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# High Performance Education Fails in Sustainability? —A Reflection on Finnish Primary Teacher Education

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**Abstract:** Sustainability is internationally often emphasized as an essential aim of higher education, but more as a principle than on the practical level. This is also obvious in the academic education of primary teachers in Finland. Therefore, it is a great challenge for Finnish teachers to include sustainability in their teaching and everyday life in schools. The aim of this article is to critically analyze why the implementation of sustainability in teacher education is so intricate and to discuss possible solutions with Finland—a country highly valued for its education—as an example. The article reports outcomes from educational policy documents and research on educational, philosophical, scientific and social aspects of sustainability, including evaluation of how sustainability has been implemented in schools and at universities, especially among teacher educators. In addition, the article builds on analyses of comprehensive university strategies and primary school teacher education programs. We found these reasons for the ignoring of sustainability in the Finnish teacher education: sustainability is in conflict with overall trends in society and politics, teacher education takes place at universities and is based on separate academic disciplines. Sustainability is also intricate because it is strongly connected to ecological literacy and it is value dependent. Universities need to overcome these obstacles and become forerunners in the sustainability process.

**Keywords:** higher education; university education; teacher education; primary school teachers; sustainable development; sustainability; implementation of sustainability; sustainability education; education for sustainability; Finland

## 1. Introduction

"We are faced with a paradox: Is education the problem or the solution in working toward a sustainable future? At current levels of unsustainable practice and over consumption it could be concluded that education is part of the problem. If education is the solution then it requires a deeper critique and a broader vision for the future" [1] (p. 59).

The words above are from a UNESCO publication from 2005 and much has taken place after that since "education for sustainable development" has frequently been on the agenda for the last decade. Many international education policy documents from this decade contain terms related to sustainability. One clear reason is that UNESCO declared the decade 2005–2014 as the "UN decade of education for sustainable development" with a mission to promote sustainable development at all levels of education in the member states. However, education was mentioned as a key to sustainable development in the United Nation's document "Agenda 21" as early as 1992 [2], so thus we step back to the 1990s.

The concept of *sustainable development* has been much used in politics since the UN Conference on Environment and Development in Rio de Janeiro in 1992 [2] and it is since then interpreted in various

ways. In short, the complex concept denotes a social and economic development where the utilization of natural resources takes place with future generations' analogous life opportunities in mind. In the so called Brundtland report that preceded the UNCED conference, the concept is interpreted as follows: "[S]ustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations [3] (p. 46)."

The principle of sustainable development focuses actually at the same time on humans living today and in the future. According to Sachs [4] sustainable development is both a worldview and a method of solving worldwide problems. Besides emphasizing the three commonly defined dimensions of sustainable development, economic, social and environmental (the environmental dimension is also called the ecological, and the social dimension is often split into two: social and cultural, see Section 3.3 below), he, therefore, also distinguishes two approaches: an analytic and an ethical. "Sustainable development is both a way of looking at the world, with a focus on the interlinkages of economic, social, and environmental change, and a way of describing our shared aspirations for a decent life, combining economic development, social inclusion, and environmental sustainability. It is in short both an analytic theory and a 'normative' or ethical framework [4] (p. XIII)."

The three (or four) dimensions of sustainable development include several different aspects. For example, cultural aspects and health aspects are parts of the social dimension; political aspects are mainly parts of the economic dimension, but also of the other two dimensions. This means that the different aspects as well as the dimensions are complexly interrelated. Sustainability is, thus, not only an environmental issue to be controlled by scientists, it is a multifaceted and interdisciplinary matter related to both local and global circumstances and past events as well as future prospects.

Yet, the concept sustainable development is also problematic. Many scholars and others are critical against using the word 'development' to denote indisputable belief in a steady economic and technological progress. Like numerous other authors we, therefore, will use the single concept of *sustainability* and the two word concept *sustainability education* in this article, with exception of situations where the authors we refer use the concept of sustainable development or education for sustainable development. By sustainability we mean *creating and living a human life on Earth in a way that does not damage life but that preserves its various life forms for the future*—not only future human life. We thus recognize challenges on ethical, cognitive as well as practical levels.

After the Rio conference, the concept 'education for sustainable development' (ESD) gradually became common in educational policy documents and included the three dimensions of sustainable development as educational goals. There is, however, no consensus regarding the educational content of ESD [5]. Already in the 1970s, the political goal of 'environmental education' was to change learners' attitudes [6], and the UN goal for ESD in 2014 still focused on influencing learners' values and attitudes [7]. Many educational researchers have claimed that the whole concept limits education to merely a tool for reaching sustained economic growth [8,9]. Researchers have also criticized the idea behind the concept for neglecting teachers as reflective agents [10].

Vare and Scott [11], on the other hand, point out that ESD needs to be seen as two approaches that complement each other, like the Chinese concept of yin and yang. The authors define the term ESD 1 as promoting changes in what people do, promoting behaviors and ways of thinking through a learning *for* sustainable development, while the complementary term ESD 2 promotes learning *as* sustainable development through the capacity to build critical thinking and the exploration of inherent contradictions. Some researchers have reacted negatively to the preposition 'for' in the concept of ESD and consider it normative [12,13]. To avoid the preposition 'for', the concept 'sustainability education' has become an alternative [14,15].

When, in this article, we follow many forerunners and adopt the concept of *sustainability education*, we thus move the focus from the question of what teachers are supposed to teach to the question: what is an education focusing on sustainability supposed to achieve? When first and foremost

reflecting on what to achieve, the main focus is on action competence, critical thinking, deliberation and understanding of how one's choices affect local and global societies and the entire biosphere. Vare and Scott [11], on the other hand, emphasize that ESD is a learning process that should build the learners' capacity to analyze, negotiate, question alternatives and develop their ability to make sound choices. Furthermore, the role of sustainability education is to deal with inequality and power issues and encourage critique of the systems of which the students' and educators' daily life and education is a part [12].

What we are asking for, as researchers, is an interdisciplinary, even transdisciplinary, learning in a context of diversity [16]. Transdisciplinary processes encourage collaboration between science and society, and thus emphasize joint undertakings and learning [17], and diversity means that various views are appreciated. There is a growing interest in transdisciplinary approaches to the sustainability challenge, approaches that can handle complex authentic problems and create practice-oriented learning situations [17].

Sustainability education is characterized by a holistic approach when it comes to content and a pluralistic approach when it comes to teaching [18]. Holism implies in this sense that all the dimensions and perspectives of sustainability are integrated in the instruction. Pluralistic teaching, on the other hand, is teaching so that different views and perspectives concerning sustainability are acknowledged, reflected on and discussed, and the aim is to improve the student's democratic action competence [19].

The role of educators subsequently becomes to improve the students' joint involvement and participation in authentic environmental activities and critical discourses [20–22]. In Denmark 'action competence' has been a favored approach and key concept in environmental education and health education research since the 1980s [23]. According to action competence, the role of education is not to serve political goals or promote strongly normative purposes. The approach is based on the idea that environmental problems involve social conflicts of interests and has to be handled by problem-oriented and cross-curricular methods. Therefore, the role of education is to encourage students and provide learning conditions that transform them into critical, political agents [23]. Action competence relates to the German *Bildung* concept based on the central idea that human beings have intrinsic possibilities for self-development, but also for the joint development of society [24]. In higher education this means that sustainability becomes "a dynamic and flexible synergy issue for different sciences and subjects so that science, education, art and practices are combined, transformed and developed" [24] (p. 62).

When *Bildung* is an educational ideal, elementary critical questions are: where is education heading and what is the ultimate goal of education? The sustainability education ideal is an education where the transformation of oneself and society is a dual task [12]. Education has to promote a planetary consciousness and a visioning of a different world in a cosmic perspective, according to Gadotti [25], but also a vision of a better self through self-reflection and authenticity, according to Wolff [12]. However, it is fruitless to teach people about sustainability and at the same time ignore the unsustainability problems in a neoliberal society, applying aims that are in contradiction with the whole idea of sustainability [8,26,27], and blaming others for not acting appropriately [28]. The history and the culture of societies (both local and global) transform people every day, and with that in mind the mission is to create new models of mutual living in more sustainable ways [29], which demands braveness and political action competence.

In many countries environmental and sustainability issues have increased in education on all levels from nursery schools to universities over the last decade [7,30]. Still, it has been argued that the development is too slow [8,12]. In the evaluation of the impact of the Decade of Education for Sustainable development, UNESCO found that in most UN member states ESD was increasing, but few states could report full implementation across education systems, as well as across policies and planning [7]. More and more commentators have actually argued that the educational efforts have not been radical enough to address the most urgent problems of our time [27,31,32]. There is obviously still much to do and many challenges to face [33].

Even if there are tasks enough for many players, teachers have for decades been cited as key agents in the sustainability process [3,34]. To prepare teachers for this important task, analysts have asked for a stronger emphasis on teacher education [34,35]. Yet, teacher education in many countries has failed in this respect [36–41]. According to Martin and Carter [42], education settings need to become "proactive in sustainability" and to make that happen, ESD needs to be a *core concept* in teacher education. Since there are risks of both normatively steering and narrowing of the scope, we would rather say that "sustainability" has to be the core and its implementation obvious in policy, campus practice, and last but not least, in research, teaching and learning.

In this article, Finland has been used as an example in identifying how and why teacher education, especially primary teacher education, has failed in sustainability and what need to be changed in teacher education to improve the situation. Even if we focus on primary school teachers, some of the studies we use in our analysis include secondary schools. We begin with an overview of Finnish teacher education, including both international and national policy documents concerning the implementation of sustainability in teacher education.

## 2. Finnish Teacher Education

Finnish teacher education has a worldwide reputation, since Finnish students have performed very well in international comparisons, such as PISA (The Programme for International Student Assessment of OECD). As one of the contributory factors behind these successful achievements, reference has been made to the high quality of Finnish teacher education [43,44]. Finnish teacher education has a fairly long academic tradition by international standards, entering Finnish universities in the 1970s [45,46]. Of the sixteen Finnish universities and six regional university centers running today, eight main universities and two centers provide teacher education.

Apart from Finnish teacher education's international reputation, it is also very popular nationally and many would-be teachers apply every year. Both primary and secondary school teacher education leads to a higher academic degree (300 ECTS), and primary school teachers have education as their major subject. Together with multidisciplinary school subject studies this qualifies graduates to teach in grades 1–6. Primary school teachers are also qualified to teach in grades 7–9 if they take further studies in one or more school subjects. However, most of the teaching in grades 7–9 and in upper secondary school is carried out by "subject teachers", who have a major in one of the teaching subjects and a minor in one or two other school subjects, and who also have studied education (60 ECTS), including teacher training [43]. Table 1 shows what qualifications are needed for teachers in Finland at different school levels.

**Table 1.** Type of school and teachers' qualifications in Finland (modified from Jakku-Sihvonen and Niemi [45] (p. 11)).

| Age | Type of school | Teachers' qualification |
|---|---|---|
| **0–6** | Kindergarten | Kindergarten teachers (BA) 180 ECTS |
| **6** | Pre-school | Kindergarten teachers (BA) or primary school teacher (MA) |
| **7–12** | Comprehensive school, 1–6 | Primary school teachers (MA) 300 ECTS |
| **13–15** | Comprehensive school, 7–9 | Subject teachers (MA) |
| **16–** | Upper secondary school | Subject teachers (MA) |
| **16–** | Vocational school | Subject teachers (BA or MA)[i] |
| **19–** | Higher education | Teachers with higher academic degree (Ph. D) |

Notes: [i] If it is not organized in higher education courses in the subject they teach or if they have received competence in other ways, they can get exemption from this rule.

Research-based teaching and learning is one of the major aims of Finnish teacher education. By integrating theory and practice in a dialogic process, the aim is to produce reflective teachers who will become life-long learners with a readiness for professional development throughout their

vocations [47]. The writing of a Master's thesis, together with studies in educational research methodology, is an important part of this process. Integration of research when dealing with various challenges in teachers' work is also considered a prerequisite for their future career [45,46,48]. Teachers are trained to develop their teaching analytically and systematically and create good learning environments [48]. However, this does not guarantee that they are trained in interdisciplinary procedures and in how to teach about complex global dilemmas.

Teaching practice is a crucial part of Finnish teacher education, but it does not necessarily give any training in how to teach about sustainability. Much of the teaching practice takes place in particular training schools belonging to the teacher education departments of the universities. The integration of teaching practice with educational theory, as well as with subject studies and subject teaching, is essential. This is accomplished through a three-part practice supervision in cooperation between a university lecturer, a teacher at the training school and the student teacher. Students also complete teaching practice in actual schools. As this section shows, Finnish teachers are well educated in general. Yet, even if many Finnish educational policy documents and action plans include sustainability education and training of students at many levels [49–51], sustainability undeniably plays a minor role in the education of Finnish teachers.

## 3. Sustainability in Finnish School Systems and Teacher Education

Even if policy documents and strategies on many levels request sustainability at all levels of education, the Finnish universities are autonomous and can therefore make their own decisions regarding the scope of sustainability in education and practice. Therefore, there are no common models of how to integrate sustainability into university courses and teacher education. There is also great variation in teacher educators' knowledge of and skills in integrating and teaching sustainable issues in higher education. The same problem is obvious in schools; graduated teachers do not know how to teach about sustainability.

### *3.1. Sustainability in Policy Documents*

Numerous ambitious international and national policy documents and action plans describe goals and ideas on how to implement sustainability at all levels of education [37,52,53]. The Brundtland Report [3] and Agenda 21 in Finland [54] clearly emphasized the link between the environment and development, as well as the importance of the human dimension in all decisions concerning environmentally sound development. According to these documents, citizens have to learn to maintain social, cultural, and economic well-being without depleting natural resources or overloading nature's delicate balance. The faintly behavioristic goals suggest that it is the role of education and training to ensure that citizens of all ages have the knowledge, skills, readiness and vision that will enable them to build a sustainable and equitable future and commit to a sustainable way of life [55]. From 2001 sustainable development is included in Finnish basic education according to the decree on national goals of education and the Basic Education Act: "Students are educated to take responsibility and work together and to promote tolerance and trust between human groups, peoples and cultures. The teaching should also support the development of pupils into active members of society, and they are given skills to function in a democratic and equal society and *promote sustainable development*" [56] (translation and italics by the authors).

Already in the core curriculum for basic education 1985 [57] "the environment and nature protection" is one of the main aims, and in the curriculum of 1994 [58] human rights, equality, democracy, biodiversity and cultural diversity build the main values. The following Finnish national core curriculum for basic education from 2004 [59] and the current version from 2014 [60] emphasize sustainability to be implemented in several ways in education but also in the everyday life in schools. In the core curriculum from 2004, the goal of one of the cross-curricular themes is "to raise environmentally conscious citizens who are committed to a sustainable way of life" [59] (p. 39), and who will "learn to examine the challenges to sustainable development from several points of

views" [59] (p. 29). Even if these goals were set more than ten years ago, the impact has not been particularly significant.

It is quite obvious that sustainability is even more important in the current curriculum for basic education from 2014 [60]. A sustainable future is mentioned in the curriculum in the very first paragraph, where the aim of the revision of the governance system of basic education is described. According to this, the aim is to improve the possibilities for basic education to take into account the changes in the world, and also to strengthen the role of education in the process of building a sustainable future. Overall, the concept of a sustainable future is mentioned 42 times, a sustainable lifestyle 45 times, sustainable development 40 times, and sustainability nine times in the 2014 core curriculum.

When the undertaking of basic education is described, the current curriculum states that education shall promote participation and a sustainable lifestyle, and also support the students' development as members of a democratic society. The "need for a sustainable lifestyle" is one of the four headlines defining the basic values of the core curriculum [60] (pp. 15–16, the authors' translation). The other headlines are "all pupils are unique and have a right to a good education"; "humanity, education, equality and democracy"; and "cultural diversity is richness" [60] (p. 16), which all relate to the social and cultural dimensions of sustainability. Hence, sustainability can clearly be regarded as a core component in the values of contemporary basic education in Finland.

The current core curriculum from 2014 also strives to develop a comprehensive competence among students. Comprehensive competence involves a unity of knowledge and skills, values, attitudes and also both the will and the ability to use the knowledge and skills in practice. The intention is that by applying its methods and contents every school subject contributes in its own way to comprehensive competence. Seven sectors build up the comprehensive competence, one of them being "an ability to participate, affect and contribute to a sustainable future" [60] (p. 24). Other sectors including issues of sustainability are everyday competence, digital competence, and cultural and communicative competence.

According to the current curriculum, sustainability is also an integral part of the working culture of the school. "Responsibility for the environment and a sustainable future" [60] (p. 39) is one of the important integrated themes. Sustainable development is emphasized as an example of an area within democracy education to increase the pupils' active participation (cf. action competence in the Introduction). Furthermore, the curriculum also underlines that learning organizations have to consider the environment and a sustainable future throughout their work, concerning for example the importance of the sustainable use of raw material and energy and the protection of biodiversity to the health of our planet and its ecosystems.

However, many other policy documents also influence the content of the basic education besides the school curriculum. The education system is expected to supply the labor market, at the same time as schools are expected to fulfill curriculum requirements [61]. Success in international comparisons is viewed as a consequence of good politics, though unfortunately an important goal of local educational politics is to decrease costs [62]. A similar problem of mixed signals is obvious in teacher education. Student teachers are trained by teacher educators in the university context for many years. If that context does not enhance sustainability, why should the graduated teachers be ready to take such steps when they start working in schools? In their study of teacher educators, Goodwin et al. [63] found that teacher educators realized that their work relates to the larger contexts in which it is situated. A quarter of the respondents saw it as challenging to navigate among agendas and policies at the universities, since these agendas are often in conflict with their own view of their work. In addition, these policies may be in conflict with the demands of the school curricula.

The official profile of the universities is stated in their strategies, and, consequently, these strategies are relevant when considering sustainability in teacher education. According to Hofman's [5] study, one can discern some rhetorical attempts by Finnish universities to live up to the Ministry of Education and Culture's agreement item "promotion of sustainable development." In 2010—2012 this agreement

item was part of performance agreements with the universities that the Ministry makes every four years [64]. Hofman's [5] analysis of how the three dimensions of sustainable development are acknowledged in the policy documents, study plans and strategies of three universities revealed that none of these universities mentioned sustainable development more than twice in their strategies for 2012.

When examining the role of sustainability in the strategies of the eight Finnish universities offering teacher education programs in 2016 in comparison with earlier versions [5], it is obvious that the emphasis on sustainability has become stronger since the previous strategies, but the variation is still remarkable. In the strategies, which vary in length and depth, seven mention sustainability, six of them as a vision or basic focus area, and one as an objective in societal interaction. One university has omitted sustainability from this strategy version, and the extent to which universities mention sustainability varies from none to eleven times. Two universities talk about all the dimensions of sustainable development, but only one seems to have a strong sustainable profile, namely the University of Lapland. In most of the other Finnish universities other interests are much stronger. An international profile, for example, is very noticeable in seven universities. Other apparent ambitions are collaboration, efficiency and high-quality, whereas social equality and cultural diversity is nearly absent in all but one strategy. Three of the universities are eager to become top-ranking. The concept of sustainability is also mentioned as merely an economic attribute, and it is remarkable that no university mentions campus greening in its strategy. In conclusion, the strategic goals are diverse and sustainability might be difficult to fulfill at the universities offering teacher education, since interests are aimed in so many conflicting directions.

### 3.2. Sustainability in Schools

Currently, the aspect of sustainability is integrated into Finnish schools' practices in many different ways, and more or less frequently. An external evaluation carried out on behalf of the Ministry of Education and Ministry of the Environment in 2012 revealed that only 35% of the 917 primary and secondary schools participating in the questionnaire had programs for sustainable development [65]. This despite the political request for sustainable development programs in every school. The situation on the management stage is equally diverse. Susiluoma [66] investigated the situation regarding sustainable development management at the school level in Finnish basic education and general upper secondary education. Of the participating schools ($n$ = 597), 16% had an environmental education program or plan, 20% had an environmental plan, 12% had a teacher who was responsible for environmental education, 23% had a person responsible for environmental issues, and 19% had an environmental group. Based on this investigation a conclusion could be that environmental issues are not generally prioritized on a management level in Finnish schools. Nevertheless, plans and responsible staff do not obviously guarantee sustainability education in the teacher's practice either. One of the reasons might be that primary school teachers do not have enough education in how to deal with sustainability issues to start such programs.

In a Finnish study including 442 lower secondary subject teachers from 49 schools, Uitto and Saloranta [67] found that the teachers did not consider sustainability issues very frequently in their teaching. Well-being and social sustainability were the most common aspects, while ecological, economic, and cultural aspects were less common. There were large differences in how teachers teaching different major subjects used different aspects of sustainability. The results indicate that teachers in biology, geography and history were generally more active teaching the three dimensions of sustainability in a holistic way, while teachers in the mother tongue, religion, visual arts, crafts, music, physical and health education considered two or three dimensions of sustainability, but were not teaching holistically. Teachers in mathematics, physics, chemistry and languages commonly used only one dimension of sustainable development. These results strengthen the view that sustainability issues are not seen as a common aspiration among teachers.

Since there is not much research from Finland about the implementation of sustainability in the school system it is also relevant to take into consideration how sustainability has been implemented in other countries. Sweden is culturally most similar to Finland, and there are Swedish studies that have investigated the implementation of ESD in schools. Borg et al. [68] have collected data from Swedish upper secondary school teachers ($n$ = 3229) to identify barriers to implementing ESD. For the teachers in their study it seems to be a lack of inspiring examples and the absence of necessary expertise that are the most common obstacles for integrating sustainability into teaching. According to Borg et al. [68], more than half of the upper secondary school teachers in their study felt underprepared to integrate sustainability. The study also shows that the subject-based curricula in upper secondary schools set barriers for interdisciplinary work. This highlights the problem with subject-based curricula and the academic disciplines in teacher education as well.

Berglund et al. [69] studied the effect of the implementation of ESD in grade 12 in regular schools and in grade 12 in schools with an ESD profile ($n$ = 638). They measured the students' sustainability consciousness, a concept built of knowledge, attitudes and behaviors in all the three dimensions of sustainability. Significant but small differences were found in sustainability consciousness between students in regular schools and students in schools with an ESD profile. Furthermore, when sustainability consciousness was analyzed dimension by dimension, it was only in the economic dimension where students in the ESD schools had significantly higher values.

Olsson et al. [70] conducted similar research, where they compared the effectiveness of ESD in regular and in ESD schools, but in grades 6 and 9 ($n$ = 1773), and the results are in line with the findings of Berglund et al. [69]. The effect of implementation of ESD was relatively limited. In grade 6, there were significant differences in sustainability consciousness. Students in ESD schools scored higher on knowledge, attitudes and behavior in all dimensions of sustainability, than the students in regular schools. In grade 9 there were small differences between the regular schools and the schools with an ESD profile, but the results indicate a negative effect of the ESD profile on the students' sustainability consciousness. The social dimension was the one which contributed most to this difference. The authors discuss that the possible reason for this could be that the schools with an ESD profile have not been directed toward an ESD approach in teaching, characterized by holism and pluralism. The support might have only been aimed at the implementation of sustainability activities.

A study of Boeve-de Pauw et al. [18] showed that neither the holistic nor the pluralistic approach were commonplace in Swedish schools. The holistic approach was more common than the pluralistic, and these approaches were more frequent in higher grades than in lower. The results indicate that a more holistic approach in sustainability teaching increases the sustainability knowledge, while a more pluralistic approach generates more sustainable conduct. They conclude that ESD based on holism and pluralism effectively improves students' sustainability consciousness. However, pluralism is not commonplace in schools, the researchers suggesting that this might be the result of the "normativity paradox" [71], which means that pluralistic teaching in a sense is in conflict with the predefined aims of sustainable development. Boeve-de Pauw et al. [18] also point out that the strong rhetoric in steering documents does not seem to have affected the actual practice of teaching. Borg et al. [68] also regarded leadership as crucial when implementing sustainability education in schools. This reconnects to the situation in higher education and in particular to teacher education.

### 3.3. Sustainability in Teacher Education

No clear directions exist on how to teach future teachers about sustainability. Neither is there any strong commitment among the teacher educators. The respondents in a study including seven universities and ten polytechnics offering preservice training for various categories of teachers (including vocational teachers) had no answer about how higher education could guarantee that student teachers are prepared to teach sustainability [65]. The investigation was a part of a study organized by the educational division of the Finnish Commission on Sustainable Development and aimed at the educational organizations appointed as responsible for the implementation of sustainable

development, such as higher education institutions offering teacher training, regional governmental agencies, and NGOs [65]. The results show that the promotion of sustainability in higher education is still very much dependent on enthusiastic key persons. Many of the respondents (administrators and governmental staff, $n = 45$) also hoped for stronger steering by the Ministry of Education and Culture. However, Pathan et al. [65] highlight that Finnish universities and higher education institutions play an important role in ensuring that teachers are provided with the necessary skills and competencies for teaching about sustainable development. They also conclude that the role of sustainable development should be increased in teacher education, and consider the lack of commitment to be basically a problem of leadership.

Since Finnish primary teacher education has to prepare future teachers to teach primary school subjects, most of the educational studies consist of compulsory courses. In addition, students mostly choose their minors among the subjects that are part of the school curricula. Sustainability as a theme to be implemented in all subjects has been a challenge for a long time and it has mainly been up to the teachers to actualize it. This has not only been a problem in schools, but also in teacher education.

In universities it is up to the lecturers how to implement the topic of sustainability in various courses in the teacher education programs. None of the universities offering teacher education have compulsory courses on sustainability for all at basic levels, according to a study from 2010 [65]. Our website analyze in 2016 showed that the number of courses on sustainability still differs between higher education institutions in Finland, and sustainability is seldom compulsory in teacher education programs.

Optional courses of different lengths might well be offered. It is unusual with extensive courses, but since 2015 it has been possible for student teachers at the University of Lapland to complete a master in environment and nature studies, and at Åbo Akademi University a master focusing on environmental education can be completed, but only if external funding is granted for the courses. Other universities offer basic courses providing different views on sustainability, which are open to students from all faculties, but they may be difficult to combine with the teacher education program for practical reasons. In addition, the topic of the various courses might be very different from what the trainee teacher needs.

As Goodwin et al. have pointed out, "Quality teacher education relies on quality teacher educators" [63] (p. 284). Therefore it is important to investigate teacher educators' views on sustainability and the implementation of sustainability in their work. However, only a few investigations have been carried out concerning this aspect of teacher educators' competence, though several have been concerned with other aspects. According to a study by Hökkä and Eteläpelto [48], rather than sustainability, the most important aspects for teacher educators in general were their professional learning and identity. However, for science teacher educators the main goals were "to promote meaningful learning of science concepts and to inspire students' interest in learning about science" [72] (p. 121). Buchanan [73] investigated sustainability education in Australian primary teacher education in a focus group study with teacher educators representing all the subjects in the curriculum of primary education. The analysis of the discussions in focus groups revealed that it was not easy to come to a common and unambiguous understanding of the concept of sustainability education. Social science and science were the subjects where sustainability issues were most frequently addressed, while these issues were only sporadically touched upon in other subjects, except for some cross-curricular subjects. However, the cross-curricular nature of sustainability education is a richness, but also a problem, as few take the responsibility for implementing it. Limited time resources were mentioned as the major obstacle for including sustainability issues in an already crowded curriculum. The implementation of sustainability in teacher education was scanty and sporadic, and sidestepped because of a lack of time both for teaching and preparing. Another obstacle according to the respondents was the presence of many other urgent teaching issues.

A nationwide questionnaire by Borg et al. [74] among Swedish upper secondary school teachers ($n = 3229$) revealed similar problems with adapting a holistic view as in Buchanan's study.

The conceptual understanding of sustainable development varied dependent on which subjects the teachers were teaching. Social science teachers emphasize the social dimension of sustainability, while science teachers concentrate on the ecological dimension. Even though the teachers were generally aware of the three dimensions, they did not have a holistic understanding of the concept of sustainable development, and consequently did not have the competence to teach sustainability issues holistically either. Borg et al. [74] suggest that the lack of holism in the conceptual understanding could be explained by a lack of sustainability education related to their subjects in their teacher education program. Compared with Hofman's [5] study that we present below this conclusion sounds accurate.

Hofman's [5] study of Finnish teacher education is to our knowledge the only Finnish study that focuses on teacher educators' view of how sustainable development has been implemented in their own teaching at the course level. It indicates that the whole undertaking has largely failed. The implementation of sustainability in teacher education is more a question of political rhetoric than a reality at the course level. Despite elective courses in environmental education or sustainable development, the aims of sustainability have not been reached.

We shall now take a closer look at Hofman's [5] material, summarizing the results concerning teacher educators' views on sustainability. When the respondents (154 teacher educators) were asked to describe how they personally understand the concept of sustainable development only 10 percent mentioned all the four integrated dimensions of sustainable development, i.e., ecological, economic, cultural and social dimensions (the cultural and social dimensions are often also counted as one, see Introduction). A slightly greater part (11%) touched upon three of the four dimensions, and did not include a cultural or social dimension.

The ecological (called "environmental" by several of the respondents) dimension was sometimes combined with some other aspects, like human well-being, which was stressed by nearly half of the teacher educators (49%). The rest of the teacher educators (30%) understood the concept in very different ways without naming any of the four (three) main dimensions. For example, they explained that sustainability was an ethical or moral question or simply the recirculation of waste products or continued growth in general. As many as 70% of the teacher educators in Hofman's study mentioned the ecological or environmental dimension, including those who represented subjects other than the natural sciences. Therefore, the teacher educators stated that sustainability does not concern them and they do not include it in their teaching (18%) (since the sustainability issue belongs to the natural science educators, according to them). More than half of the respondents said that they did not know if their department had defined the concept of sustainable development in their strategies or other policy documents. In conclusion, Hofman's study indicates that policy documents and recommendations have not had a major effect on teacher educators.

Nevertheless, up to 75% of Hofman's respondents considered that sustainability is extremely important for all student teachers [5]. They also mentioned education and awareness raising as the best ways for society to promote sustainable development, but they did not see their own work as an important contributor. The great majority of the teacher educators (87%) had not received any training or education in how to integrate sustainability into all subjects, although several policy documents maintain that universities and teacher training departments have to incorporate basic sustainability knowledge and that pedagogical skills should be highlighted as an important educational policy issue in in-service training of teachers and supervisors [34,55]. Sustainability is merely rhetoric if teacher educators training future teachers have not received any education in sustainability themselves. In the section below we will present our interpretation of why this topic has been addressed in such a piecemeal fashion until now.

## 4. Why is an "Excellent" Education Failing in Sustainability?

When we were searching for answers about why Finnish teacher education fails in the implementation of sustainability, we found many fundamental components that hindered the process. We identified five strong elements that prevent purposeful implementation. Three of them are

connected to characteristics of Finnish teacher education, which *reflects a combination of overall trends in society and politics* that are contradictive to sustainability (1); *takes place at universities*, which means that it struggles with the same obstacles regarding sustainability as Finnish university education in general (2); and *is based on separate academic disciplines* and fragmented school curricula (3); Two other obstacles for a successful implementation are that sustainability demands a *profound ecologic literacy* (4); and *is strongly value dependent* (5). Below we explore these five obstacles in more detail. Our argumentation below is based on a critical analysis of actual literature on sustainability topics (research on sustainability in higher education; reports from the Worldwatch Institute, UN, and the Finnish government), educational research (policy documents, educational policy studies and empirical research), and social philosophy. Besides our analyses on current university strategies and comparisons of university courses on sustainability, results from our earlier empirical and theoretical studies have also been crucial complements to the literature.

### *4.1. Sustainability is in Conflict with Trends in Society*

Finland is one of the richest countries in the world [75]. During the last century, domestic consumption has grown eleven times [76]. After World War II, in the 1950s and 60s, mass consumption became a part of the Finnish life style [76]. However, from a planetary perspective, this is not necessarily a favorable development. Since the Club of Rome published *Limits to Growth* in 1972, arguing that the limits of planet Earth had been reached, the sustainability issue has been continuously under consideration. Planet Earth suffers from air pollution, deforestation, decreased biodiversity and many other problems. Overpopulation, unequal distribution of food and access to water and sanitation are alarming global human issues. One of the major environmental threats is climate change. This is a complex problem that influences many levels of life, both human and non-human, including water availability, food production, biodiversity, health, equality, human rights and employment. According to the *Worldwatch Institute* [77] and the *Intergovernmental Panel on Climate Change* [78], climate scenarios are dominated by orthodox economic views with unrestricted growth as the hidden goal.

The speedily growing world population is predicted to be as large as between 9.4 and 10 billion by 2050 [79]. Therefore, future forecasts concerning material and resource usage are all but bright, and yet economists still recommend continued consumerism. In this situation people may well feel insecure about whether they should consume more to support the current economy or less to help ensure a sustainable future [26].

Consumerism has become a dominant paradigm throughout the world [80,81], and Finland is no exception. The average consumption of goods of the world population in 2008 was 10 tons per year. However, the variety was vast, from a few tons to nearly 30 tons [80]. The reason for such high consumption is not only to be found on the individual level or to prevalent choices, but is primarily due to policies, economies and structures that facilitate environmentally destructive behavior [82]. Over the decades many joint efforts have been made to create a growing demand for goods. This has taken place with the help of policymakers, marketers, media experts, business leaders, and many others [82]. Talented "consumerism architects" have succeeded in shaping norms, values and narratives that attract buyers to choose a lifestyle where they express themselves through consumption. Thus, individuals are not the only ones to blame; it might even be unfair to make single individuals responsible for consumerism [26]. This can absolve the state from responsibility.

However, great obstacles hinder change, since consumerism has become part of human identity [83]. It is a sign of what Foucault [84,85] calls *governmentality*, which means that individuals are governed so skillfully that they can no longer separate their own will and actions from the system. People always make choices in a context [26] and, thus, structural problems become personal moral issues [83]. Nonetheless, education cannot escape the dilemma between politics and ethics [31] and the formation of identities [85]. Studies show that economic growth has reached the point in industrialized countries where it no longer has a positive impact on people's subjective experience of well-being and happiness [86].

Undoubtedly, education has also become a consumer good and a remarkable vehicle for competition. This is also the case in Finland, where education is seen as a tool in Finland's economic success on the world market. The excellent results in the PISA comparison is seen as proof of a successful educational system [62]. Consequently, Finnish education has become a goal and is market oriented. This is especially the case with higher education, and teacher education is no exception. Teacher educators are subject to accountability in the same way as all other university lecturers.

### *4.2. Finnish Teacher Education is A Reflection of University Education in General*

Finland signed the *Bologna Declaration of 19 June 1999* together with twenty-eight other European countries [87]. The aim of the declaration was to homogenize European higher education, but also to make students more competitive in the world educational market [88]. Since the 1990s, Finnish university evaluation has been institutionalized, and in 2004 the development of quality assurance and evaluation started [61]. Finnish universities have adopted the same values as the business sector and are steered by quality standards and top-down management [89]. When business ideologies became a part of the university strategies, the rhetoric also changed; learning became a form of market competition, and education developed into a sales product to be delivered to the market [90].

This has had a remarkable effect on both staff and students. According to Kallio and Kallio [91], university lecturers lack motivation for creative, knowledge-intensive work, because of the "management-by-results" atmosphere at their workplaces. Time efficiency decreases academic discussions and obstructs deeper understanding among teachers and students [89], elements that are crucial when dealing with challenging issues like sustainability. The idea of educating future teachers about sustainability is in conflict with a strong market-oriented agenda, but also with traditional practices. Although teacher education in Finland is research-based, it is not particularly critical [92] nor especially focused on development and adjustment [93]. Hökkä and Eteläpelto [48] have pointed to a lack of research on why the development of teacher education is so slow both on the individual and the collective level. Most educational research has applied a positivist approach and followed a normative agenda committed to the official values, according to Simola [92]. Sustainability, however, does not come about without open discussions about the issueof unsustainability.

Despite conflicting interests, international organizations, governments, industry and universities throughout the world have addressed the universities' urgent role in promoting the idea of a sustainable future among their students [53]. Yet, to promote sustainability, it is not enough that universities train students in sustainability; they need to *act* sustainably and focus on long-term goals [94].

Even if there have been major developments in higher education, there is still much to improve, according to Ramos et al. [95], who have studied implementation processes, participation, change management, assessment, and the popularity of sustainable development at the higher education level by reading of 33 academic papers from various countries. Higher education institutions can actually implement sustainability in three ways. One of these ways is called 'campus greening' and takes place through innovative planning, development of practical solutions and activities that promote sustainability in the daily life at the campuses. Examples of campus greening activities are often related to consumption; saving energy and water, reducing waste, etc. The other way of implementing sustainability is through teaching, and the third way is through research.

Sustainability is not only knowledge, among other things it is also an "open-minded and participative process" that has a connection to the students' own reality [96]. That means that universities are also life worlds for students. Innovative research and creative education build on academic freedom that together shape an ethical framework and prepare for the unpredictable [94]. Thus, universities should be seen as trustworthy institutions that train both scientists and citizens and conduct research that decreases uncertainty and ignorance. This is a field that needs a lot of development.

### *4.3. Separate Disciplines and Split Curricula Complicates the Implementation of Sustainability Education*

Universities have three main tasks to fulfill: education, research and social engagement, and they are the leading producers of knowledge. At the same time, they are conservative institutions with a strong subject orientation. Research shows that there is a lack of interdisciplinary scientific understanding with an increasing numbers of specialists even though sustainability issues are widely connected [97]. For example, the environmental and the financial crisis is a mixture of finance and economy as well as of climate, resources and the environment. Sustainability education has to deal with ideology, social change, and political power relations, and could gain much from political science [98].

Declarations and documents about sustainability in higher education stress that sustainability has to include all students regardless of subject, and has to be a part of the study programs and teaching [53]. The reason for the slow implementation of sustainability in higher education is, according to Christie et al., both the complexity of the sustainability problematic and the epistemological differences between different disciplines, and Dillon [99] asks for interdisciplinary meta-knowledge when solving sustainability problems. Weber [33] also emphasizes the complexity and distinguishes between two interlinked dimensions, a natural one (focusing on planet Earth) and a social one (focusing on human societies). One apparent obstacle for implementing sustainability in higher education teaching is its interdisciplinary nature. Interdisciplinary research is still seen as challenging, a form of research that is not supplied by academic practice [65].

Arts, humanities and social sciences introduce other crucial views of the sustainability dilemma. Because of its complexity [53] it is easier to implement sustainability issues in creative disciplines rather than science subjects. Likewise, sustainability might require an innovative and student-centered pedagogy [52]. Students need to develop an ability to judge, criticize, argue and predict, as well as to fight ignorance and understand various perspectives when dealing with sustainability [33]. In a study among university students in the USA ($n$ = 552), Fisher and McAdams [15] found that the way college professors approached the issue of sustainability, was also the way in which students framed the issue. This means that if the view the students receive is mainly one-sided or monodisciplinary, they will miss the complex picture. To deal with this problem, university teachers as individuals need to have both a complex understanding and a multidisciplinary approach in their teaching [15].

Teacher education is still based on separate academic disciplines and serves a fragmented school curriculum. Yet, according to Katehi [100], the multidisciplinary nature of universities provides grounds for jointly promoting new ideas and new practices. Since sustainability is more a matter of process than content, it turns the traditional curricula upside down in a quest for reorganization.

In Finnish schools, environmental and sustainability topics have often been passed to science lessons and delegated to science teachers (mostly biology and geography) [101]. Sustainability, however, cannot be handled only by natural sciences, even if these sciences are fundamental. Nevertheless, the core curriculum for basic education from 2014 emphasizes interdisciplinary teaching and learning to a much greater extent than earlier curricula [60]. Integrating teaching and multidisciplinary learning themes in the curriculum is a promising way forward from the view of sustainability education. The intention is that this educational approach will influence both content and teaching methods. The need for encouraging cross-curricular themes has also been underlined in earlier curricula, but the practical impact has not always been evident. Finnish teachers of grades 1–6 generally teach most subjects in the school class they are responsible for, which facilitates working interdisciplinary. However, sustainability is also emphasized within the curriculum contents and also in the aims of different subjects. Nevertheless, subjects like languages, mathematics, music, and history do not include sustainability issues in their aims and contents.

The new curriculum states that basic education in every school is obliged to arrange at least one cross-curricular learning theme during the school year, guaranteeing that each student has the opportunity to participate in this work. Furthermore, these themes are included in the assessment of the students, for example when assessing the subjects included in a particular learning theme. This clear statement in the curriculum might improve the conditions for working interdisciplinary, and this bodes well for dealing with the sustainability issue and the development work which has already started. Therefore, the conditions for the interdisciplinary perspective in general, and regarding sustainability education in particular, can possibly also improve teacher education at the university level.

### *4.4. Sustainability is Complicated without A Profound Ecological Literacy*

For over thirty years environmental issues and sustainability has been discussed as something that should be faced comprehensively and should influence all education, but still very often these issues have been treated as "add-on topics". The complex concept of sustainability hides many components, among them nature. Nature is the basis of all life. Without nature there is, moreover, no social life and no economics or culture. That is why the idea of sustainability originally rose from biologists and the field of nature protection. Today, the climate change dilemma more obviously than ever before shows how dependent humans are on well-functioning ecosystems, but also how all kinds of human undertakings and social engagements are dependent upon careful observation of nature.

Nevertheless, nature and the ecological dimension of sustainability still seem to be increasingly ignored in the sustainability debate. Environmental education as a new educational approach in the 1960s included a basic ecological approach to environmental problems [102,103]. Later, when it was pointed out that environmental education does not only concern the natural sciences [3], other aspects of sustainability were paid more attention. The more recent concept, ESD [2], clearly pronounced the importance of the human dimension in all decisions concerning environmentally sound development [54] (see also the Introduction).

Environmental aspects do not, however, inevitably include basic ecological aspects. Therefore, ecological literacy and ecological understanding as a more positive approach than environmental problems form the bases of ecological sustainability. Ecological literacy means "understanding the key ecological systems using sound ecological thinking, and also understanding the nature of ecological science and its interface with society" [104] (p. 230). Ecological aspects of sustainability include both knowledge- and value-based issues of the sustainable use of natural resources, conserving bio- and genetic diversity and maintaining nature's ecological systems [105]. Therefore, an insight into natural resources, the fragility of the physical environment, and the effect of human activities on them, are environmental concern issues which should be considered in all social and economic policy development [34]. The fundamentals for sustainable development are the maintenance of biological diversity, the viability of ecosystems and the long-term reconciliation of economics and other human activity with the environment's carrying capacity [106]. Learning to care for all life on earth as early in life as possible is important as a basis for sustainability education [107].

However, the majority of student teachers and graduates in many universities are unable to explain the meaning of key integrating ecological concepts at even a minimum level of maturity, alluding to a possible systemic problem [108–110]. To achieve ecological literacy a greater understanding of ecological topics is needed. The ecologically literate person is, moreover, significantly more likely to engage in a set of pro-environment activities than someone who is not educated in ecology [111].

Future teachers ought to be profoundly trained, on the one hand, to understand ecologic components and ecological relationships and, on the other hand, to realize how nature and natural phenomena relate to social structures. Teachers unquestionably need a profound ecological knowledge to really understand, for example, the complex climate change dilemma. An ecologically literate teacher can also understand the complex relationships between human and ecological systems more easily [109]. Basic knowledge on many levels is a foundation for teachers, who have the task of integrating sustainability into all school subjects, but to do this they also need to be trained in ethical reasoning.

### *4.5. Sustainability Education is Complicated because of Its Value Dependence*

The global sustainability challenges need to be tackled by knowledge and facts (to know how the world and the situations actually are) and tackled under real life conditions. Yet, the problems also need to be faced by normative questions, such as what ought we to do about it, and what is just to do [12,112–114]. As Moore and Nelson have said, "It is from the partnership between science and ethics that policies are born" [112] (p. 226), and education has to be designed so it triggers the students' own thinking and judgment [114,115]. However, ethics in education can be both a method

and an aim. As a method in teacher education, ethics activates students morally and encourages even unpredictable transformations; but if regarded as a narrow aim, educators can only transmit a particular ethical view [12]. Without any determined aim, the outcome becomes undecided and makes room for future teachers to formulate visions and jointly shape temporal aims and even to disbelieve the entire "sustainable development" aspiration [12,116] and shape new projects and visions.

Humans' relation to nature and the idea of a sustainable future is wedded to many social dilemmas. Individual choices and fulfillment of personal desires do not necessarily promote socially valuable goals. Worldwide justice as well as intergenerational justice requires an equitable distribution of benefits as well as of burdens [112]. This calls for society-wide changes that involve the implementation of new policies, new infrastructures, new technologies and new laws [82]. To create a more sustainable course, there is a need for wider structural changes. Unsustainability is a global problem that is often in conflict with the individual quest for freedom of choices that has become a privilege in the wealthy countries. When considering the basic provision of the Universal Declaration of Human Rights, Article 3: "Everyone has the right to life, liberty and security of person" [117] it becomes obvious that interpreting the word "liberty" widely as "freedom of choice" easily turns the provision into a paradox. According to Moore and Nelson [112], these notions signal that the rich nations of today are carrying out the most severe violation of human rights.

The role of education is then also to train one's practical reason to consider the ethical conditions for mutual human undertakings and to identify the limits and terms nature sets for human life. Viewed this way, education has to offer both theoretical knowledge and provide possibilities for ethical deliberation, thus "provoking" students to form personal judgments and to participate in responsible actions based on both knowledge and reflection.

This ethical deliberation starts from an ethically conscious teacher education. A teacher education with sustainability as an important aim takes this mission seriously. In a qualitative study among upper secondary teachers, Sund [118] became convinced of the difficulty of teaching about ethical sustainability issues like global equity, fairness and responsibility to distant others. Emotions and passions were common elements when dealing with these kinds of issues, and she underscored that sustainability/unsustainability, justice/injustice and wealth/poverty are complex and demanding teaching topics which require talented teachers. A quick fix kind of training is definitively not enough.

## 5. Pedagogical Implications and Conclusions

A non-sustainable life has not come about suddenly and will not be overcome without joint efforts and fertile learning conditions. The concrete process towards sustainability needs to become a canon in teacher education in Finland and elsewhere. Words in policy documents are not enough; without training in sustainability education student teachers will hardly be able to teach this topic. If universities and other institutions offering teacher education do not regard sustainability as an important topic, there is a great risk that future teachers as well as teacher educators will enter the labor market without enough knowledge and skills to teach sustainability. The main actors to solve this issue are the leaders of universities, especially in Finland where the universities are autonomous. When leaders have embedded sustainability in the visions and goals of strategy documents they are responsible for the implementation of the issue in the university as a whole, including educational programs and research. However, somebody needs to take responsibility for a broad application, otherwise only those who have an economic interest in the topic will act.

Both strategies and national curricula are a good beginning, but without a purposeful interdisciplinary and transdisciplinary implementation that involves university leaders, teachers and students from different disciplines, and also other stakeholders, the policies will remain merely words. Universities have autonomy in terms of educational content, so to find a consensus between teacher educators about which subjects are most essential and have to be included in teacher education is challenging [65]. One teacher educator can seldom teach an interdisciplinary topic alone [65]. Another problem with the implementation of sustainability is the competition among so many compulsory subjects that must all be covered by the teacher education curriculum [65].

Pathan et al. [65] found that the strategies around sustainable development are most realized in the Finnish vocational institutions and in polytechnics when compared to other educational sectors in Finland. They argue that this is the case because vocational training has a closer relationship to workplaces and employers than higher education and especially university education has. Sustainability has, moreover, become a must in many workplaces. A Finnish study from 2001 shows that teachers in vocational education were more committed to teaching sustainability than teachers in primary and secondary schools [101]. One reason was that the leaders encouraged the teachers in vocational education to participate in sustainability in-service training. To rely too much on in-service training is though hazardous, since all schools might not have resources for that [65] or might prioritize other kinds of training courses. The teachers' preservice training at the university is without doubt the most important.

Universities in Finland and elsewhere are top knowledge institutions in a key educational position. Therefore, the sustainability process could create excellent opportunities for them to produce new ways of thinking as forerunners in a sustainable process. Then they become important participants in a dynamic and flexible synergy issue of different sciences and subjects where science, education, art and practices are combined, transformed and developed [119]. Universities already have both a research infrastructure, and staff with knowledge to train students in sustainability issues, according to Weber [33], so they even have a responsibility to jointly take the lead in the sustainability process as models and living laboratories [100]. As we have discussed the situation is sometimes less promising. The shortcomings of universities in general are obvious in the *2nd Glion declaration* of the *Glion Colloquium* (a forum that gathers university leaders and leaders from business and governments every second year in Glion, Switzerland to jointly consider what role the world's leading universities should play in addressing the great challenges and opportunities of our times.). The Glion Colloquium is still hopeful in their vision about the universities' role in the sustainability process: "Universities exist to liberate the unlimited creativity of the human species and to celebrate the unbounded resilience of the human spirit" [120].

A redesign of the universities and teacher education requires visionary leadership, social networking, and new forms of research and high levels of participation [7]. The sustainability trajectory becomes a joint commitment where visioning, planning, activities, daily conducts and evaluation continually follow each other in a steadily transforming process that engages both teachers and students in democratic processes and joint work that enables profound learning and the understanding of multiple views. There is a need for teacher education where future teachers learn to relate to sustainability issues as reflective practitioners and learning facilitators.

Because of the interdisciplinary nature of sustainability and the fact that universities are autonomous, the implementation of sustainability in teacher education is challenging. To prepare teachers for teaching about sustainability, this topic needs to be seen as important not only at the course level, but significant already in strategies, curricula and plans. Managers, administrators, teacher educators, researchers and students from various fields need to work together in this crucial development process. Student teachers have to be involved in campus greening, experiencing how sustainability is included in various school subjects both in theory and practice, but also treated as a subject in its own right. Another necessity is purposeful high quality sustainability in-service training for both teachers in general education and teacher educators at universities.

In 2013–2018 the new Finnish Education Evaluation Centre perform assessments of learning outcomes in sustainability in upper secondary vocational education [121]. No results of these assessments have been published yet. The same interest will hopefully soon be shown in general education, and why not in teacher education as well, even if the economic benefit of the sustainability knowledge of those graduated from general education might not be directly observable. Negligence on this level will be disastrous in the long run. Features like the learning outcomes of sustainability education, action competence or interdisciplinary skills have hitherto not been measured in PISA tests. Yet, according to a recent plan [122], 'global competency' will be a target for measurement in 2018. This will hopefully raise the sustainability issues to the agenda both in teacher education and schools in the countries involved, not least in Finland.

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