD	Strongly agree and Agree (%)	Mean	SD	Strongly agree and Agree (%)

	ECO group (N=49)			ORD group (N=53)		
Item	Mean	SD	Strongly agree and Agree (%)	Mean	SD	Strongly agree and Agree (%)
SK2 (Env)	4.39	0.862	79.6	4.23	0.800	81.1
SK4 (Soc)	3.90	1.195	69.4	3.66	0.919	58.5
SK5 (Soc)	4.15	1.043	71.4	3.87	1.052	58.5
SK6 (Soc)	4.47	0.960	87.8	4.28	1.063	83.0
SK7 (Eco)	3.90	1.177	59.2	3.92	0.895	71.7
SK8 (Eco)	3.82	1.054	59.2	3.53	1.067	50.9
SA3 (Env)	4.24	0.969	75.5	4.15	0.949	75.5
SA4 (Soc)	4.31	0.871	81.6	4.11	1.013	71.7
SA5 (Soc)	4.24	0.947	73.5	3.94	0.989	67.9
SA6 (Soc)	4.65	0.830	89.8	4.53	0.868	86.8
SA9 (Eco)	4.16	1.106	69.4	3.94	1.082	69.8
SB1 (Env)	4.02	0.854	73.5	3.57	1.118	54.7
SB2 (Env)	3.88	1.148	63.3	3.34	1.143	47.2
SB3 (Env)	3.65	1.200	59.2	3.21	1.246	43.4
SB6 (Eco)	3.35	1.091	32.7	2.75	0.998	20.8

Note: SK= sustainability knowingness; SA= sustainability attitudes; SB=sustainability behaviours; Env=Environment; Soc=Society; Eco=Economy.

4.1.2   Independent *t*-test and Mann-Whitney U test results

As mentioned in section 3.4, an independent *t*-test was used for assessing the difference in sustainability consciousness between the two groups, and the effect size was reported by Cohen's d. Regarding sustainability knowingness, sustainability attitudes, and sustainability behaviours, a Mann-Whitney U test was applied to investigate the group difference (see the results in Table 9). Since SPSS didn't calculate an effect size, the author computed the effect size "r" manually by dividing the z score by the root square of N (Field, 2018; Rosenthal, 1991). The hypotheses testing results are listed below.

H1. Eco-Schools students report higher sustainability consciousness than their peers in ordinary schools (ACCEPTED).

In terms of sustainability consciousness, Levene's test assumed an equal variance between the groups (F=.99, p=.32), and the independent sample t-test showed that the ECO group (M=4.08, SD=0.57) reported higher sustainability consciousness than the ORD group (M=3.80, SD=0.49); t (100) =2.60, p=.001, and the effect size was moderate (d=.53). Therefore, the hypothesis H1 was accepted.

H1a. Eco-Schools students report higher sustainability knowingness than their peers in ordinary schools (REJECTED).

Sustainability knowingness in the ECO group (Mdn=4.17) did not differ significantly from the ORD group (Mdn=3.83, U=1540, p=.11), and the effect size was trivial (r=.16). Thus, hypothesis H1a was rejected.

H1b. Eco-Schools students report higher sustainability attitudes than their peers in ordinary schools (REJECTED).

There was no significant difference in sustainability attitudes between the ECO group (Mdn=4.40) and the ORD group (Mdn=4.40, U=1534, p=.11), and the effect size was small at .16. Accordingly, hypothesis H1b was rejected.

H1c. Eco-Schools students report higher sustainability behaviours than their peers in ordinary schools (ACCEPTED).

Mann-Whitney U test showed that the ECO group's sustainability behaviours (Mdn=3.75) were higher compared to the ORD group's sustainability behaviours (Mdn=3.25, U=1698, p=.007). But the effect size was moderate (r=.27), indicating the difference was not large.

Table 9. Mann-Whitney U test results for differences in sustainability knowingness, sustainability attitudes, and sustainability behaviours between the ECO group and the ORD group.

	SK	SA	SB
Mann-Whitney U	1540	1534	1698
Standard Error	149	148	149
Standardized Test Statistic (z score)	1.62	1.59	2.69
Asymptotic Sig. (2-sided test)	.11	.11	.007
Effect size estimate	.16	.16	.27

Note: SK= sustainability knowingness; SA= sustainability attitudes; SB=sustainability behaviours; SC= sustainability consciousness

Figure 6 visualizes the differences in sustainability consciousness and its three subconstructs between the two groups. It is obvious to see that the box plots for the ECO group were all higher than the equivalent plots for the ORD group, suggesting higher values in the ECO group across all the dependent variables. Despite this, the box plots of the ORD group in sustainability knowingness and sustainability behaviours were comparatively shorter than those of the ECO group, indicating a higher level of agreement from the ORD group within the two dimensions. Additionally, while the medians in sustainability attitudes for the two groups were at the same level, the distributions of views were quite different.
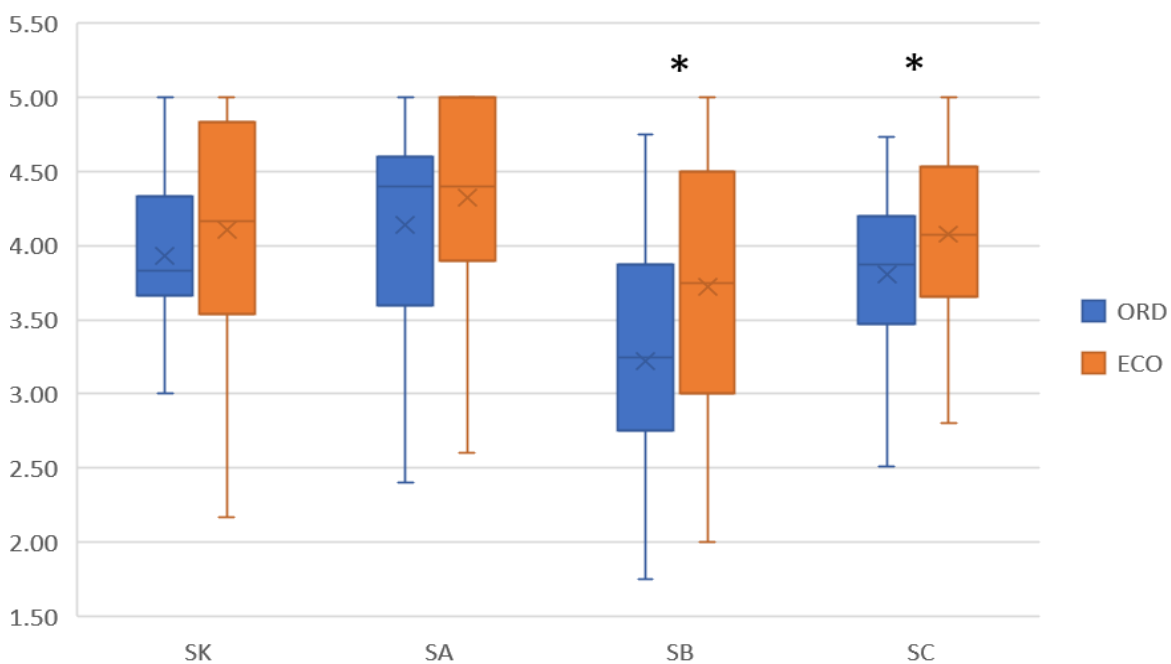
Figure 6. A box plot illustrates the differences in sustainability consciousness and its three dimensions between the ECO group and the ORD group. (*p<.05)

Note: SK= sustainability knowingness; SA= sustainability attitudes; SB=sustainability behaviours; SC= sustainability consciousness

4.2 Relationship between sustainability knowingness, sustainability attitudes, and sustainability behaviours

4.2.1 Spearman's correlation results

To answer the second research question, "What are the relationships between sustainability knowingness, sustainability attitudes, and sustainability behaviours?", Spearman's correlation coefficients were computed as the first step for the entire group. According to Field (2018), correlation coefficients between ±.10 represent a small effect, ±.30 is a medium effect, and ±.50 indicates a large effect. Table 10 summarizes the results of Spearman's correlation analyses using the data from 102 respondents. It revealed that all three factors were positively associated with each other, where sustainability knowingness and sustainability attitudes had a relatively stronger association (r_s =.538, p<.001) compared to the association between sustainability attitudes and sustainability behaviours (r_s=.427, p<.001). Although sustainability knowingness and sustainability behaviours were positively connected, their correlation was found weak and insignificant (r_s =.177, p=.075).

To identify whether consistent results can be obtained when the samples were dealt with separately, Spearman's correlation analysis was also run individually for each group (Table 10). Similarly, the highest association was found between sustainability knowingness and sustainability attitudes for both groups (rs =.548, p<.001 for the ECO group; rs =.515, p<.001 for the ORD group), while the lowest association existed between sustainability knowingness and sustainability behaviours (rs =.335, p=.018 for the ECO group; rs =-.055, p=.693 for the ORD group). To our surprise, for the ORD group, sustainability knowingness and sustainability behaviours were correlated negatively, which demonstrated that as students' sustainability knowingness increased, their sustainability behaviours may decrease slightly. Another finding was that the correlations between the three factors for the ECO group were all higher than the correlations in the ORD group.

Table 10. Spearman's correlation coefficients between factors of sustainability knowingness, sustainability attitudes, and sustainability behaviours.

		SK	SA	SB
Whole sample (N=102)				
SK	Correlation Coefficient	1.000	.538**	.177
	Sig. (2-tailed)		<.001	.075
SA	Correlation Coefficient	.538**	1.000	.427**
	Sig. (2-tailed)	<.001		<.001
SB	Correlation Coefficient	.177	.427**	1.000
	Sig. (2-tailed)	.075	<.001	
ECO group (N=49)				
SK	Correlation Coefficient	1.000	.548**	.335*
	Sig. (2-tailed)		<.001	.018
SA	Correlation Coefficient	.548**	1.000	.512**
	Sig. (2-tailed)	<.001		<.001
SB	Correlation Coefficient	.335*	.512**	1.000
	Sig. (2-tailed)	.018	<.001	
ORD group (N=53)				
SK	Correlation Coefficient	1.000	.515**	-.055
	Sig. (2-tailed)		<.001	.693
SA	Correlation Coefficient	.515**	1.000	.345*
	Sig. (2-tailed)	<.001		.011
SB	Correlation Coefficient	-.055	.345*	1.000
	Sig. (2-tailed)	.693	.011	

Note: **. correlation is significant at the .01 level (2-tailed); *. correlation is significant at the .05 level (two-tailed). SK= sustainability knowingness; SA= sustainability attitudes; SB=sustainability behaviours; SC= sustainability consciousness

4.2.2   Regression analysis results

As Field (2018) denoted, correlations by themselves did not indicate a causal relationship between the two variables. To further examine the relationships between the three factors and test our hypotheses, regression analyses were carried out in the second stage. Probability plot of residues confirmed that the residuals were normally distributed. Although the variable data were non-normally distributed as noted previously, regression analysis is robust to violation of the normality assumption. Thus, the results were reliable.

A simple linear regression was used to test hypotheses H2a, H2b, and H2c, as it investigated the predicted relationship between one independent variable (predictor variable) and one dependent variable (outcome variable) (Field, 2018). Figure 7 presents the scatter plots for the simple linear regression analyses. For hypothesis H2d, a multiple regression was applied, as it allowed researchers to examine the relationships among two or more predictor variables and one outcome variable (Field, 2018). The hypotheses testing results are listed below.

H2a. Sustainability knowingness is a positive predictor of sustainability attitudes (ACCEPTED).

In the analysis, variable sustainability knowingness entered the equation first to estimate how much of the variance of sustainability attitudes could be explained. A significant regression equation was found ($F_{(1,100)}=37.1$, $R^2=.271$, $p<.001$), which indicated that sustainability knowingness explained 27.1% of the variance of sustainability attitudes. Therefore, hypothesis H2a was accepted.

H2b. A sustainability attitude is a positive predictor of sustainability behaviours (ACCEPTED).

Regarding the relationship between sustainability attitudes and sustainability behaviours, a similar significant regression equation was found ($F_{(1,100)}=27.4$, $R^2=.216$, $p<.001$), and sustainability attitudes explained 21.6% of the variance of sustainability behaviours. Hence, hypothesis H2b was accepted.

H2c. Sustainability knowingness is a positive predictor of sustainability behaviours (REJECTED).

However, when checking if sustainability knowingness predicted sustainability behaviours, no significant regression equation was found (F (1,100) =3.625, R^2=.035, p=.060), leaving about 96.5% of the variation in sustainability behaviours unexplained. As a result, hypothesis H2c was rejected.
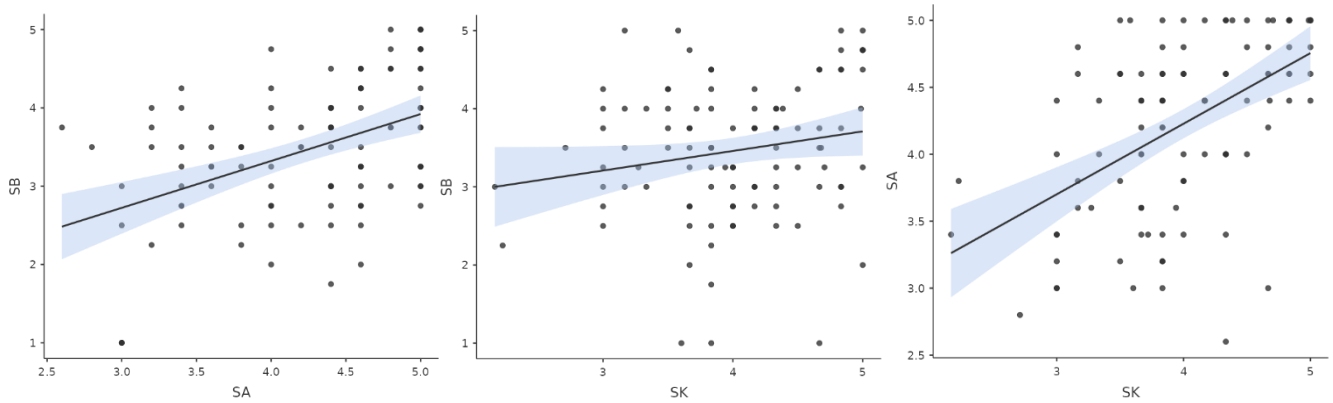

Figure 7. Scatter plots illustrate the relationship between sustainability knowingness (SK), sustainability attitudes (SA), and sustainability behaviours (SB).

Note: vertical axis stands for outcome variables, and the horizontal axis stands for predictor variables.

H2d. Sustainability attitudes impact sustainability behaviours more than sustainability knowingness (ACCEPTED).

Multiple regression results showed that sustainability knowingness and sustainability attitudes, as a combined model, predicted sustainability behaviours. This model explained 22.0% of the variance in sustainability behaviours (F (2,99) =13.93, R^2=.220, $p<$ .001). According to the analysis, sustainability attitudes (β=.503, $p<$.001) was a significant predictor of sustainability behaviours, and for every unit increase in sustainability attitudes, there will be a .503 unit increase in sustainability behaviours. On the contrary, sustainability knowingness (β=-.075, p=.474) was not a significant predictor and was negatively associated with sustainability behaviours. Thus, the impact of sustainability attitudes was greater than that of sustainability knowingness, and hypothesis H2d was accepted.

5 Discussion

5.1 Results interpretations

The main objective of the research was to explore the differences in sustainability consciousness among sixth graders between Eco-Schools and ordinary schools in Finland. Currently, little is known about ESD implementation in Finnish primary schools. Given the validity and reliability (discussed in section 3.5) of our data, this research provides valuable information to the Eco-Schools literature as well as the ESD study in Finnish basic education.

Our result interpretations were discussed in response to the two research questions: (1) Are there any differences in students' sustainability knowingness, sustainability attitudes, and sustainability behaviours between Eco-schools and ordinary schools? (2) What are the relationships between sustainability knowingness, sustainability attitudes, and sustainability behaviours? In addition, we also discussed a few of the items in the questionnaire that were pertinent to the research questions.

5.1.1 Differences in sustainability consciousness and its dimensions between the ECO group and the ORD group

The current study found that there were significant differences in students' sustainability consciousness between the ECO group and the ORD group, where Eco-Schools students reported higher values than their peers in ordinary schools. The result confirms our hypothesis H1. In the review of the literature, this finding is consistent with that of Olsson et al. (2016), who reported higher values in sustainability consciousness among sixth graders when comparing the ESD-profile schools and ordinary schools in Sweden. However, it is contrary to that of Olsson et al. (2019), who conducted the research in the context of Taiwan, and their study revealed that participating in ESD-certified schools didn't make a significant impact on students' sustainability consciousness. One possible explanation for our finding might be that Finland shared similar cultural and educational background to Sweden, but not to Taiwan. As Berglund et al. (2020) expressed in their cross-cultural comparative study, cultural value orientations should be one of the factors influencing the difference in students' sustainability consciousness.

Regarding the three subconstructs, however, students' differences were only reported as significant for sustainability behaviours, not for sustainability attitudes or sustainability knowingness, indicating that Eco-Schools students had stronger sustainability behaviours. This finding is at odds with earlier research that found that the Eco-Schools' impact was only on knowledge, but not on attitudes or behaviour (e.g., Boeve-de Pauw & Van Petegem, 2018; Boeve-de Pauw & Van Petegem, 2011; Krnel & Naglič, 2009). As the programme developed, however, most recent research found different, reporting its significant impact on behaviours, as well as other outcomes like knowledge and belief (e.g., Gan et al., 2019; Nurwidodo et al., 2020). Our findings partially confirm the results from these recent studies and support the claim from Eco-Schools that the programme's greatest achievement is in learners' behavioural changes (Eco-Schools, 2022b). The reason for the lack of differences in sustainability knowingness and sustainability attitudes may be attributed to the emphasis on SD in the Finnish national curriculum.

Several reasons may explain the differences discussed above. For example, Saloranta (2017) conducted a doctoral study in Finnish comprehensive schools and pointed out that ESD programmes' success largely depended on a sustainable school culture, which was believed to bring about students' behavioural changes. This corresponded with Higgs and McMillan (2006), who discovered that school culture played a key role in modelling students' sustainability behaviours. Further, school culture was embedded in the school's missions, environment, and activities. As Eco-Schools (2022a) described, the programme was ideal for creating a sustainable school culture by guiding schools to promote social and environmental justice. In light of this, it may be a possible explanation for our result, but it needs further research to investigate it deeply. In Saloranta (2017)'s study, another aspect that may contribute to the effectiveness of ESD programmes was the dedication of school administrators. Many studies have supported this argument by underscoring the importance of school leaders and administrators in Environmental Education (e.g., Fazio & Karrow, 2013; Mogren & Gericke, 2017). Since the Eco-Schools programme required schools' registration, it is possible that the school leaders who applied to participate in the programme themselves had a high commitment to ESD and would therefore be more likely to support the programme.

Another explanation for the significant difference in sustainability behaviours could be that students in Eco-schools experienced different teaching methods from students in ordinary schools. In a study by Cincera et al. (2019), researchers concentrated on the implementation schemes of the Eco-Schools programme in the Czech Republic and recognized that an emancipatory approach had a positive impact on students. According to Wals et al. (2008), one of the key features of the emancipatory strategy is involving students in making decisions and implementing a participatory approach. As Jensen and Schnack (1997) pointed out, encouraging students to make decisions through participatory learning was effective in promoting students' environmental engagement and action competence. This also corresponded with the study of Uitto et al. (2015), who used a representative sample of Finnish adolescents and revealed that participatory school experiences enhanced environmental behaviours. Based on Eco-Schools' Seven Steps Framework (see section 2.3.1), students' decision-making and participation were emphasized in almost every step. Students led an Eco-committee, through which they organized meetings, identified the problems they wanted to investigate, made action plans, and evaluated their own work. Accordingly, students' involvement in decision-making was also included in the Finnish "Green Flag" school accreditation criteria. For example, whether the activities were student-driven, whether the students made up two-thirds of the Eco-committee, etc.

These possible explanations above, including a sustainable culture, the commitment of school leaders, and students' involvement in decision-making, were all aspects of the whole-school approach (Eames et al., 2009), which had been advocated as an effective strategy for implementing ESD into practice (UNESCO, 2014a). Since Eco-Schools' Seven Steps Framework operationalized the notion of a whole-school approach, it seemingly could explain the students' differences in sustainability consciousness and sustainability behaviours between the two groups.

If we turn to the descriptive analysis results, we can see that in general, both groups assigned the highest scores in sustainability attitudes and the lowest scores for sustainability behaviours. The same results can also be found in the study by Marcos-Merino et al. (2020), who conducted an analysis of sustainability knowingness, sustainability attitudes, and sustainability behaviours among a group of Spanish pre-service primary teachers using the same instrument of SCQ. Boeve-de Pauw et al. (2014) proposed a possible explanation for the higher attitudes in the scale, suggesting that the statements related to sustainability attitudes may be quite simple to agree with, and therefore may cause a ceiling

effect. As a result, it is important to take the possible bias in these responses into account. Another notable finding was that the means for item SA6 "I think that women and men throughout the world must be given the same opportunities for education and employment" and SA4 "I think that everyone ought to be given the opportunity to acquire the knowledge, values and skills that are necessary to live sustainably" ranked top two among all the items in sustainability attitudes. The two items were concerned with equality, indicating a recognized value of equality among the participating students. The results were not surprising, as in the 2014 Finnish National Core Curriculum, "humanity, education, equality and democracy" was one of the four headlines defining the basic values (as cited in Wolff et al., 2017). For Berglund et al. (2020), the values of egalitarianism advocated in Western countries may lead to high means for some items in the scale.

While analysing the scale of sustainability behaviours, item SB6 "I do things which help poor people" not only displayed the widest discrepancy between the two groups but also the lowest mean values for both groups. Compared with other items related to recycling and separating food waste, SB6 was not closer to students' daily life, and probably students didn't know how to help poor people, or there were no appropriate ways for them to help poor people. For Diekmann and Preisendörfer (1992), individuals intended to choose the behaviours that demanded the least cost in terms of money, time, and effort. In this regard, our results may be partly explained, as "helping poor people" seemed to require more cost. Throughout the sustainability behaviours scale, however, it was important to note that three of the four items examined pro-environmental behaviours, and due to the narrow focus, sustainability behaviours may be overgeneralized. Thus, the data should be interpreted with caution.

Concerning the items across sustainability knowingness, item SK6 "To achieve sustainable development, all the people in the world must have access to good education" obtained the highest scores for both groups. This finding can be similarly explained by a headline named "All pupils are unique and have a right to a good education" in the 2014 Finnish National Core Curriculum (as cited in Wolff et al., 2017). Meanwhile, it was also noteworthy that both groups assigned the lowest scores for item SK8 "Sustainable development requires a fair distribution of goods and services among people in the world", which belonged to the economic domain of SD. Likewise, other economic items like SK7 and SB6 received equally poor scores, which may indicate a weak consciousness in the economic dimension of SD. These findings are aligned with the research of (Michalos et al., 2015), who investigated

sustainability knowledge, sustainability attitudes, and sustainability behaviours among tenth graders in Canada, and revealed that students' knowledge of economic sustainability was weaker than that of social and environmental dimensions of SD and, therefore may suggest a gap between the three aspects. Since this study dealt with the three dimensions of SD as an integral whole, students' consciousness related to the environment, society, and the economy would need additional studies to present in detail in the future.

5.1.2 Relationship between sustainability knowingness, sustainability attitudes, and sustainability behaviours

Correlation analysis suggested positive correlations between the three subconstructs of sustainability consciousness when the sample was treated as a whole. These associations corroborate previous work in the field of ESD (e.g., Chen et al., 2022; Michalos et al., 2012), which implies that sustainability consciousness is a synergy of sustainability knowingness, sustainability attitudes, and sustainability behaviours. The ORD group, on the other hand, reported a negative correlation between sustainability knowingness and sustainability behaviours, which is perhaps the most unexpected result of this study. One possible explanation might be that the sustainability behaviours scale in this study primarily investigated the low-impact behaviours, which contributed little to Green House Gas reduction when compared with high-impact behaviours such as having a plant-based diet and reducing flight travel (Wynes & Nicholas, 2017). If students in the ORD group had high-level knowledge of the behavioural impact, they might realize that the items in sustainability behaviours were insignificant to make a difference and therefore, were less likely to take action. Since the sustainability knowingness scale used in this study was not to examine the knowledge about behavioural impact, more specific studies are needed to verify this explanation in the future.

Simple regression analysis indicated that sustainability knowingness was a significant variable in predicting sustainability attitudes, and sustainability attitudes was a significant variable in predicting sustainability behaviours, while sustainability knowingness was not a significant predictor of sustainability behaviours. That is to say, Finnish sixth graders who ranked sustainability attitudes higher were likely those who reported better sustainability knowingness, though those who claimed higher sustainability knowingness were not necessarily those who showed stronger sustainability behaviours. Regarding

the relationship between sustainability knowingness and sustainability attitudes, contesting results were observed in previous studies. For example, Marcos-Merino et al. (2020), who used the same survey instrument of the SCQ, observed that sustainability knowingness was a significant indicator of sustainability attitudes. Whereas, in a longitudinal study by Yavetz et al. (2009), a limited contribution of knowledge to attitudes was reported. For the relationship between sustainability attitudes and sustainability behaviours, our results agree with a majority of previous works both in and beyond the field of ESD. For example, Johnson and Činčera (2015) published their study by investigating two groups of students in the United States and the Czech Republic, highlighting the importance of environmental attitudes in promoting behavioural changes. Likewise, another study which was conducted using a sample of Indian consumers revealed that clients were more likely to buy environmentally friendly products when they had greater environmental attitudes (Malik & Singhal, 2017).

Our findings about the relationship between sustainability knowingness and sustainability behaviours are in contrast with the result of Fang et al. (2018), who reported that environmental knowledge had a significant impact on environmental behaviour intentions by administrating surveys among Chinese and Taiwanese university students. Despite this, our study acknowledged the role of knowledge in changing behaviours in another way. The ecological behaviour model put forth by Fietkau and Kessel (1981) provided strong support for our findings, as it demonstrated that knowledge did not directly impact behaviour, but through the mediating role of attitudes, knowledge indirectly made an impact on behaviours. Meanwhile, our result is also consistent with the study by Liu et al. (2020), who detected the same chain relationship between environmental knowledge, attitudes, and behaviour. In their study, they concluded that it was through environmental attitudes and behaviour intentions that knowledge influenced behaviours.

When we examined the statistics from multiple regression analysis, our results indicated that compared with accumulating sustainability knowingness, changing sustainability attitudes was more important for making an impact on sustainability behaviours. However, neither sustainability knowingness nor sustainability attitudes alone can fully explain the whole picture of sustainability behaviours. Behaviours are too contextually complicated and influenced by a large variety of factors, making them challenging to achieve (Wals, 2011). Our findings may gain support from the theory of planned behaviour (Ajzen, 1991), according to which, behaviours were determined by behaviour intentions, which

were influenced by attitudes, subjective norms, and perceived behaviour control. Only when the three variables were all favourable that behavioural changes could be possible. Besides these internal factors, Kollmuss and Agyeman (2002) also identified some external factors, like economic conditions, infrastructure, and social and political norms, which may influence individuals' behaviour change. For example, in a study by Tucker and Izadpanahi (2017), the researchers discovered that primary students who studied at schools with sustainable designs such as solar panels, gardens, and recycling systems reported more pro-environmental behaviours.

From the perspective of psychology, several psychological barriers may impede behavioural choices toward sustainability, such as limited awareness of the issues and comparison with other people (Gifford, 2011). Chen et al. (2022) used the word "ignorance" to explain the limited awareness, which was interpreted either as "not knowing a problem exists" or "not knowing what to do" (p.15). If we looked at Table 3, which illustrated the missing values in the scale of sustainability knowingness, "ignorance" may be one of the reasons to explain those "I don't know" responses. On the contrary, Pihkala (2017) provided another explanation for the mismatch between attitudes and behaviours, noting that instead of being ignorant, people may care too much and, thus, experience anxiety, despair, and hopelessness, which prevented them from acting in a pro-environmental way. Given that these emotions were not reflected in our survey instrument, their claim would require additional research to be verified in the future.

Above all, the relationships detected between sustainability knowingness, sustainability attitudes, and sustainability behaviours agree with most of the educational studies, and the aforementioned factors may presumably provide some thoughts for us to interpret our results.

5.2 Implications

This study responded to UNESCO's call for regular evaluation of the ESD programmes and dissemination of good practices (UNESCO, 2020, 2022a). It moved from the narrow environmental aspect to the sustainable aspect, taking the holistic nature of ESD into account. Employing the SCQ instrument has not only provided an overall picture of the participating students' sustainability consciousness but also

evidence that the converted instrument can be validated in the context of Finland, expanding the instrument's applications.

Our results may create a link between the Eco-Schools programme and students' sustainability consciousness, and investing in the Eco-Schools programme pays off in raising students' sustainability consciousness, particularly in the behavioural domain. This empirical finding may increase the Eco-Schools programme's recognition and strengthen its cooperation with international organizations like the UN and UNESCO. From a local perspective, it might serve to better promote the programme in Finland. One of the intriguing questions that emerged from this finding related specifically to what Eco-Schools have done differently. In a study by Gough et al. (2020), the authors highlighted the crucial role of the whole-school approach employed in the programme. As was discussed, sustainable school culture, the commitment of school leaders, and participatory decision-making were all key elements of the whole-school approach (Eames et al., 2009); therefore, it is recommended that the ongoing ESD programmes systematically adopt this approach.

Although this study found a significant difference in students' sustainability behaviours between the two groups, it obtained the lowest scores compared with sustainability knowingness and sustainability attitudes, indicating the difficulty of inducing behavioural changes. Based on the finding that a sustainability attitude was one of the significant predictors of sustainability behaviours, more emphasis should be placed on attitudes, or in a broader sense, on the affective domain. According to the study of Sanchez-Martin et al. (2018), the teaching approach was the most influential factor for affective change in science learning. Compared with a traditional methodology like oral knowledge transmission, hands-on activities or gamification were more likely to elicit affective responses. In a study by Marcos-Merino et al. (2020), the researchers identified a variety of innovative teaching methods that may result in sustainability attitudes such as field trips, inquiry-based learning, phenomenon-based learning, case study, participatory learning, blended learning and so on. In the latest ESD studies, art and aesthetic education were indicated as effective in shaping one's awareness when integrated into SD visions (e.g., Acevedo et al., 2022; Lehtonen, A. et al., 2019; Turan & Cetinkaya, 2022). Specific areas included music (Guo et al., 2020), dancing (Grindheim & Grindheim, 2021), drama (Lehtonen et al., 2020), and museums (Hansson & Öhman, 2022).

These approaches and pedagogies may provide insights to both the Eco-Schools programme developers and educators in Finland. Furthermore, it is important to acknowledge that education should not be the only way to address sustainability challenges. Based on the theory of planned behaviour (Ajzen, 1991, 2019) and the model of Kollmuss and Agyeman (2002), some institutional factors like sustainability infrastructure, economic incentives, and social norms were worth the attention of policy-makers in Finland.

5.3 Limitations and recommendations for future research

The current study has several limitations and understanding them is necessary for readers to evaluate the results critically. To begin with, two limitations concerned the sample. First, neither Eco-Schools nor ordinary schools were randomly selected; thus, it failed to represent the general population concerned in this study. Second, a sample size of 102 for a quantitative study was relatively small so it might be difficult to produce strong conclusions. Further, the gender distribution between the two groups was extremely divergent, with the ECO group having a higher number of girls. However, due to the small sample size, it was difficult to control for gender. Consequently, caution must be applied when attempting to conclude that the differences detected in this study were caused by the factor of school. Future research can increase the sample size, and control for gender to test whether the results still hold.

The third limitation of this study was the questionnaire. Many factors that may influence the study's results like parents' education level, family background, and students' school performance were not included in the questionnaire. The future instrument can be improved to take these variables into account. Besides, to obtain acceptable CFA results, the items of the original questionnaire were heavily reduced for analysis. For instance, the sustainability behaviours scale only had four items left, three of which fell under the environmental category and the other one under the economic category. In this sense, our instrument may not be as comprehensive as expected, as several themes related to SD were left out. As a result, our findings may be overly generalized to some extent. In addition, students' sustainability consciousness level was assessed by self-report, and they might have responded based on social desirability rather than truthfulness (White & Raitzer, 2017). One of the ways to increase the credibility of this research is to use a triangulation strategy to collect data from various sources such

as documents, interviews, and observations (Martella et al., 2013b). Triangulation will largely reduce the research bias associated with a single method and is therefore recommended if time permits.

The fourth limitation was the language barrier. As a non-native speaker of Finnish, the researcher had to rely on translators or interpreters to help communicate. Furthermore, several key documents, like the national curriculum, were translated or based on second-hand information, which could have affected the interpretation. The language barrier also prevented the researcher from locating any Finnish-language literature, resulting in most of the references and citations being made in other contexts. In the future, the researcher could consider inviting native speakers to collaborate on the study.

According to the research objectives, the present study is mainly to identify students' differences in sustainability consciousness between Eco-Schools and ordinary schools and describe these differences. It is not clear how we explain these differences; therefore, there is abundant room for further progress in identifying them. Meanwhile, it raises a series of follow-up questions like how the Eco-Schools programme is implemented in practice, and how teachers and students perceive the Eco-Schools programme, both of which are critical yet heavily under-researched issues. Furthermore, it would be a valuable topic to validate our final model in a representative context and among different age groups. If time allows, a large-scale longitudinal study would be desirable in studying the topic thoroughly.

References

Acevedo, B., Malevicius, R., Fadli, H., & Lamberti, C. (2022). Aesthetics and education for sustainability. *Culture and Organization*, *28*(3–4), 263–278. https://doi.org/10.1080/14759551.2022.2028147

Agbedahin, A. V. (2019). Sustainable development, Education for Sustainable Development, and the 2030 Agenda for Sustainable Development: Emergence, efficacy, eminence, and future. *Sustainable Development*, *27*(4), 669–680. https://doi.org/10.1002/sd.1931

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I. (2001). Nature and Operation of Attitudes. *Annual Review of Psychology*, *52*, 27–58. https://doi.org/10.1146/annurev.psych.52.1.27

Ajzen, I. (2019). *Theory of Planned Behavior Diagram*. https://people.umass.edu/aizen/tpb.diag.html#null-link

Andreou, N. (2020). Towards a Generation of Sustainability Leaders: Eco-Schools as a Global Green Schools Movement for Transformative Education. In A. Gough, J. C.-K. Lee, & E. P. K. Tsang (Eds.), *Green Schools Globally: Stories of Impact on Education for Sustainable Development* (pp. 31–45). Springer International Publishing. https://doi.org/10.1007/978-3-030-46820-0_3

Ariza, M. R., Boeve-de Pauw, J., Olsson, D., Van Petegem, P., Parra, G., & Gericke, N. (2021). Promoting Environmental Citizenship in Education: The Potential of the Sustainability Consciousness Questionnaire to Measure Impact of Interventions. *Sustainability*, *13*(20), Article 20. https://doi.org/10.3390/su132011420

Astuti, D., & Aminatun, T. (2020). Student's environmental literacy based on Adiwiyata and non-Adi-wiyata at senior high school in Sleman, Yogyakarta. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *6*(3). https://doi.org/10.22219/jpbi.v6i3.13629

Bandalos, B. (1996). Confirmatory Factor Analysis. In J. Stevens (Ed.), *Applied multivariate statistics for the social sciences* (3rd ed., pp. 389–420). Lawrence Erlbaum Assosiates.

Barton, by H. (2000). Conflicting Perceptions of Neighbourhood. In *Sustainable Communities*. Routledge.

Berglund, T., Gericke, N., & Chang Rundgren, S.-N. (2014). The Implementation of Education for Sustainable Development in Sweden: Investigating the Sustainability Consciousness Among Upper Secondary Students. *Research in Science & Technological Education*, *32*(3), 318–339. https://doi.org/10.1080/02635143.2014.944493

Berglund, T., Link to external site, this link will open in a new window, Niklas, G., Jelle, B. P., Olsson, D., & Tzu-Chau, C. (2020). A cross-cultural comparative study of sustainability consciousness between students in Taiwan and Sweden. *Environment, Development and Sustainability*, *22*(7), 6287–6313. https://doi.org/10.1007/s10668-019-00478-2

Boeve-de Pauw, J., Jacobs, K., & Van Petegem, P. (2014). Gender Differences in Environmental Values: An Issue of Measurement? *Environment and Behavior*, *46*(3), 373–397. https://doi.org/10.1177/0013916512460761

Boeve-de Pauw, J., & Van Petegem, P. (2011). The Effect of Flemish Eco-Schools on Student Environmental Knowledge, Attitudes, and Affect. *International Journal of Science Education*, *33*(11), 1513–1538. https://doi.org/10.1080/09500693.2010.540725

Boeve-de Pauw, J., & Van Petegem, P. (2018). Eco-school evaluation beyond labels: The impact of environmental policy, didactics and nature at school on student outcomes. *Environmental Education Research*, *24*(9), 1250–1267. https://doi.org/10.1080/13504622.2017.1307327

Boeve-de Pauw & Van Petegem. (2013). The effect of eco-schools on children's environmental values and behaviour. *Journal of Biological Education*, *47*(2), 96–103. https://doi.org/10.1080/00219266.2013.764342

Bornstein, R. F. (1996). Face validity in psychological assessment: Implications for a unified model of validity. *American Psychologist*, *51*, 983–984. https://doi.org/10.1037/0003-066X.51.9.983

Cairney, P. (2013). Standing on the Shoulders of Giants: How Do We Combine the Insights of Multiple Theories in Public Policy Studies? *Policy Studies Journal*, *41*(1), 1–21. https://doi.org/10.1111/psj.12000

Carmi, N., Arnon, S., & Orion, N. (2015). Transforming Environmental Knowledge Into Behavior: The Mediating Role of Environmental Emotions. *The Journal of Environmental Education*, *46*(3), 183–201. https://doi.org/10.1080/00958964.2015.1028517

Cheema, J. R. (2014). A Review of Missing Data Handling Methods in Education Research. *Review of Educational Research*, *84*(4), 487–508. https://doi.org/10.3102/0034654314532697

Chen, C., An, Q., Zheng, L., & Guan, C. (2022). Sustainability Literacy: Assessment of Knowingness, Attitude and Behavior Regarding Sustainable Development among Students in China. *Sustainability*, *14*(9), Article 9. https://doi.org/10.3390/su14094886

Cincera, J., Boeve-de Pauw, J., Goldman, D., & Simonova, P. (2019). Emancipatory or instrumental? Students' and teachers' perceptions of the implementation of the EcoSchool program. *Environmental Education Research*, *25*(7), 1083–1104. https://doi.org/10.1080/13504622.2018.1506911

Creswell, J. W. (2018). *Research design: Qualitative, quantitative & mixed methods approaches* (5th edition., International student edition.). SAGE.

Diekmann, A., & Preisendörfer, P. (1992). Persönliches Umweltverhalten: Diskrepanzen zwischen Anspruch und Wirklichkeit. *Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, *44*, 226–251.

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes* (pp. xxii, 794). Harcourt Brace Jovanovich College Publishers.

Eames, C., Barker, M., Wilson-Hill, F., & Law, B. (2009). Investigating the relationship between whole-school approaches to education for sustainability and student learning. A summary. *Teaching and Learning Research Initiative*. http://test.tlri.org.nz/sites/default/files/projects/9245_summaryreport.pdf

Eco-Schools. (2022a). *About Eco-Schools*. Eco Schools. https://www.ecoschools.global/how-does-it-work

Eco-Schools. (2022b). *Eco Schools*. Eco Schools. https://www.ecoschools.global

Eco-Schools. (2022c). *Our History*. Eco Schools. https://www.ecoschools.global/our-history

Eco-Schools. (2022d). *Seven Steps*. Eco Schools. https://www.ecoschools.global/seven-steps-methodology

Fang, W.-T., Lien, C.-Y., Huang, Y.-W., Han, G., Shyu, G.-S., Chou, J.-Y., & Ng, E. (2018). Environmental Literacy on Ecotourism: A Study on Student Knowledge, Attitude, and Behavioral Intentions in China and Taiwan. *Sustainability*, *10*(6), Article 6. https://doi.org/10.3390/su10061886

Fazio, X., & Karrow, D. D. (2013). Negotiating the constraints of schools: Environmental education practices within a school district. *Environmental Education Research*, *19*(5), 639–655. https://doi.org/10.1080/13504622.2012.729812

FEE Finland. (2022a). *Eco-Schools in Finland*. Vihreä lippu. https://vihrealippu.fi/en/

FEE Finland. (2022b). *Finland Eco-Schools*. Foundation for Environmental Education.

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th edition.). SAGE.

Fietkau, H.-J., & Kessel, H. (1981). *Umweltlernen: Veränderungsmöglichkeiten des Umweltbewusstseins: Modelle, Erfahrungen*. Hain. http://www.dandelon.com/isearch/intelligentSEARCH_CLASSICS.nsf/alldocs/C1257680005BA28 4C1256DB00030F8BF/$File/000000066642.PDF?OpenElement

Finnish National Board of Education. (2004). *National core curriculum for basic education 2004*. Helsinki: Finnish National Board of Education.

Finnish National Board of Education. (2016). *National core curriculum for basic education 2014*. Helsinki: Finnish National Board of Education.

Flamm, B. (2009). The impacts of environmental knowledge and attitudes on vehicle ownership and use. *Transportation Research Part D: Transport and Environment*, *14*(4), 272–279. https://doi.org/10.1016/j.trd.2009.02.003

Gan, D., Gal, A., Könczey, R., & Varga, A. (2019). Do eco-schools really help implementation of ESD?: A comparison between eco-school systems of Hungary and Israel. *Hungarian Educational Research Journal*, *9*(4), 628–653. https://doi.org/10.1556/063.9.2019.4.53

Gericke, N., Boeve-de Pauw, J., Berglund, T., & Olsson, D. (2019). The Sustainability Consciousness Questionnaire: The theoretical development and empirical validation of an evaluation instrument for stakeholders working with sustainable development. *Sustainable Development*, *27*(1), 35–49. https://doi.org/10.1002/sd.1859

Giddings, B., Hopwood, B., & O'Brien, G. (2002). Environment, economy and society: Fitting them together into sustainable development. *Sustainable Development*, *10*(4), 187–196. https://doi.org/10.1002/sd.199

Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *The American Psychologist*, *66*(4), 290–302. https://doi.org/10.1037/a0023566

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. *International Journal of Psychology*, *49*(3), 141–157. https://doi.org/10.1002/ijop.12034

Goldman, D., Ayalon, O., Baum, D., & Weiss, B. (2018). Influence of 'green school certification' on students' environmental literacy and adoption of sustainable practice by schools. *Journal of Cleaner Production*, *183*, 1300–1313. https://doi.org/10.1016/j.jclepro.2018.02.176

Gough, A., Lee, J. C.-K., & Tsang, E. P. K. (2020). Green School Movements: An Introduction. In A. Gough, J. C.-K. Lee, & E. P. K. Tsang (Eds.), *Green Schools Globally: Stories of Impact on Education for Sustainable Development* (pp. 1–9). Springer International Publishing. https://doi.org/10.1007/978-3-030-46820-0_1

Graham, J. W. (2009). Missing Data Analysis: Making It Work in the Real World. *Annual Review of Psychology*, *60*(1), 549–576. https://doi.org/10.1146/annurev.psych.58.110405.085530

Grant, L. K. (2010). Sustainability: From Excess to Aesthetics. *Behavior and Social Issues*, *19*, 5–45.

Grindheim, M., & Grindheim, L. T. (2021). Dancing as Moments of Belonging: A Phenomenological Study Exploring Dancing as a Relevant Activity for Social and Cultural Sustainability in Early Childhood Education. *Sustainability*, *13*(14), Article 14. https://doi.org/10.3390/su13148080

Guo, M., Su, H., & Yue, L. (2020). Ecology-focused aesthetic music education as a foundation of the sustainable development culture. *Interdisciplinary Science Reviews*, *45*(4), 564–580. https://doi.org/10.1080/03080188.2020.1820154

Hansson, P., & Öhman, J. (2022). Museum education and sustainable development: A public peda-

gogy. *European Educational Research Journal*, *21*(3), 469–483.

https://doi.org/10.1177/14749041211056443

Hector, P., & Kohtala, C. (2022). Experimenting with sustainability education: The case of a student-

driven campus initiative in Finland. *Local Environment*, *27*(12), 1415–1430.

https://doi.org/10.1080/13549839.2021.1891033

Higgs, A. L., & McMillan, V. M. (2006). Teaching Through Modeling: Four Schools' Experiences in Sus-

tainability Education. *The Journal of Environmental Education*, *38*(1), 39–53.

https://doi.org/10.3200/JOEE.38.1.39-53

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and Synthesis of Research on Respon-

sible Environmental Behavior: A Meta-Analysis. *The Journal of Environmental Education*, *18*(2),

1–8. https://doi.org/10.1080/00958964.1987.9943482

Hofman-Bergholm, M. (2018). Changes in Thoughts and Actions as Requirements for a Sustainable

Future: A Review of Recent Research on the Finnish Educational System and Sustainable Devel-

opment. *Journal of Teacher Education for Sustainability*, *20*(2), 19–30.

https://doi.org/10.2478/jtes-2018-0012

Holm, T., Sammalisto, K., Grindsted, T. S., & Vuorisalo, T. (2015). Process framework for identifying sus-

tainability aspects in university curricula and integrating education for sustainable develop-

ment. *Journal of Cleaner Production*, *106*, 164–174. https://doi.org/10.1016/j.jcle-

pro.2015.04.059

Howell, D. C. (2007). The treatment of missing data. In W. Outhwaite & S. Turner (Eds.), *The SAGE

Handbook of Social Science Methodology* (pp. 208–224). SAGE.

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparam-

eterized model misspecification. *Psychological Methods*, *3*, 424–453.

https://doi.org/10.1037/1082-989X.3.4.424

Jensen, B. B., & Schnack, K. (1997). The Action Competence Approach in Environmental Education. *En-

vironmental Education Research*, *3*(2), 163–178. https://doi.org/10.1080/1350462970030205

Johnson, B., & Činčera, J. (2015). Examining the Relationship between Environmental Attitudes and Be-

haviour in Education Programmes. *Sociální Studia / Social Studies*, *12*(3), Article 3.

https://doi.org/10.5817/SOC2015-3-97

Kalsoom, Q., & Khanam, A. (2017). Inquiry into sustainability issues by preservice teachers: A peda-

gogy to enhance sustainability consciousness. *Journal of Cleaner Production*, *164*, 1301–1311.

https://doi.org/10.1016/j.jclepro.2017.07.047

Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are

the barriers to pro-environmental behavior? *Environmental Education Research*, *8*(3), 239–260.

https://doi.org/10.1080/13504620220145401

Kopnina, H. (2014). Revisiting Education for Sustainable Development (ESD): Examining Anthropocen-

tric Bias Through the Transition of Environmental Education to ESD. *Sustainable Development*,

22(2), 73–83. https://doi.org/10.1002/sd.529

Krnel, D., & Naglič, S. (2009). *Environmental literacy comparison between eco-schools and ordinary

schools in Slovenia*. 20.

Lacy, P., Arnott, J., & Lowitt, E. (2009). The challenge of integrating sustainability into talent and organ-

ization strategies: Investing in the knowledge, skills and attitudes to achieve high performance.

Corporate Governance: The International Journal of Business in Society, *9*(4), 484–494.

https://doi.org/10.1108/14720700910985025

Lee, T. H., Jan, F.-H., & Huang, G. W. (2015). The influence of recreation experiences on environmentally responsible behavior: The case of Liuqiu Island, Taiwan. *Journal of Sustainable Tourism*, *23*(6), 947–967. https://doi.org/10.1080/09669582.2015.1024257

Lehtonen, A., Österlind, E., & Viirret, T. L. (2020). *Drama in Education for Sustainability: Becoming Connected through Embodiment*. https://doi.org/10.26209/IJEA21N19

Lehtonen, A., Salonen, A. O., & Cantell., H. (2019). Climate Change Education: A New Approach for a World of Wicked Problems. In Justin W. Cook (Ed.), *Sustainability, Human Well-Being, and the Future of Education*. Springer International Publishing. https://doi.org/10.1007/978-3-319-78580-6

Leiner, D. J. (2019). Too Fast, too Straight, too Weird: Non-Reactive Indicators for Meaningless Data in Internet Surveys. *Survey Research Methods*, *13*(3), Article 3. https://doi.org/10.18148/srm/2019.v13i3.7403

Levine, T. R. (2005). Confirmatory Factor Analysis and Scale Validation in Communication Research. *Communication Research Reports*, *22*(4), 335–338. https://doi.org/10.1080/00036810500317730

Liu, P., Teng, M., & Han, C. (2020). How does environmental knowledge translate into pro-environmental behaviors?: The mediating role of environmental attitudes and behavioral intentions. *Science of The Total Environment*, *728*, 138126. https://doi.org/10.1016/j.scitotenv.2020.138126

Loukola, M.-L., Isoaho, S., & Lindström, K. (2001). *Education for sustainable development in Finland* (p. 115). Ministry of Education.

Lozano, R., Merrill, M. Y., Sammalisto, K., Ceulemans, K., & Lozano, F. J. (2017). Connecting Competences and Pedagogical Approaches for Sustainable Development in Higher Education: A Literature Review and Framework Proposal. *Sustainability*, *9*(10), Article 10. https://doi.org/10.3390/su9101889

Malik, C., & Singhal, N. (2017). Consumer Environmental Attitude and Willingness to Purchase Environmentally Friendly Products: An SEM Approach. *Vision*, *21*(2), 152–161. https://doi.org/10.1177/0972262917700991

Marcos-Merino, J. M., Corbacho-Cuello, I., & Hernández-Barco, M. (2020). Analysis of Sustainability Knowingness, Attitudes and Behavior of a Spanish Pre-Service Primary Teachers Sample. *Sustainability*, *12*(18), Article 18. https://doi.org/10.3390/su12187445

Martella, R. C., Nelson, J. R., Morgan, R. L., Marchand-Martella, N. E., & Marchand-Martella, N. E. (2013a). Basic Statistical Concepts and Sampling Procedures. In *Understanding and Interpreting Educational Research* (pp. 99–134). Guilford Publications. http://ebookcentral.proquest.com/lib/uef-ebooks/detail.action?docID=1186793

Martella, R. C., Nelson, J. R., Morgan, R. L., Marchand-Martella, N. E., & Marchand-Martella, N. E. (2013b). Data collection and designs in qualitative research. In *Understanding and Interpreting Educational Research*. Guilford Publications. http://ebookcentral.proquest.com/lib/uef-ebooks/detail.action?docID=1186793

Martella, R. C., Nelson, J. R., Morgan, R. L., Marchand-Martella, N. E., & Marchand-Martella, N. E. (2013c). Reliability, Validity, and Interobserver Agreement. In *Understanding and Interpreting Educational Research* (pp. 69–96). Guilford Publications. http://ebookcentral.proquest.com/lib/uef-ebooks/detail.action?docID=1186793

Mat Roni, S., Merga, M. K., & Morris, J. E. (2020). Getting Started: What, Where, Why. In S. Mat Roni, M. K. Merga, & J. E. Morris (Eds.), *Conducting Quantitative Research in Education* (pp. 7–23). Springer. https://doi.org/10.1007/978-981-13-9132-3_2

Matsunaga, M. (2010). How to factor-analyze your data right: Do's, don'ts, and how-to's. *International Journal of Psychological Research*, *3*(1), 97–110. https://doi.org/10.21500/20112084.854

Michalos, A. C., Creech, H., Swayze, N., Maurine Kahlke, P., Buckler, C., & Rempel, K. (2012). Measuring Knowledge, Attitudes and Behaviours Concerning Sustainable Development among Tenth Grade Students in Manitoba. *Social Indicators Research*, *106*(2), 213–238. https://doi.org/10.1007/s11205-011-9809-6

Michalos, A. C., Kahlke, P. M., Rempel, K., Lounatvuori, A., Macdiarmid, A., Creech, H., & Buckler, C. (2015). Progress in Measuring Knowledge, Attitudes and Behaviours Concerning Sustainable Development Among Tenth Grade Students in Manitoba. *Social Indicators Research*, *123*(2), 303–336. https://doi.org/10.1007/s11205-014-0752-1

Ministry of Education. (2006). *Sustainable development in education; Implementation of Baltic 21E - programme and Finnish strategy for the Decade of Education for Sustainable Development (2005–2014)* (No. 2006–6). Ministry of Education.

Ministry of the Environment. (1992). *Implementation of agenda 21 in Finland*. Finnish National Commission.

Ministry of the Environment. (2007). *Saving nature for people. National strategy and action plan for the conservation and sustainable use of biodiversity in Finland 2006-2016*. Ministry of the Environment.

Mogren, A., & Gericke, N. (2017). ESD implementation at the school organisation level, part 2 – investigating the transformative perspective in school leaders' quality strategies at ESD schools. *Environmental Education Research*, *23*(7), 993–1014.

Murray, P., Goodhew, J., & Murray, S. (2014). The heart of ESD: Personally engaging learners with sustainability. *Environmental Education Research*, *20*(5), 718–734. https://doi.org/10.1080/13504622.2013.836623

Niemi, H., Toom, A., & Kallioniemi, A. (2012). *Miracle of Education: The Principles and Practices of Teaching and Learning in Finnish Schools*. BRILL. http://ebookcentral.proquest.com/lib/uef-ebooks/detail.action?docID=3034693

Nurwidodo, N., Amin, M., Ibrohim, I., & Sueb, S. (2020). The Role of Eco-School Program (Adiwiyata) towards Environmental Literacy of High School Students. *The Role of Eco-School Program (Adiwiyata) towards Environmental Literacy of High School Students*, *9*(3), 1089–1103.

Olsson, D., & Gericke, N. (2017). The effect of gender on students' sustainability consciousness: A nationwide Swedish study. *The Journal of Environmental Education*, *48*(5), 357–370. https://doi.org/10.1080/00958964.2017.1310083

Olsson, D., Gericke, N., Boeve-de Pauw, J., Berglund, T., & Chang, T. (2019). Green schools in Taiwan – Effects on student sustainability consciousness. *Global Environmental Change*, *54*, 184–194. https://doi.org/10.1016/j.gloenvcha.2018.11.011

Olsson, D., Gericke, N., & Chang Rundgren, S.-N. (2016). The effect of implementation of education for sustainable development in Swedish compulsory schools – assessing pupils' sustainability consciousness. *Environmental Education Research*, *22*(2), 176–202. https://doi.org/10.1080/13504622.2015.1005057

Ovais, D. (2023). Students' sustainability consciousness with the three dimensions of sustainability: Does the locus of control play a role? *Regional Sustainability*, *4*(1), 13–27. https://doi.org/10.1016/j.regsus.2023.02.002

Özsoy, S., Ertepinar, H., & Saglam, N. (2012). Can eco-schools improve elementary school students' environmental literacy levels? 1. *Asia - Pacific Forum on Science Learning and Teaching*, *13*(2), 1–25.

Páll, J., Ólafur, Bragi, G., Bergliot, Ø., Anne, & James, D., Robert. (2021). *Mapping Education for Sustain-ability in the Nordic Countries*. Nordic Council of Ministers.

Pallant, J. (2016). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (6th edi-tion.). Open University Press, McGraw-Hill Education.

Pauw, J. B., Gericke, N., Olsson, D., & Berglund, T. (2015). The Effectiveness of Education for Sustainable Development. *Sustainability*, *7*(11), 15693–15717. https://doi.org/10.3390/su71115693

Pihkala, P. (2017). Environmental education after sustainability: Hope in the midst of tragedy. *Global Discourse*, *7*(1), 109–127. https://doi.org/10.1080/23269995.2017.1300412

Pirrie, A., University of Glasgow, & Scottish Centre for Research in Education. (2006). *Evaluation of Eco Schools Scotland*. SCRE Centre. http://www.scre.ac.uk/resreport/pdf/124.pdf

Ponterotto, J. G., & Ruckdeschel, D. E. (2007). An overview of coefficient alpha and a reliability matrix for estimating adequacy of internal consistency coefficients with psychological research measures. *Perceptual and Motor Skills*, *105*(3 Pt 1), 997–1014. https://doi.org/10.2466/pms.105.3.997-1014

Robson, C. (2002). *Real World Research: A Resource for Social Scientists and PractitionerResearchers. (2nd edition)* (p. xxii+599-xxii+599).

Rosenthal, R. (1991). *Meta-Analytic Procedures for Social Research*. SAGE Publications, Inc. https://doi.org/10.4135/9781412984997

Rubin, D. D. (1987). *Multiple imputation for nonresponse in surveys*. John Wiley & Sons, Ltd. https://doi.org/10.1002/9780470316696.ch6

Salonen, A. O., & Konkka, J. (2015). An Ecosocial Approach to Well-Being: A Solution to the Wicked Problems in the Era of Anthropocene. *Foro de Educación*, *13*(19), 19–34. https://doi.org/10.14516/fde.2015.013.019.002

Saloranta, S. (2017). *Koulun toimintakulttuurin merkitys kestävän kehityksen kasvatuksen toteuttamis-essa perusopetuksen vuosiluokkien 1–6 kouluissa [The importance of a school's culture in imple-menting Education for Sustainable Development in Basic Education grades 1–6 Schools]* [Univer-sity of Helsinki]. https://helda.helsinki.fi/handle/10138/216724

Sánchez, M. J., & Lafuente, R. (2010). Definición y medición de la conciencia ambiental. *Revista Inter-nacional de Sociología*, *68*(3), Article 3. https://doi.org/10.3989/ris.2008.11.03

Sanchez-Martin, J., Cañada-Cañada, F., & Dávila-Acedo, M. A. (2018). Emotional responses to innova-tive Science teaching methods: Acquiring emotional data in a General Science teacher educa-tion class. *Journal of Technology and Science Education*, *8*(4), Article 4. https://doi.org/10.3926/jotse.408

Sandell, K., Öhman, J., & Östman, L. O. (2005). *Education for sustainable development: Nature, school and democracy*. Studentlitteratur. http://hdl.handle.net/1854/LU-8646440

Scott, R. (2013). Sustainable curriculum, sustainable university. *ECULTURE*, *2*(1). https://ro.ecu.edu.au/eculture/vol2/iss1/15

Sharma, K., & Bansal, M. (2013). Environmental consciousness, its antecedents and behavioural out-comes. *Journal of Indian Business Research*, *5*(3), 198–214. https://doi.org/10.1108/JIBR-10-2012-0080

Singer-Brodowski, M., Brock, A., Etzkorn, N., & Otte, I. (2019). Monitoring of education for sustainable development in Germany – insights from early childhood education, school and higher educa-tion. *Environmental Education Research*, *25*(4), 492–507. https://doi.org/10.1080/13504622.2018.1440380

Spearman, C. (1910). Correlation Calculated from Faulty Data. *British Journal of Psychology*, *3*(3), 271–295. https://doi.org/10.1111/j.2044-8295.1910.tb00206.x

Stables, A., & Scott, W. (2002). The Quest for Holism in Education for Sustainable Development. *Environmental Education Research*, *8*(1), 53–60. https://doi.org/10.1080/13504620120109655

Sullivan, G. M., & Artino, A. R. (2013). Analyzing and Interpreting Data From Likert-Type Scales. *Journal of Graduate Medical Education*, *5*(4), 541–542. https://doi.org/10.4300/JGME-5-4-18

Summers, M., & Childs, A. (2007). Student science teachers' conceptions of sustainable development: An empirical study of three postgraduate training cohorts. *Research in Science & Technological Education*, *25*(3), 307–327. https://doi.org/10.1080/02635140701535067

Sun, J. (2005). Assessing Goodness of Fit in Confirmatory Factor Analysis. *Measurement and Evaluation in Counseling and Development*, *37*(4), 240–256. https://doi.org/10.1080/07481756.2005.11909764

Suwarto, R. S., Sanjaya, Y., & Solihat, R. (2021). Implementation of education for sustainable development and pupils' sustainability consciousness in Adiwiyata School and ESD-based school. *Journal of Physics: Conference Series*, *1806*(1), 012153. https://doi.org/10.1088/1742-6596/1806/1/012153

Tabachnick, B. G., & Fidell, L. S. (2014). *Using multivariate statistics* (Sixth edition, Pearson new international edition.). Pearson.

Tolppanen, S., Claudelin, A., & Kang, J. (2021). Pre-service Teachers' Knowledge and Perceptions of the Impact of Mitigative Climate Actions and Their Willingness to Act. *Research in Science Education*, *51*(6), 1629–1649. https://doi.org/10.1007/s11165-020-09921-1

Tucker, R., & Izadpanahi, P. (2017). Live green, think green: Sustainable school architecture and children's environmental attitudes and behaviors. *Journal of Environmental Psychology*, *51*, 209–216. https://doi.org/10.1016/j.jenvp.2017.04.003

Turan, F. K., & Cetinkaya, S. (2022). The role of aesthetics and art in organizational sustainability: A conceptual model and exploratory study in higher education. *Sustainable Development*, *30*(1), 83–95. https://doi.org/10.1002/sd.2230

Tytler, R. (2014). Attitudes, Identity, and Aspirations toward Science. In N. G. Lederman & S. K. Abell (Eds.), *Handbook of Research on Science Education, Volume II* (pp. 82–103). Routledge.

Uitto, A., Boeve-de Pauw, J., & Saloranta, S. (2015). Participatory school experiences as facilitators for adolescents' ecological behavior. *Journal of Environmental Psychology*, *43*, 55–65. https://doi.org/10.1016/j.jenvp.2015.05.007

UNESCO. (2006). *Framework for the UN DESD international implementation scheme*. Paris: UNESCO.

UNESCO. (2012). *Education for sustainable development: Building a better, fairer world for the 21st century*. Paris: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000216673

UNESCO. (2014a). *Roadmap for implementing the Global Action Programme on Education for Sustainable Development*. Paris: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000230514

UNESCO. (2014b). *Shaping the Future We Want: UN Decade of Education for Sustainable Development (2005-2014): Final Report*. http://unesdoc.unesco.org/images/0023/002301/230171e.pdf

UNESCO. (2019). *Educational content up close: Examining the learning dimensions of Education for Sustainable Development and Global Citizenship Education*. https://unesdoc.unesco.org/ark:/48223/pf0000372327

UNESCO. (2020). *Education for sustainable development: A roadmap*. https://unesdoc.unesco.org/ark:/48223/pf0000374802

UNESCO. (2022a). *Berlin Declaration on Education for Sustainable Development; Learn for our planet: Act for sustainability*. UNESCO: Paris, France. https://unesdoc.unesco.org/ark:/48223/pf0000381228

UNESCO. (2022b). *Greening Education Partnership.* https://www.unesco.org/en/node/66713

United Nations. (1992). *Agenda21*. United Nations: New York.

Vandamme, E. (2009). *Concepts and challenges in the use of Knowledge-Attitude-Practice surveys: Literature review*. https://www.semanticscholar.org/paper/Concepts-and-challenges-in-the-use-of-surveys%3A-Vandamme/e33554a49ddc6facc637e5f768fcb1e474efc053

Velmans, M. (2009). How to Define Consciousness: And how Not to Define Consciousness. *Journal of Consciousness Studies*, *16*(5), 139–156.

Von Glasersfeld, E. (1990). An Exposition of Constructivism: Why Some Like It Radical. *Journal for Research in Mathematics Education.*, *4*, 19–210. https://doi.org/10.2307/749910

Wals, A. E. J. (2011). Learning Our Way to Sustainability. *Journal of Education for Sustainable Development*, *5*(2), 177–186. https://doi.org/10.1177/097340821100500208

Wals, A. E. J., Geerling-Eijff, F., Hubeek, F., van der Kroon, S., & Vader, J. (2008). All Mixed Up? Instrumental and Emancipatory Learning Toward a More Sustainable World: Considerations for EE Policymakers. *Applied Environmental Education & Communication*, *7*(3), 55–65. https://doi.org/10.1080/15330150802473027

White, H., & Raitzer, D. A. (2017). *Impact Evaluation of Development Interventions: A Practical Guide*. Asian Development Bank Institute. http://ebookcentral.proquest.com/lib/uef-ebooks/detail.action?docID=5455312

Wilkinson, L. & the Task Force on Statistical Inference. (1999). Statistical methods in psychology journals: Guidelines and explanations. *American Psychologist*, *54*, 594–604. https://doi.org/10.1037/0003-066X.54.8.594

Wolff, L.-A., Laherto, A., Cheah, S., Vivitsou, M., & Autio, M. (2022). Transformation toward sustainability in Finnish teacher education policy: Promises and shortcomings. *Frontiers in Education*, *7*, 856237. https://doi.org/10.3389/feduc.2022.856237

Wolff, L.-A., Sjöblom, P., Hofman-Bergholm, M., & Palmberg, I. (2017). High Performance Education Fails in Sustainability? —A Reflection on Finnish Primary Teacher Education. *Education Sciences*, *7*(1), Article 1. https://doi.org/10.3390/educsci7010032

World Commission on Environment and Development. (1987). *Our common future*. Oxford University Press, Oxford, GB. https://idl-bnc-idrc.dspacedirect.org/handle/10625/18365

Wynes, S., & Nicholas, K. A. (2017). The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environmental Research Letters*, *12*(7), 074024. https://doi.org/10.1088/1748-9326/aa7541

Yavetz, B., Goldman, D., & Pe'er, S. (2009). Environmental literacy of pre-service teachers in Israel: A comparison between students at the onset and end of their studies. *Environmental Education Research*, *15*(4), 393–415. https://doi.org/10.1080/13504620902928422

Young, W., Weckman, G., & Holland, W. (2011). A survey of methodologies for the treatment of missing values within datasets: Limitations and benefits. *Theoretical Issues in Ergonomics Science*, *12*(1), 15–43. https://doi.org/10.1080/14639220903470205

Appendices

Appendix 1: The original questionnaire in Finnish

Kyselylomake kestävästä kehityksestä, – 6. luokka

SMEER, CENTER OF
SCIENCE, MATHEMATICS
AND ENGINEERING
EDUCATION RESEARCH

Osa 1 (Tietäminen)

Merkitse kunkin alla olevan väitteen kohdalle se vastaus, joka vastaa parhaiten sitä, mitä tiedät kestävästä kehityksestä.

Voit merkitä vastauksesi asteikolla **täysin eri mieltä** - **täysin samaa mieltä**. Jos et ole samaa etkä eri mieltä, merkitse **keskimmäinen vaihtoehto**. Jos et osaa vastata kysymykseen, merkitse **En osaa sanoa**.

		Täysin eri mieltä				Täysin samaa	En tiedä
1	Vedenkulutuksen vähentäminen on välttämätöntä kestävän kehityksen kannalta.	☐	☐	☐	☐	☐	☐
2	Monien kasvi- ja eläinlajien suojelu on olennaisen tärkeää kestävän kehityksen kannalta.	☐	☐	☐	☐	☐	☐
3	Kestävän kehityksen vuoksi ihmisiä on koulutettava siitä, miten he voivat suojautua luonnonkatastrofeilta.	☐	☐	☐	☐	☐	☐
4	Kestävä kehitys edellyttää kulttuuria, jossa riitatilanteet ratkaistaan rauhanomaisesti keskustelemalla.	☐	☐	☐	☐	☐	☐
5	Ihmisoikeuksien kunnioittaminen on välttämätöntä kestävän kehityksen kannalta.	☐	☐	☐	☐	☐	☐
6	Kestävän kehityksen saavuttamiseksi kaikilla maailman ihmisillä on oltava mahdollisuus hyvään koulutukseen.	☐	☐	☐	☐	☐	☐
7	Kestävä kehitys edellyttää, että yritykset toimivat vastuullisesti työntekijöitään, asiakkaitaan ja toimittajiaan kohtaan.	☐	☐	☐	☐	☐	☐
8	Kestävä kehitys edellyttää tavaroiden ja palvelujen oikeudenmukaista jakautumista maailman ihmisten kesken.	☐	☐	☐	☐	☐	☐

9   Köyhyyden poistaminen maailmasta on välttämätöntä   ☐ ☐ ☐ ☐ ☐   ☐
    kestävän kehityksen kannalta.

Osa 2 (Asenteet)

Merkitkää kunkin alla olevan väitteen kohdalle se vastausvaihtoehto, joka vastaa parhaiten henkilökohtaista mielipidettänne.

Voit merkitä vastauksesi asteikolla **täysin eri mieltä** - **täysin samaa mieltä**. Jos et ole samaa etkä eri mieltä, merkitse **keskimmäinen vaihtoehto**.

		Täysin eri mieltä				Täysin samaa
10	Uskon, että luonnonvarojen käyttäminen yli tarpeidemme ei uhkaa ihmisten terveyttä ja hyvinvointia tulevaisuudessa.	☐	☐	☐	☐	☐
11	Mielestäni tarvitsemme tiukempia lakeja ja asetuksia ympäristön suojelemiseksi.	☐	☐	☐	☐	☐
12	Mielestäni on tärkeää ryhtyä toimiin ilmastonmuutokseen liittyvien ongelmien torjumiseksi.	☐	☐	☐	☐	☐
13	Mielestäni kaikille pitäisi antaa mahdollisuus hankkia tietoja, arvoja ja taitoja, joita tarvitaan kestävään elämään.	☐	☐	☐	☐	☐
14	Mielestäni meidän, jotka elämme nyt, pitäisi varmistaa, että tulevaisuuden ihmiset saavat nauttia samasta elämänlaadusta kuin me tällä hetkellä.	☐	☐	☐	☐	☐
15	Mielestäni naisilla ja miehillä on kaikkialla maailmassa oltava samat mahdollisuudet koulutukseen ja työhön.	☐	☐	☐	☐	☐
16	Mielestäni yrityksillä on velvollisuus vähentää pakkausten ja kertakäyttötavaroiden käyttöä.	☐	☐	☐	☐	☐
17	Mielestäni on tärkeää vähentää köyhyyttä.	☐	☐	☐	☐	☐
18	Mielestäni rikkaiden maiden yritysten pitäisi antaa köyhien maiden työntekijöille samat ehdot kuin rikkaissa maissa.	☐	☐	☐	☐	☐

Osa 3 (Käyttäytyminen)

Merkitse kunkin alla olevan väitteen kohdalle se vastausvaihtoehto, joka vastaa parhaiten henkilökohtaista käyttäytymistäsi.

Voit merkitä vastauksesi asteikolla **täysin eri mieltä** - **täysin samaa mieltä**. Jos et ole samaa etkä eri mieltä, merkitse **keskimmäinen vaihtoehto**.

		Täysin eri mieltä				Täysin samaa
19	Kierrätän niin paljon kuin voin.	☐	☐	☐	☐	☐
20	Erittelen ruokajätteet aina ennen roskien viemistä ulos, kun minulla on siihen mahdollisuus	☐	☐	☐	☐	☐
21	Olen muuttanut henkilökohtaisia elämäntapojani vähentääkseni jätteiden määrää (esim. heitän vähemmän ruokaa pois tai en tuhlaa materiaaleja).	☐	☐	☐	☐	☐
22	Kun käytän tietokonetta tai kännykkää chattailuun, tekstiviesteihin, peleihin ja muuhun vastaavaan, suhtaudun toisiin ihmisiin aina yhtä kunnioittavasti kuin oikeassa elämässä.	☐	☐	☐	☐	☐
23	Osoitan samaa kunnioitusta miehille ja naisille, pojille ja tytöille.	☐	☐	☐	☐	☐
24	Teen asioita, jotka auttavat köyhiä ihmisiä.	☐	☐	☐	☐	☐

25. Mikä on nimesi?

26. Mikä on sukupuolesi?

     A. tyttö   B. poika   C. En halua kertoa

27. Kuinka vanha olet?

     A. 11   B.12   C. 13   D. 13+

28. mistä koulusta olet?

     A. Latokartanon peruskoulu

B. Munkkiniemen ala-aste

C. Kannelmäen peruskoulu

D. Suutarilan ala-asteen koulu

E. Virtain Yhtenäis koulu

Appendix 2: Introduction video for students

Appendix 3: Research permit from the City of Helsinki

Helsingin kaupunki Kasvatuksen ja koulutuksen toimiala Perusopetuksen palvelukokonaisuus	**Pöytäkirjanote** 4.10.2022	1 (3)

Perusopetusjohtaja
_____

Lu Fu
Tikkamäentie 6 A 13

104 §
Päätös tutkimusluvan myöntämisestä HEL 2022-011089

HEL 2022-011089 T 13 02 01

Päätös

Perusopetusjohtaja päätti myöntää tutkimusluvan Lu Fu pro gradutut-kielmalle "A Quantitative Comparison into Students Sustainability Consciousness" päätöksen perusteluista tarkemmin ilmenevillä ehdoil-la. Tutkimuslupapäätös on voimassa 31.12.2022 saakka.

Päätöksen perustelut

Lu Fu on hakenut tutkimuslupaa pro gradututkielmalle. This research aims to explore the differences of students' sustainability conscious-ness by comparing Eco-schools and ordinary schools in Finland. It uses a questionnaire to assess students' sustainability consciousness level. It is an important question for the implementation of Education for Sustainable Development locally and globally.

Tutkimusaineisto kerätään ajalla 10/2022-12/2022. Tutkimusaineisto kerätään kyselyllä, joka kohdistuu 12-vuotiaisiin oppilaisiin. Tutkimuk-sen otoskoko on 200 (n=200). Kyseessä on kyselytutkimus.

Tutkimuksen otos kohdistuu Latokartanon peruskouluun, Munkkinie-men ala-asteelle ja Kannelmäen peruskouluun.

Tutkimus toteutetaan noudattaen Helsingin kaupungin korona-ohjeistusta.

Tutkimukseen osallistuminen on vapaaehtoista. Tutkittavilta pyydetään kirjallinen suostumus tutkimukseen osallistumisesta. Alle 15-vuotiaiden oppilaiden huoltajilta pyydetään kirjallinen suostumus lapsen tutkimuk-seen osallistumiselle. Alle 18-vuotiaiden opiskelijoiden/oppilaiden huol-tajia tiedotetaan ennalta tutkimuksesta. Tutkimusaineistoa käsitellään ja säilytetään tutkimuksen teon ajan hyvää tieteellistä käytäntöä nou-dattaen. Aineisto hävitetään 3 vuotta tutkimuksen valmistuttua, viimeis-tään 31.12.2025.

Helsingin kaupunki
Kasvatuksen ja koulutuksen toimiala
Perusopetuksen palvelukokonaisuus

Pöytäkirjanote

2 (3)

4.10.2022

Perusopetusjohtaja

Tunnistetietojen käsittely sekä tutkimusrekisteriin kerättävät tiedot on kuvattu tarkemmin tutkimuksen tietosuojailmoituksessa (liite 3).

Kasvatuksen ja koulutuksen toimialajohtajan päätöksen 3.8.2017 § 57 mukaan kasvatuksen ja koulutuksen toimialalla päätöksen tutkimusluvasta tekee kunkin palvelukokonaisuuden johtaja omaa palvelukokonaisuuttaan koskevien tutkimusten osalta. Mikäli tutkimus koskee useamman palvelukokonaisuuden toimintaa, tekee päätöksen toimialajohtaja.

Tutkimuslupaan sovelletaan seuraavia ehtoja:

Päätös antaa mahdollisuuden tutkimusaineiston keräämiseen ajalla 10/2022-12/2022 koulujen ja oppilaitosten työaikana.

Päätös ei anna oikeutta saada tietoja Helsingin kaupungin asiakirja- ja rekisteriaineistoista.

Tutkimukseen osallistuneiden yksittäisten henkilöiden tunnistetietoja ei saa ilmaista tutkimusraportissa tai muulla tavoin.

Kasvatuksen ja koulutuksen toimiala ei osallistu tutkimuksen toteuttamiseen.

Tutkimuksesta ei tule koitua kustannuksia kasvatuksen ja koulutuksen toimialalle.

Tutkimusraportin sähköinen osoite toimitetaan kasvatuksen ja koulutuksen toimialan käyttöön sähköpostiosoitteeseen:
kasko.tutkimusluvat@hel.fi

Lisätiedot

Jukka Orava, arviointiasiantuntija, puhelin: 310 78018
jukka.orava(a)hel.fi

Liitteet

1	Tutkimuslupahakemus 19.9.2022 (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)
2	Tutkimuslupahakemus 19.9.2022, liite, tutkimussuunnitelma (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)
3	Tutkimuslupahakemus 19.9.2022, liite, tietosuojailmoitus
4	Tutkimuslupahakemus 19.9.2022, liite, vanhempien suostumus (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)
5	Tutkimuslupahakemus 19.9.2022, liite, kysely (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)
6	Tutkimuslupahakemus 19.9.2022 liite, informaatiokirje (Salassa pidettä-

Helsingin kaupunki　　　　　　　**Pöytäkirjanote**　　　　　　3 (3)
Kasvatuksen ja koulutuksen toimiala
Perusopetuksen palvelukokonaisuus

　　　　　　　　　　　　　　　　　4.10.2022

Perusopetusjohtaja
_____

	vä, JulkL (621/1999) 24.1 § 21 k)
7	Tutkimuslupahakemus 19.9.2022, saate (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)

Muutoksenhaku

Otteet　　　　　　　Oikaisuvaatimusohje, kasvatus- ja koulutuslautakunta

Ote	**Otteen liitteet**
Hakija	Oikaisuvaatimusohje, kasvatus- ja koulutuslautakunta

Pöytäkirjanote on lähetetty asianosaiselle 10.10.2022.

Perusopetusjohtaja

Outi Salo
perusopetusjohtaja

Appendix 4: Research permit for supplementary samples from the City of Helsinki

Helsingin kaupunki	**Pöytäkirjanote**	1 (3)
Kasvatuksen ja koulutuksen toimiala		
Perusopetuksen palvelukokonaisuus		
	27.10.2022	

Perusopetusjohtaja

Lu Fu
Tikkamäentie 6 A 13

120 §
Päätös tutkimusluvan HEL 2022-011089 (myönnetty 4.10.2022) täydentämisestä

HEL 2022-011089 T 13 02 01

Päätös

Perusopetusjohtaja päätti myöntää tutkimusluvan HEL 2022-011089 (myönnetty 4.10.2022) täydentämisen Lu Fu pro gradututkielmalle "A Quantitative Comparison into Students Sustainability Consciousness" päätöksen perusteluista tarkemmin ilmenevillä ehdoilla. Tutkimuslupapäätös on voimassa 31.12.2022 saakka.

Päätöksen perustelut

Lu Fu on hakenut tutkimusluvan otoksen täydentämistä kahdella koululla. Muilta osin tutkimusluvan HEL 2022-011089 (myönnetty 4.10.2022) ehdot pysyvät voimassa.

Tutkimusaineisto kerätään ajalla 10/2022-12/2022. Tutkimusaineisto kerätään kyselyllä, joka kohdistuu 12-vuotiaisiin oppilaisiin. Tutkimuksen otoskoko on 200 (n=200). Kyseessä on kyselytutkimus.

Tutkimuksen otokseen lisätään Hertsikan ala-asteen koulu ja Suutarilan ala-asteen koulu.

Tutkimus toteutetaan noudattaen Helsingin kaupungin korona-ohjeistusta.

Tutkimukseen osallistuminen on vapaaehtoista. Tutkittavilta pyydetään kirjallinen suostumus tutkimukseen osallistumisesta. Alle 15-vuotiaiden oppilaiden huoltajilta pyydetään kirjallinen suostumus lapsen tutkimukseen osallistumiselle. Alle 18-vuotiaiden opiskelijoiden/oppilaiden huoltajia tiedotetaan ennalta tutkimuksesta. Tutkimusaineistoa käsitellään ja säilytetään tutkimuksen teon ajan hyvää tieteellistä käytäntöä noudattaen. Aineisto hävitetään 3 vuotta tutkimuksen valmistuttua, viimeistään 31.12.2025.

Helsingin kaupunki
Kasvatuksen ja koulutuksen toimiala
Perusopetuksen palvelukokonaisuus

Pöytäkirjanote

27.10.2022

2 (3)

Perusopetusjohtaja

Tunnistetietojen käsittely sekä tutkimusrekisteriin kerättävät tiedot on kuvattu tarkemmin tutkimuksen tietosuojailmoituksessa (liite 3).

Kasvatuksen ja koulutuksen toimialajohtajan päätöksen 3.8.2017 § 57 mukaan kasvatuksen ja koulutuksen toimialalla päätöksen tutkimusluvasta tekee kunkin palvelukokonaisuuden johtaja omaa palvelukokonaisuuttaan koskevien tutkimusten osalta. Mikäli tutkimus koskee useamman palvelukokonaisuuden toimintaa, tekee päätöksen toimialajohtaja.

Tutkimuslupaan sovelletaan seuraavia ehtoja:

Päätös antaa mahdollisuuden tutkimusaineiston keräämiseen ajalla 10/2022-12/2022 koulujen ja oppilaitosten työaikana.

Päätös ei anna oikeutta saada tietoja Helsingin kaupungin asiakirja- ja rekisteriaineistoista.

Tutkimukseen osallistuneiden yksittäisten henkilöiden tunnistetietoja ei saa ilmaista tutkimusraportissa tai muulla tavoin.

Kasvatuksen ja koulutuksen toimiala ei osallistu tutkimuksen toteuttamiseen.

Tutkimuksesta ei tule koitua kustannuksia kasvatuksen ja koulutuksen toimialalle.

Tutkimusraportin sähköinen osoite toimitetaan kasvatuksen ja koulutuksen toimialan käyttöön sähköpostiosoitteeseen:
kasko.tutkimusluvat@hel.fi

Lisätiedot

Jukka Orava, arviointiasiantuntija, puhelin: 310 78018
jukka.orava(a)hel.fi

Liitteet

1	Tutkimuslupahakemus 19.9.2022 (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)
2	Tutkimuslupahakemus 19.9.2022, liite, tutkimussuunnitelma (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)
3	Tutkimuslupahakemus 19.9.2022, liite, tietosuojailmoitus
4	HEL 2022-011089_PDFa2b (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)
5	Tutkimuslupahakemus 19.9.2022, liite, vanhempien suostumus (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)
6	Tutkimuslupahakemus 19.9.2022 liite, informaatiokirje (Salassa pidettävä, JulkL (621/1999) 24.1 § 21 k)
7	Tutkimuslupahakemus 19.9.2022 liite, informaatiokirje (Salassa pidettä-

Helsingin kaupunki   **Pöytäkirjanote**   3 (3)
Kasvatuksen ja koulutuksen toimiala
Perusopetuksen palvelukokonaisuus

27.10.2022

Perusopetusjohtaja
_____

vä, JulkL (621/1999) 24.1 § 21 k)

Muutoksenhaku

Oikaisuvaatimusohje, kasvatus- ja koulutuslautakunta

Otteet

Ote	**Otteen liitteet**
Hakija	Oikaisuvaatimusohje, kasvatus- ja koulutus-lautakunta

Pöytäkirjanote on lähetetty asianosaiselle 28.10.2022.

Perusopetusjohtaja

Outi Salo
perusopetusjohtaja

Appendix 5: Parent consent form in English

UNIVERSITY OF
EASTERN FINLAND

PARENT CONSENT FORM
09/10/2022

Study title: A Quantitative Comparison of Students' Sustainability Consciousness Between Eco-Schools and Ordinary Schools: A Finnish Context

Name: Lu Fu
Email: fulu@student.uef.fi

My child has been invited to participate in the above research study. The purpose of the research is to explore the differences of students' sustainability consciousness between Eco-schools and ordinary schools.

I have read and understood the written participant information sheet. The information sheet has provided me with sufficient account of the above study and of the collection, processing and transfer/disclosure of my child's personal data during the study. The content of the information sheet is clear, and I have had the opportunity to ask questions about the study and have had these answered satisfactorily.

I have had enough time to consider my child's participation in the study. I have received sufficient information about our rights, about the purpose and execution of the study, as well as about the benefits and risks involved in it. I have not been pressurized or persuaded into participation.

I understand that my child's responses will be kept strictly confidential and that no one outside the research team will be allowed access to them.

I understand that my child's participation is entirely voluntary and that he/she is free to withdraw my consent at any time, without giving any reason. I am aware that if my child withdraws from the study or withdraw my consent, any data collected before the withdrawal can be included as part of the research data.

By signing this form, I permit my child to participate in this study.

Date

_____
Signature of Participant

Appendix 6: Participant information sheet in English

UNIVERSITY OF EASTERN FINLAND

Participant information sheet	1 (3)
Date	09/10/2022

PARTICIPANT INFORMATION SHEET

Study title: A Quantitative Comparison of Students' Sustainability Consciousness Between Eco-Schools and Ordinary Schools: A Finnish Context

Invitation to participate in a research study
This information sheet describes the study and your child's role in it. Before you decide, it is important that you understand why the research is being done and what it would involve for you. Please take time to read this information and discuss it with others if you wish. If there is anything that is not clear, or if you would like more information, please ask me. After that I will ask you to sign a consent form to permit your child's participation in the study.

Voluntary nature of participation
The participation is entirely voluntary, and your child can withdraw from the study at any time. If the participant withdraws from the study or withdraws his/her consent, any data collected from him/her before the withdrawal can be included as part of the research data.

Purpose of the study
This research aims to explore the differences of students' sustainability consciousness by comparing between eco-schools and ordinary schools in Finland. It uses a questionnaire to assess students' sustainability consciousness level. It is an important question for the implementation of Education for Sustainable Development locally and globally.

What will the participation involve
Your child will be asked to answer a questionnaire with 24 items online, which will take approximately 10 minutes in total. Your answers will be transferred to a statistical software for further analysis afterwards. I am recruiting about 200 students from Helsinki and participants are from Grade 6. I hope to include an equal number of boys and girls.

Possible benefits of taking part
The questionnaires used in the study will help students to understand the knowledge, attitudes, and behaviors about sustainability. Teachers can also use the compilations provided to schools to create reflection exercises. Reflections can be used to help students to understand their own role as agents of change.

Possible disadvantages and risks of taking part
There won't be any disadvantages or risks of taking part.

Financial information
Participation in this study will involve no cost to you. Your child will receive no payment for the participation.

Informing about the research results
This study is a master thesis of Lu Fu. Although the outcomes will be determined by the research findings, possible research products will include articles in scientific journals. I will only report group results, therefore, data subjects will not be identified in any way in my reports.

UNIVERSITY OF
EASTERN FINLAND

Termination of the study

The researcher conducting the study can also terminate the study due to some unanticipated problems or risks such as natural disasters or pandemic disease.

Further information

Further information related to the study can be requested from the researcher.

Contact details of the researchers

Title: A Quantitative Comparison into Students' Sustainability Consciousness Between Eco-Schools and Ordinary Schools: A Finnish Context
Name: Lu
Fu
Tel. number: +358 466650790
Email: fulu@student.uef.fi

Appendix to the Participant Information Sheet: Processing of personal data in the study

Within this study, the personal data will be processed according to the European Union General Data Protection Regulation (EU:n Act 679/2016) and current national regulation. The processing of personal data will be described in the following items:

Data controller of the study:

Name: Lu Fu
Unit: University of Eastern Finland
Tel. number: +358 466650790
Email: fulu@student.uef.fi

Types of personal data that will be collected:

Personal data like name, gender, school, and age will be collected.

Personal data will be collected also from other sources:

No

For what purpose will personal data be processed?

The personal data of the data subject is used to combine data collected in the survey instrument, for data analysis, and for producing research. In addition, the data can be used to the development of the research data, and, if requested by the data subject, to verify the data.

Legal basis of processing personal data:

The collection of personal data is based on the EU General Data Protection Regulation and Data Protection Act. The data subject therefore has the right to refuse to take part in the survey, to discontinue participation in the survey or to withdraw consent at any stage of the research without this having any adverse effect.

Duration of the research (how long will the personal data be processed):

The research will last for about 9 months, from August 1st, 2022 till April 30th, 2023. The data collection period is from October 1st, 2022 to November 30th, 2022. After the study, there are 3 years for possible reclamations about the research results.

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What happens to the personal data after the research has ended?
At the end of the study, the personal data will be stored in computer behind a password for 3 years. And they will be destroyed permanently no later than November 30, 2025.

Data transfer outside of research registry:
Your personal data will not be transferred to outside of research registry.

Possible transfer of personal data outside the EU or the EEA:
The personal data will not be transferred to a third country outside EU or the EEA.

Because personal data will be used in this study, you child will be registered to study registry.

Your rights as a registered person are the following:
- Right to obtain information on the processing of personal data
- Right of access
- Right to rectification
- Right to restriction of processing
- Notification obligation regarding rectification of personal data or restriction of processing
- Right to object to the processing
- Right not to be subject to a decision based solely on automated processing
- Right to notify the Data Protection Ombudsman if you suspect that an organization or individual is processing personal data in violation of data protection regulations.

You can exercise your rights by contacting the data controller of the study.

Personal data collected in this study will not be used for automated decision-making.

A Privacy Notice for Scientific Research has been compiled of the study, and you have a possibility to get to know it by contacting:
Lu Fu
Tel. number: +358 466650790
Email: fulu@student.uef.fi

All information collected from your child will be handled confidentially and according to the legislation. Individual participants will be given a code, and the data will be stored in a coded form in the research files. Results will be analyzed and presented in a coded, aggregate form. Individuals cannot be identified without a code key. A code key, which can be used to identify individual research participants and their responses, will be stored by Lu Fu, and the data will not be given to people outside the research group. The final research results will be reported in aggregate form, and it will be impossible to identify individual participants. Research registry will be stored for 3 years, after which it will be destroyed.

The data collected from your child can be later used in theses. The participant has the right to request information of people who have received data for their use. If the legal basis for processing personal data has been consent and you wish to use the data in further studies, a specific consent for that has to be received.