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UN Global Action Programme and Education for Sustainable Development: A Critical Appraisal of the Evidence Base

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Abstract

The United Nations (UN) proclaimed the years 2005 to 2014 the World Decade on Education for Sustainable Development (ESD). As a follow up on the World Decade, the UN launched a Global Action Programme (GAP) that is designed to set the framework for international activities on ESD. The GAP focuses on five priority areas that are of high relevance for further implementation of ESD in educational systems.

The research presented in this paper results from a training research course that was conducted with advanced bachelor students in environmental and sustainability science. This project pursued two main objectives on different levels: the aim of the research aspect was to identify well-documented success factors for specific research questions associated with the GAP designated priority action areas by means of conducting systematic literature reviews. The aim of the training was to enable students enrolled in the university course to experience systematic review and critical appraisal of the current state of research in the various fields of ESD. As a result, the paper summarizes and discusses both the findings of the research projects and university course. Inclusive is the potential of the teaching approach and its contribution to advancing higher education for sustainable development.

Keywords: Evidence-based policy, education for sustainable development, systematic literature review, training research project, research-based learning

The Global Action Programme on Education for Sustainable Development: An Introduction to the Context

Since its inception at the 1992 United Nations (UN) World Summit in Rio de Janeiro, the concept of Education for Sustainable Development (ESD) features prominently on the international political agenda. The importance attributed to ESD culminated in the proclamation and implementation of the World Decade on ESD, delivered under the patronage of the UN between the years 2005 to 2014 (UNESCO, 2014b). In order

to foster and increase the activities conducted in the context of the World Decade, the Global Action Programme (GAP) was launched at the 2014 World Conference on ESD; hosted in Japan, the conference marked the end of the UN World Decade.

The GAP is established for an initial period of five years. At the heart of the GAP lie five priority action areas that are considered as "key leverage points to advance the ESD agenda" (UNESCO, 2014a, p. 34):

1. *Integrate* ESD into international and national **policy support** for education and sustainable development.
2. *Promote* **whole-institution approaches** to ESD at all levels and in all settings.
3. *Strengthen* the capacity of **educators**, trainers and other change agents to become learning facilitators for ESD.
4. *Support* **youth** in their role as change agents for sustainable development through ESD.
5. Accelerate the search for sustainable development solutions at the **local community** level through ESD.

The focus of the key leverage points is to generate and foster activities that contribute to achieving the goals of each priority action area, such as increasing the number of countries that have integrated ESD into their policies. There is good reason to assume that the GAP and its five priority action areas will shape the near future of policy-making and practice on ESD. But how does the GAP relate to *research* on ESD? First of all, it can be expected that the strategic impact of the GAP on policy and praxis will also influence the research agenda in the coming years, focusing researchers' attention on the five priority action areas. A more urgent need, however, arises from the observation that ESD "remains poorly researched and weakly evidenced" (Tilbury, 2011, p. 9). This observation not only calls for more and better research; it also challenges research to contribute to the implementation of the GAP by informing and substantiating decisions on which specific activities to embrace and what measures to take in the five priority action areas, based on careful review of the best existing evidence available.

Appraising the Evidence Base in ESD: a Training Research Project

This paper reports on the design and results of a course that was offered in the winter term 2014/2015 at Leuphana University Lüneburg, Germany, in the module *education, participation and communication* to advanced undergraduate students of environmental and sustainability sciences. The course was designed as a training research project according to the principles of research-based learning. Eight students enrolled in the course were split up in two groups of four students each. The task assigned to each group was to develop and carry out a research project related to one of the five priority action areas of the GAP. The course design provided input on the methodology that was then applied by the two student groups to specific research questions related to a GAP priority area. The main objective was to explore the existing evidence base resulting from past and present research in these fields by conducting systematic literature reviews.

The following provides a threefold introduction to the context of the overall course design, discussing (1) the principles of research-based learning, (2) the course design and its didactics and (3) the method of systematic literature analysis that was applied in the student research projects. Section 3 then described the outcomes of the research projects by the two student groups.

Teaching Approach: Training Research Project

In the debate about teaching and learning in higher education, a growing interest can be observed in approaches that seek to move away from transmissive forms of instruction towards promotion of more active modes of engaging students with research as a practice for constructing knowledge. Approaches in this field are labeled as "research-oriented," "research-enhanced" or "research-based" (Webster & Kenney, 2011, p. 362), or, alternatively, as "inquiry-led" or "research-informed" (Pawelleck & Brendel, 2013, p. 161). A widely recognized attempt to systematize the variety of approaches was proposed by Healey & Jenkins (2009) who distinguish between four modes according to their emphasis on either research content or processes and whether students are active participants or passive recipients (see Figure 1).

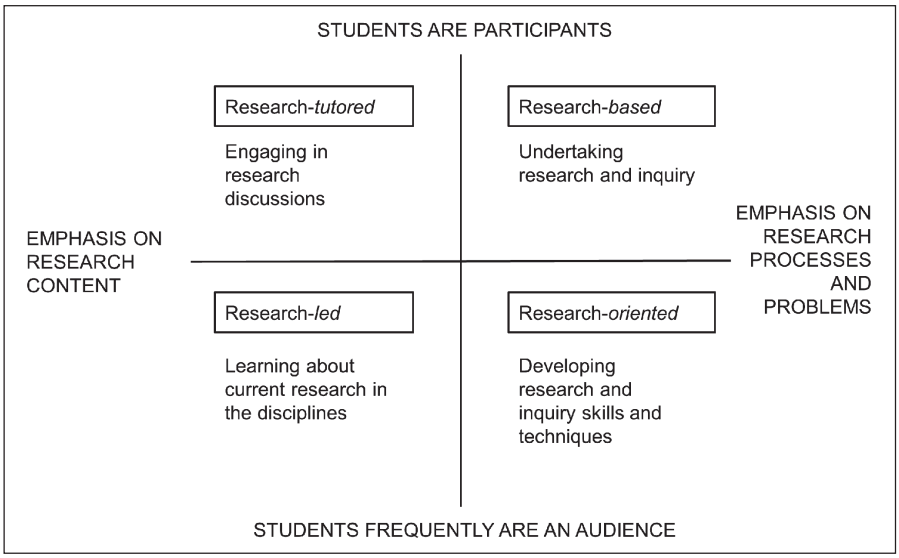

Figure 1. The nature of undergraduate research and inquiry (after Healey & Jenkins, 2009, p. 7)

In Germany, the concept of research-based learning was popularized in the 1970s by the West German Federal Conference of Assistant Professors (Bundesassistenten-konferenz, 2008) as an institutional reform to improve teaching and learning as well as to foster active, independent, self-determined and intrinsically motivated learning during research processes (Dippelhofer-Stiem, 1989). Four features distinguish a research-based learning approach from other forms of active learning (Huber, 2009). Firstly, it involves students in an overarching research project that is not carried out as an end in itself, but in order to produce results of interest and relevance to others. Secondly, it involves students in all stages of the research process, from the development of questions and hypotheses, to the selection and application of methods, to the evaluation and presentation of results. Thirdly, student involvement goes beyond mere observation and requires active collaboration, codetermination, autonomy and responsibility. Lastly, research-based learning entails a reflective component that involves evaluating experiences incurred during the course of the research project. According to Healey and Jenkins' typology

(2009), research-based learning can be qualified as an approach that promotes engagement with the research processes, rather than solely with its contents, in addition to the active participation of students in these processes.

The training research project offered in the university Bachelor course titled "UN Global Action Programme on ESD: A Critical Appraisal of the Evidence Base" was designed according to the aforementioned principles of research-based learning. The university course aimed to encourage and support the development of skills and competencies with regard to

- self-organized research projects: formulation of research questions, literature review, development of a research design, data analysis, presentation of the results,
- conceptual foundations and political implementation processes of ESD,
- knowledge of contemporary priority action fields in research on, and practice in, ESD,
- critical evaluation of the concept/construct of "evidence" in educational policy making.

At the heart of the course was the design and implementation of research assignments by two groups of students. The course was laid out in five different phases that mixed input and consultation (see Table 1).

Table 1
Overview of Course Design

Sessions	Phase	Description
1–3	Input I	Introduction to the theme of the course and research method of the course and research methodology: ESD, UN GAP, systematic literature review
4–8	Consultation I	In groups, focus on development of research questions and review protocol
9	Input II	The notion of evidence and evidence-based policy making
10–13	Consultation II	In groups, focus on data extraction and synthesis
14–15	Examination and Evaluation	Group presentations and oral examination Reflection on the research assignments and the course design

Research Approach: Systematic Literature Reviews

The research projects developed during the course of the semester employed systematic literature analysis. This method has received growing attention in past years for a number of reasons. Systematic literature reviews meet the need for orientation in light of the rapidly growing body of publications that can hardly be overlooked by individuals anymore (Ridley, 2012). Furthermore, there is a tendency to base policy decisions on a synthesis of high-quality, rigorously identified evidence available; importantly, evidence-based policy making necessitates standardized procedures and methods. According to a distinction proposed by Okoli and Schabram (2010), current literature reviews are commonly found (1) in introductory parts of scholarly papers to provide theoretical background, (2) in student theses and (3) in the form of stand-alone research enterprises. The third form of literature review differs from the first two types with

respect to the scope and rigor they adhere to. A widely accepted definition of a systematic literature review refers to "a systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners" (Fink, 2009, p. 3). Importantly, a systematic literature review from this perspective is not simply an introductory component of a research study. Rather, it "is in itself a research study, addressing research questions and using the literature as data to be coded, analyzed and synthesized to reach overall conclusions" (Ridley, 2012, p. 190). The approach pursued in the students' research assignments involved four main steps that different approaches to systematic literature reviews hold in common (Centre for Reviews and Dissemination, 2009; Fink, 2009; Petticrew & Roberts, 2009; Ridley, 2012). These main steps encompass (1) developing research questions, (2) conducting literature reviews, (3) synthesizing the evidence base and (4) reporting and recommendations (see Figure 2).

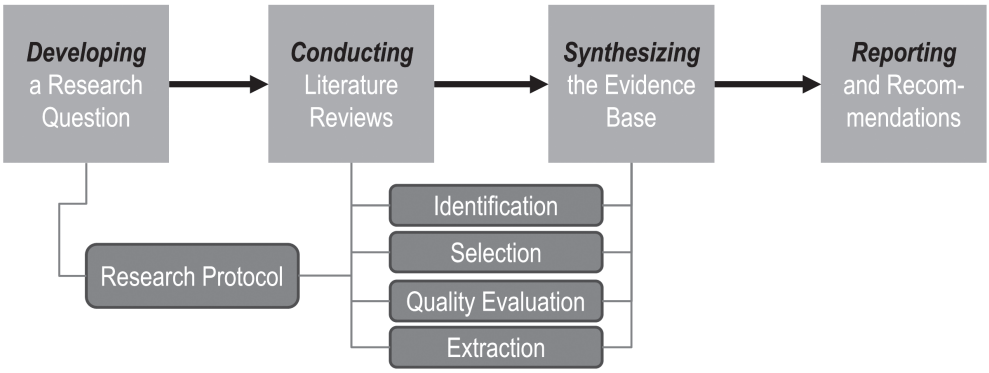

Figure 2. Key steps involved in a systematic literature review (authors' illustration based on Fink, 2009, and Centre for Reviews and Dissemination, 2009)

Between developing research questions and conducting literature reviews, the initial conceptual phase consists of designing a research protocol that contains:

- the research questions and underpinning hypotheses,
- information on the background of the study including a discussion of the existing research within the field and the need to conduct the review,
- information on the criteria for including or excluding studies, such as using the PICOS formula: selection based on study *p*opulation, *i*nterventions and *c*omparators used, reported *o*utcomes or specific *s*tudy designs,
- an outline of the methods used and the strategy pursued to search for literature,
- an explanation of the proposed approach to appraise the quality of, and extract data from, the final sample of studies included,
- a description of the approach to synthesize and report findings.

The remaining phases of *conducting*, *synthesizing* and *reporting* basically carry out as described in the research protocol.

Aims, Approach and Findings from two Student Research Projects

This section reports on the two student research projects that utilized the method of systematic literature review in order to answer specific research questions in the context of the GAP. The two studies addressed somewhat different aspects associated with the GAP. The first study raised some overarching questions with respect to the transition from the UN World Decade to the GAP. Based on the understanding that ESD not only attempts to introduce new topics to educational settings, but also seeks to establish a more holistic pedagogical approach, this study set out to identify key qualities of holistic education in the literature and to relate them to a concept of ESD that is widely established in Germany. The second study is located more closely in the GAP priority action area aligned with youths. It focused on the notion of participation and attempted to synthesize the evidence on the impact of school programs on the development of participatory competence among students.

Study 1: Towards a more holistic ESD

The goal of ESD is not simply to teach different contents but also to incorporate alternative approaches and methods that differ from what many teachers in schools traditionally use; for some examples, refer to Table 2.

Table2
Some Exemplary Approaches in Ideas, Teaching and Contents for ESD Versus Traditional Teaching in Schools (based on Haan, 2008, p. 27–29)

	Traditional Approach	ESD
Problem solving strategies	A *retrospective strategy* for solving future problems: Problem solving is based on hypotheses and strategies from the past and the present that are applied to the future.	A *prospective strategy* for solving future problems: Based on found information, hypotheses for problem solving in the future are developed and tested.
Knowledge	*Epistemic knowledge* is in focus, which means students learn to decide based on knowledge from the past for rules of decision making and acting.	*Heuristic knowledge* is in focus, which means students learn to decide strategically based on general rules of decision making and acting.
Knowledge acquisition	Knowledge acquisition is *additive and cumulative* and creates archival knowledge.	Knowledge acquisition is *anticipative and contextualized* and creates innovative knowledge.
Subjects	Issues are *input-oriented*, which means that the focus is on the topics which students should interact with.	Issues are *output-oriented* which means the focus is on the competencies and strategies students should learn.

Therefore, ESD is grounded on a different and farther-reaching understanding of education than traditional teaching in schools. After the *United Nations Conference on Environment and Development* (*UNCED*) in Brazil (1992), the implementation of Agenda21 in Germany saw some different concepts of ESD evolving (Haan, 2008, p. 25). In Germany, the *UN Decade of ESD* was based on a concept of ESD that focuses on the acquisition of "*Gestaltungskompetenz*" (*shaping competence*) proposed by de Haan (2008) as an overarching goal (German Commission of UNESCO, 2014, p. 1).

The research conceives the end of the UN World Decade and the beginning of the GAP as a possibility to reconsider some conceptual underpinnings of ESD. This conception served as a foundation for the first study.

Table 3
The Hypotheses that the Research is Based on

	Hypotheses
1.	Holistic Education is farther-reaching than traditional educational concepts.
2.	There are different concepts of Holistic Education which can complement each other.
3.	Holistic Education has a stronger potential for solving future problems than traditional education.
4.	ESD has a stronger potential for solving future problems than traditional education.
5.	There are differences between de Haan's concept of ESD and Holistic Education.
6.	Holistic Education is farther-reaching than de Haan's concept of ESD.
7.	Holistic Education can enrich de Haan's concept of ESD.

The starting point of the research project was the students' interest in Holistic Education as a related field of educational discourse that is not as well-known in public schools. In order to advance from this rather general interest towards more specific and formal research questions, the group members developed an initial set of hypotheses that focus more closely on connections between Holistic Education and ESD (refer to Table 3). These hypotheses are underpinned by an overall interest to find out how far-reaching concepts of Holistic Education, refer specifically to hypotheses 1 and 6 in Table 3, could enrich the concept of ESD most widely spread in Germany by de Haan (2008) that is referred to as de Haan's concept of ESD. In the next step, the group members reworked and rearranged these hypotheses into one main research question with further specifications, which is presented in Table 4.

Table 4
The Research Questions with Further Specification

Research Questions	Specification
What are the key qualities of the different conceptualizations of Holistic Education? How do they differentiate from de Haan's concept of ESD?	*Key qualities* refer to characteristics or aspects of concepts as defined by the authors of the texts as essential to the concept(s) mentioned in the text.
	Different conceptualizations are mentioned explicitly for gaining a broad perspective on the topic. By inclusion of different perspectives, the greatest perspective possible is achieved; the variation with different key qualities can enrich Holistic Education.
	There is no specific definition of *Holistic Education* on which the research is grounded; the need to better define the term it is an integral part of this research. Texts which are included in the sample should mention a working-definition of Holistic Education.

The research questions are parsed by working hypotheses 1 and 6. Inquiry into "What are the key qualities of different concepts of Holistic Education?" is used for the literature review (see 3.1.2). For the comparison and further interpretation, the study asks, "How do they differentiate from de Haan's concept of ESD?" (see. 3.1.3 and 3.1.4).

Review Procedure

Holistic education refers to a broad body of educational literature with a considerable proportion of conceptual papers. Preliminary research shows that these resources are not very well represented in journal-based databases such as SCOPUS or Web of Science. Hence, the literature review used the Education Resources Information Center (ERIC) as database and a rather open search string to identify the initial sample of publications to be included in the review. ERIC was chosen as the primary database since its content is already filtered in matters of educational research content. The key phrase string "*holistic education,*" with quotation marks as an essential part of the string, was chosen to narrow the search result but simultaneously include texts that are defined as a contribution to holistic education research by key phrase. For reasons of feasibility the search result was further limited to full texts available, which reduced the output from 223 to 57 texts. In the next step, a systematic screening and coding of the abstracts further reduced the number of papers. Each abstract was reviewed by two group members independently. The relevance of the abstract for the research questions was rated with either 0 (not relevant), 1 (partly relevant) or 2 (fully relevant). A criterion for relevance was that the abstract addressed key qualities of holistic education. Papers with a rating sum of two or less were excluded; papers with a rating sum of four were included. Papers with a rating sum of 3 were additionally rated by the other two members of the student group. If the rating sum adds up to six or more, the paper was included in the sample, if the rating sum is less than six, it was excluded. The final sample resulting from this initial screening comprised 21 texts.

In the next step, the final sample of 21 documents was reviewed in detail. To extract fit data, a quadrinomial-coding scheme (Cooper, 2010) was established focusing on (A) basic information, (B) empirical evidence, (C) the institutional focus group and (D) the content structuring (see Figure 3). For each of the four general categories, subcategories were developed that reflect the research interest according to the research question and its specifications outlined before (see Table 4).

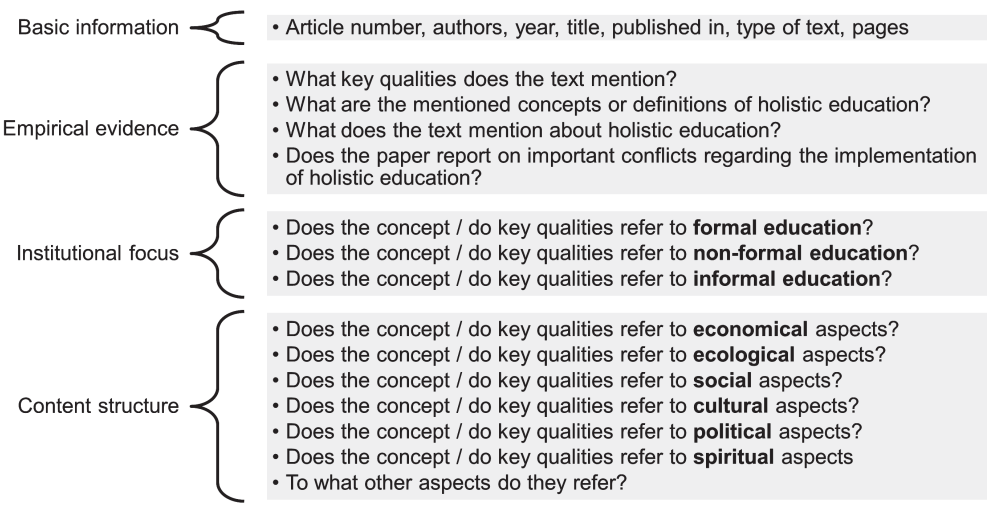

Figure 3. Coding scheme (according to Cooper, 2010).

Findings

After the literature review was conducted, the extracted data was analysed and synthesized using different sorting categories to inform comparison with de Haan's concept of ESD. These categories have been developed inductively to sort the data extracted from the 21 documents. For further simplification, these categories were narrowed down to three main themes that focus on (1) the worldview and concept of the student, (2) the goal of education and (3) methods of education used in holistic approaches. In what follows, results are discussed in light of de Haan's concept of ESD and similarities and differences are outlined.

Worldview and Concept of Student

The concept of ESD is focused on achieving sustainable development and viewing students as a powerful means to influence sustainable development of our planet and society at large. In this context, the individuality of each student is recognized in acquiring the necessary competencies. Concepts of holistic education (HE) start from a point of view that all life on earth is interconnected and, consequently, that human beings are deeply connected to the environment and other beings. All HE concepts are based on this worldview, the notion of balance and connection between self, society and nature. This triad is considered as essential to the well-being of all life. Therefore, the student is seen as the wholeness of body, heart and mind, in addition to being embedded within living systems. Maturity is consequently viewed as a state where people discover and nurture this connection and wholeness, as well as presenting their own special gift that every human being has to offer to the global community and to the earth.

Goal of Education

The concept of ESD aims to change the way of thinking about the planetary challenges and possibilities for sustainable development and to empower students to actively participate in shaping a sustainable future through the promotion of "Gestaltungskompetenz" *(shaping competence*, Haan, 2008). While definitions of holistic education agree in the goal of shaping a sustainable future, most of the concepts discussed in the literature do not limit focus on tackling problems and symptoms but see that the key to efficacy is involving healthy people, societies and environments. Therefore, the direct goal for the student, as a participant in the the educational process, is *ultimacy*; this is a state when students are able to find balance between body, heart and mind and connection to themselves, other people and nature, as well as true belonging and identity. Values and value-based principles that are embedded in this educational goal are mindfulness, compassion, peace, freedom and cooperation.

Methods of Education

Concerning methods of education, ESD's main emphasis is on innovative learning and problem solving strategies. Here, different competencies on the cognitive, emotional, motivational and social levels are integrated into the participatory group processes that lie at the heart of the methods used for ESD. Holistic education is also based on experiential and innovative group processes in education; but, in comparison to the methods that are also integrated within the ESD concept, holistic education can be considered as broader in scope. In most of the concepts resulting from the review, education is seen to expand beyond the traditional system and out-dated institutional framework. ESD sees the whole society as responsible for education. In this sense, the role of educators differs

because it is multidirectional learning where educators act as role models for the integration of attitudes and actions. At the heart of the educational process lie the four ways of knowing and learning as exemplified by John Heron (1992): (1) embodied sensation and feeling, (2) metaphoric, intuitive and heartfelt image creation, (3) conceptual analysis and critique, (4) praxis and reflective action. Pedagogy that expands the traditional set of educational methods includes the use of stories, indigenous wisdom, imagery or meditation and drama.

ESD sets out to propose new perspectives on education for a sustainable future. The analysis of the holistic education literature suggests that some aspects of holistic education are even more far-reaching than ESD in integrating the whole person in the educational process and can thus provide a basis for the further advancement of ESD as a truly holistic educational concept.

Discussion

The findings of the review give evidence that in order to successfully implement ESD through the GAP in the next few years, the whole concept may need to be further developed drawing from ten years of experience and, especially, from some alternative and probably more holistic approaches to education that can be found in the educational landscape. Although many holistic concepts have qualities that are either bound to a specific place or a specific group of people, the review has shown that there are also some broader ideas and philosophies on which holistic approaches are based, which might give the whole discourse on improving the educational system new perspectives and inspirations.

As the review, in its extent, was not able to cover the entire possible range of ways in which more holistic concepts might benefit the ESD discourse, this is an area in which further research should be conducted. While this review was meant to touch upon a basic discussion of the understanding of education, future research should also focus on the practicability and possibilities for integrating and implementing more holistic educational approaches.

Study 2: Effects of Participation in School Projects on ESD

The idea for the conducted research was based on the UN GAP on ESD and more specifically on Youth as one of the five priority action areas of the GAP. The aim, formulated by the UN in this area, is to "support youth in their role as change agents for sustainable development through ESD" (UNESCO, 2014a, p. 36).

Research Question

In order to formulate an appropriate research question, different selection criteria were discussed and determined. Regarding the population, the research focused on students in secondary education. The intervention under investigation in this review was associated with programs within schools that combine formal (delivered by trained teachers in a systematic intentional way; within a school, academy/college/institute or university) and informal (taking place naturally as part of some other activity) learning. This intervention was then expected to have an influence on the outcome, that is, on the participatory competence of the students. Participatory competence as a main focus was chosen

because it "can be viewed as a key competence, that embraces further competences crucial to promote sustainable development" (Rieckmann & Stoltenberg, 2011, p. 160; authors' translation). Thus, the systematic literature review focused on the following research question: *How do school programs in the context of ESD support students in the development of participatory competence?*

Review Procedure

The key words used in the literature review departed from the selection criteria discussed above. In order to find appropriate results, the key words YOUTH (for the selection criterion population), ESD, SCHOOL (intervention) and PARTCIPATION (outcome) were chosen. The databases Scopus and Web of Science were used as two of the most important scientific online databases and the education databases ERIC, the Journal of Sustainability Education and the Journal of Education for Sustainable Development served as three supplementary sources of data that have a specific focus in the area of interest of the conducted research. The search with the key words defined above in these databases produced a result of 114 papers (see Table 5).

Table 5
Results of Database and Journal Search

	Name of source	Number of results
1.	ERIC	28
2.	Web of Science	14
3.	Scopus	35
4.	Journal of Sustainability Education	4
5.	Journal of Education for Sustainable Development	33
Total Hits		114

Subsequently, two screenings of the papers generated by the search of the literature were undertaken to find those most adequate to address the research question. The first screening filtered the papers to extract those that were potentially pertinent with regards to language and topic. To this purpose, inclusion and exclusion criteria as to publication language, setting and target group of the intervention and the subject area of the paper were established (refer to Table 6). One member of the research group read the abstracts of all 114 papers and the papers were included or excluded according to the criteria. A total number of 24 papers remained after this step of the review was completed.

Table 6
Inclusion and Exclusion Criteria During the First Screening Period

	Inclusion criteria		Exclusion criteria
i.	publication language: English	i.	duplicates
ii.	setting: high school	ii.	setting: higher education, university of applied science, kindergarten, pre-school
iii.	target group: students and youth	iii.	target group: teachers
iv.	subject areas: Social Sciences, Environmental Science, Arts and Humanities	iv.	subject areas: Chemistry, Engineering, Medicine, Business, Economics, Biology, Health

The second screening aimed at finding the best papers available in terms of relevance and accuracy. The inclusion and exclusion criteria focused on the type of intervention mentioned (school programs), the content (mentioning of ESD, focus on participatory skills or competencies), the research design (empirical, including case studies) and the availability of the paper through the university library subscription packages. To carry out the second screening, the abstract of each of the 24 papers was read by three members of the research team and, with regard to the inclusion and exclusion criteria, rated through a coding scheme consisting of the symbols plus, minus and question mark. The symbols represent whether the abstract was included in the final sample (+), not included (-) or undecided (?). All papers rated with at least two + symbols were included in the final sample, resulting in a total of six papers.

For the final sample, the extraction of data from the papers was carried out using a questionnaire. Two students of the research team read each paper. The questions concerning Basic Information, ESD, the School, the Target Group, the Intervention, the Results and the Conclusion of each paper were answered by the first reader, then commented by the second reader as recorded on an Excel sheet. To synthesize the findings, the method of narrative synthesis was used (Ridley, 2012, p. 192), as mostly qualitative data was elevated.

Findings

The findings of the research conducted can be divided into distinct sections: general findings, goals in the different programs regarding participatory skills, outcomes of the programs concerning change in motivation and participatory skills and factors which influence the degree of students' participation. Generally, the papers were published recently in 2012 and 2010. Five papers examined the developments in secondary schools with the age of students in question between 10 and 20. Four out of the six papers mentioned ESD explicitly. The goals regarding participatory skills were mainly to empower students politically, socially and academically. In five studies, the motivation of the students, as well as their ability and willingness to participate, changed due to the programs in place. At first, students often only participated in a passive way, but then became more active and joined activities as agents for change. This occurred after students realized that specific knowledge has an effect on daily life and participation includes a role in curricular decision making processes. In conclusion, the following influence participatory competence and empowerment:

- The role of and the relationship between students and teacher,
- the integration of non-formal learning into the curriculum, as well as the interlink between formal and non-formal learning,
- the implementation of project-based and action-oriented learning,
- the degree to which students believe in their own ability to contribute and
- the degree to which students get the opportunity to be involved in the decision-making process.

Discussion

The question of how students can be supported in the development of their participatory competences is a relevant and important issue, as the GAP aims explicitly toward supporting youth in their role as change agents for sustainable development. Thus, there exists a need to adapt educational systems to current societal challenges. It has

become clear that influencing participatory competence through school programs is a complex matter and that many factors must be considered which influence students' participatory competence. Further research is needed to contribute to this important aspect of ESD that uses, in the context of a systematic literature review, a greater number of databases and, in particular, gives emphasis to the question of the critical appraisal of the evidence base.

Reflections on the Teaching Approach

In the final course phase of the seminar, students were encouraged to reflect on their experiences with carrying out autonomous research projects using systematic literature reviews as a method. This reflection was an essential part of the course presentation and took place in a more dialogic form during the last course session (see Table 1). The students were asked to comment on four questions:

a) Please name the three things that you have learnt through the course that you find the most useful.
b) Please name what you would have liked to study more intensively / to go deeper in.
c) If I was to offer the course again, what should I keep and what should I change from your perspective?
d) What else do you think is important to say/share about the course from your experience?

The students' responses to these course questions were documented and afterwards grouped into three categories: reflections on (1) the use of systematic literature review as a research method, (2) learning outcomes related to ESD, and (3) the course design and teaching approach. The following synopsis summarizes the statements for each category.

(1) The students report some overall positive experiences with the method of systematic literature review. In particular, the potential of the method to gain an overview of the field of interest was pointed out. Some students mentioned that working with the method has increased their sensitivity and ability to work in a careful, systematic, reproducible and documented way. There was also broad agreement that both project groups experienced the high degree of standardization of the method as both helpful and as somewhat restricting at the same time, as it requires a very specific research question not well suitable for exploratory studies. In addition, all reported some experiences of uncertainty in some phases of the process. They would have appreciated more time available for the research component of the course, allowing them also to repeat steps.

(2) With regard to what they have learned about ESD, the students stressed that acquainting themselves with the method of systematic literature review and applying it in project groups (the 'how') was quite time-consuming and took place at the cost of a deeper engagement with ESD issues (the 'what'). However, it was stated that the method required an intense engagement with the literature and, by screening a considerable number of publications; a lot was learned about the topic of interest. One student was surprised 'how much can be read within a relatively short period of time once the focus of interest is clear'.

Also, it was stated that, by focusing on texts in English, the reviews involved several texts from different countries and contexts that brought an international perspective into the course.

(3) Finally, the course design and the teaching approach chosen were unanimously considered successful in triggering an intensive and practical engagement with a research method. The students stressed that it was useful to have practiced the method, rather than to solely practice single steps of it or to study it theoretically. The openness of the course design that allowed students to pursue individual research questions in groups was subject to some ambivalence in the students' responses. On the one hand, some students would have favored more guidance with the method and its application; for example, more support by providing more detailed instructions on each step of the review process, by reflecting on the current status and next steps in each session or by discussing more examples of existing literature reviews. On the other, the openness of the course design was at the same time perceived as an encouragement to think independently. Positive effects of the course design mentioned including the development of project management and other soft skills related to working in groups. However, the students also agreed that they would have liked to engage more in-depth and more critically with the ESD themes. What was widely appreciated about the course design was the clear distinction between input sessions and working sessions, as well as consultation and provision of critical feedback throughout the group work sessions. Finally, it was critically discussed how the course concept could also be expanded into a seminar stretching over two semesters.

Outlook

Summing up, what lessons can be learned from the teaching approach and research projects presented and discussed in this paper? The student research projects show that the method of systematic literature reviews is potentially fruitful not only for statistically elaborated meta-analyses or for bibliometric research purposes, but also in order to provide orientation on a specific issue in a systematic and reproducible way. As such, this process extends the cursory, and often irreproducible, character of rather narrative accounts of the existing research base as still encountered in numerous publications in the field and therewith contributes to put ESD research on a more solid foundation. The method may be considered as particularly useful for research on topics, such as sustainable consumption, that lie at the intersection of several rather loosely related scientific communities which include, for example, consumer education, health promotion, economic and financial education. Here, systematic literature reviews provide opportunities to bridge traditional divides between different communities and utilize their expertise to improve ESD practices by revealing and synthesizing relevant findings across rather than within these fields.

The teaching approach presented in this paper employs principles of research-based learning and, consequently, has a strong focus on engaging students with practices of scholarly, academic and scientific knowledge creation. The competencies and skills promoted by such an approach are not only relevant to train a new generation of education researchers, but rather to a wide range of professions in the field of ESD. The

abundance of information available today, the heterogeneity of research approaches applied and the contrariness of findings produced pose a challenge to such different stakeholders in the knowledge arena like educational practitioners, policy-makers and consultants wanting to base their work on the best available evidence.

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