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ESD in Educational Processes, Schools and the School System: Frictions and Success Factors in Integration, Transfer and Implementation—An Explorative–Qualitative Multi-Perspective Interview Study

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Abstract

Education for Sustainable Development (ESD) is seen as an essential component of future-oriented education that enables learners to actively shape sustainable development. However, integrating ESD into education systems faces various challenges. The present study analyses hindering and enabling factors for the integration of ESD into the education system, the schools as organisations and learning environments for pupils. An exploratory, qualitative design was adopted, using semi-structured problem-centred interviews to explore the perspective of relevant actors across multiple levels within the German education system. Data were analysed through qualitative content analysis. The findings identified frictions, including the perception of ESD as complex and normatively charged, resource constraints across multiple levels, resistance to transforming structures and values, overload of further school development tasks, and the lack of a clear positioning from education politics. Success factors are the use of synergy effects through ESD, the commitment and skills of individuals, effective anchoring, and cross-level cooperation. As overarching leverage points, personnel competencies, structural factors, and the perception of ESD are identified. In conclusion, a Whole System Approach is required to integrate ESD with systemic coherence at all linked levels of the school system. The findings offer guidance to promote successful ESD implementation, thereby enhancing the impact of education on sustainable development.

Keywords: education; sustainable development goals; sustainability; implementation; school system; frictions; barriers; success factors; enablers; interview study

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1. Introduction

Amidst multiple human-caused planetary crises, such as the accelerating climate crisis and biodiversity loss, as well as global and intergenerational injustices (Raworth, 2017; Rockström et al., 2023), the United Nations Sustainable Development Goals set a framework to ensure human development while acknowledging key ecological and social fundaments, striving, for example, to end poverty and hunger, or to reduce inequalities and promote peace (United Nations GA, 2015). Individuals need to be equipped with key sustainability competencies to participate in shaping a sustainable future (Wiek et al., 2011). Education is the pivotal way to shape capable and informed individuals, promoting the sustainability transformation (UNCED, 1992; UNESCO, 2022). The SDG 4 aims for

"inclusive and equitable quality education" for all people, and specifically with target 4.7, it is aspired "that all learners acquire the knowledge and skills needed to promote sustainable development" via Education for Sustainable Development (ESD) (United Nations GA, 2015). At its core, ESD is an education that equips learners with relevant knowledge about sustainability issues and empowers them to critically reflect and act on this knowledge (Vare & Scott, 2007). Global efforts have been undertaken to fulfil SDG 4, yet the progress is falling short of expectations (United Nations Department of Economic and Social Affairs, 2025). Similarly, the progress in "mainstreaming" ESD in the German education system remains deficient (Holst et al., 2024). This raises the question of why comprehensive and systematic integration of ESD into schools is failing, despite the global efforts.

The present study attempts to analyse this question by identifying the factors that enable the integration of ESD into the German school system, as well as the prevailing frictions that hinder the process. As the education system is regarded as a complex system with multiple levels and a considerable number of interacting actors, and the implementation of innovations such as ESD is not linear but rather occurs through interdependent and reciprocal actions (Altrichter, 2009), the study's findings were built on experts' insights from multiple different levels within the education system. This study thus contributes to a more profound understanding of the implementation of ESD in the school system and delivers specific entry points for the relevant stakeholder groups at multiple levels within the education system to contribute to the implementation of ESD.

2. State of Research

A growing body of research focuses on hindering and enabling factors for the integration of ESD into the education system. Studies relating to this research question make clear that this task affects the entire system, relying on various stakeholder groups (C. Borg et al., 2012; Etzkorn, 2018; Janoušková et al., 2024; U. Müller et al., 2021, 2022; Teichert & Held, 2023). Principals, with their competencies and leadership styles, have a central position in the implementation of ESD (Mogren & Gericke, 2019; U. Müller et al., 2021; Huber et al., 2025), and also in the sustainable performance of the educational organisation itself (Chen, 2023). Teachers, with their skills and resources, are a widely discussed prerequisite for successful ESD implementation (Timm & Barth, 2021). Teachers were found to struggle with emerging demands on their teaching style (Van Poeck et al., 2025) and to exhibit disadvantageous attitudes towards ESD. However, targeted teacher education with ESD anchored in the curricula and restructured in-service teacher development may help address this issue (Khalid Malik et al., 2023; Seikkula-Leino et al., 2021). Additionally, pupils show great interest in sustainable development, but for the most part do not feel that their formal education enables them to address related problems (Grund & Brock, 2022). Grothmann et al. (2022) showed that an existing environmentally aware attitude does not necessarily result in a corresponding behaviour. According to Olsson et al. (2016), even certified ESD schools do not necessarily positively affect students' awareness of sustainability or their competencies. However, certified preschools were found to perform better in adopting a whole school approach and to have a greater focus on the children's understanding of sustainability (F. Borg et al., 2025). It is especially important that pupils have a high level of well-being in their learning setting, e.g., by also dealing with hopeful and optimistic topics (Janoušková et al., 2024). Grobler and Dittrich (2024) confirm the high pertinence of the development of sustainability-related skills among various educational actors, such as teachers and pupils.

For ESD to be effective in educational practice, studies stress the relevance of adopting an interdisciplinary approach together with a focus beyond the environmental dimension of ESD (Annan-Diab & Molinari, 2017), such as appropriate assessment formats

(Williams-McBean, 2023) and openness to culturally diverse and multi-faceted perspectives on sustainability (Casinader, 2021).

Structures within the school, such as bureaucracy, curricula and additional demands and burdens, can lead to frictions in the implementation process (Timm & Barth, 2021). At the same time, these structures can manifest a holistic approach to ESD, enhancing its anchoring and implementation (Mogren & Gericke, 2019). According to Grundmann (2017), key conditions for the successful integration of ESD into schools include the holistic anchoring of ESD in school structures, the cooperation and initiative of teachers in this area, and the necessary foundations being created by education policies. Furthermore, Grundmann identified a supportive civil society, including a sensitised public, the absence of inhibiting administrative requirements, and sufficient resources as key factors (Grundmann, 2017). In this context, the German National Platform on Education for Sustainable Development (Nationale Plattform Bildung für nachhaltige Entwicklung, 2023) calls for the efficient financing of ESD. The projected costs of implementing ESD in Germany were quantified by Teichert and Held (2023): €1949 per pupil is required in the period of 2023–2035, which is seen as justifiable in relation to the total expenditure in the education sector.

Municipalities and school authorities can contribute to conducive conditions for the implementation of ESD (BNE-Kompetenzzentrum, 2021). Universities provide a significant contribution to the integration of ESD into schools as knowledge-creating institutions (A.-K. Müller, 2022). They are responsible for teacher education and therefore have a major influence on ESD in schools. Research could, among other things, focus more on transdisciplinary research and further education in the field of ESD (Etzkorn, 2018). There is a lot of catching up to do (Bergmüller & Singer-Brodowski, 2023), even though some universities have already made great progress (Michelsen et al., 2023), and ESD is increasingly anchored in higher education documents (Holst & Singer-Brodowski, 2022).

Finally, local contexts, including the surrounding school environment and regional particularities, must be considered when implementing ESD. Even the same factors can be seen as either a driver or a challenge locally (Niens & Bögeholz, 2021).

3. Theoretical Foundation

3.1. Relevant Concepts

The study uses interviews with people from the education sector to analyse the factors influencing the integration of ESD into educational processes, schools and the school system. According to Huber (2022), shaping schools and educational processes can happen on the systemic levels of school personnel, the school itself, and the educational landscape. For the code scheme of this study, these levels are supplemented with the categorisation made by Altrichter and Wiesinger (2004). Thus, a distinction is made between promoting and inhibiting factors with respect to the innovation of ESD itself, the school, and the school system levels. These levels were inductively extended with subcategories (see Table 1).

This study follows the definition of implementation as a form of governance that aims to take up and adopt an innovation, in this case, the innovation of ESD (Bormann, 2013), as standard practice. This implicitly assumes an asymmetry in the relationship between the actors, such as those closer to the state and those closer to educational practice. In an adaptation process, however, the context of implementation (e.g., the context of the school) and the innovation itself are in a dynamic relationship. Transfer is understood as the translation of the innovation to a new context, for example, at the school level (Gräsel et al., 2012). At the end of the transfer process, the innovation can be structurally anchored or, more broadly, integrated into the target area (Bormann, 2011). The level of implementation should reflect the degree of integration of ESD into the respective system. Fullan divides the process into three steps: initiation, implementation and institutionalisation (Fullan, 2016). Frictions

here refer to obstacles or difficulties in the implementation of the innovation (Altrichter, 2009). The factors that promote and hinder the integration of ESD into educational processes, schools and the school system are at the centre of this study.

Table 1. Inductively extended code scheme, based on Huber (2022) and Altrichter and Wiesinger (2004).

Code	Subcode
1 ESD itself	
2 School level	2.a School structure 2.b Subject teaching 2.c School stakeholders 2.d Further school development tasks
3 System level	3.a School system structure 3.b Education politics 3.c Ministries of Education 3.d School authorities 3.e Support System 3.f Teacher education and in-service development 3.g Civil Society

3.2. Research Question

From the state of research, it becomes clear that the question of inhibiting and facilitating factors in the implementation of ESD has already been investigated more extensively at the higher education level (e.g., Aleixo et al., 2018; Bonilla-Jurado et al., 2024; Leal Filho, 2018; Lozano et al., 2017; Martín Bautista-Cerro et al., 2023; Žalėnienė & Pereira, 2021), which is why this study focuses on the school level. In addition, in the literature, it is mostly teachers who are asked for their perspectives on successful implementation (C. Borg et al., 2012; Ferguson et al., 2021; Khalid Malik et al., 2023; Niens & Bögeholz, 2021; Opuni-Frimpong et al., 2022; Zhou, 2024). That is why this exploratory qualitative interview study takes into account the perspectives of various stakeholder groups from different levels of the education system in the context of schools, which is less illuminated in comparison to universities. The research question is as follows: What are the main frictions and success factors, i.e., inhibiting and promoting factors, for the integration, transfer and implementation of ESD in educational processes, schools and the school system?

4. Methods

This research forms part of an ESD research initiative that addresses perspectives on ESD implementation by investigating stakeholders who have received limited attention to date. The exploratory–qualitative study design, adopting a cross-system-level perspective, ensures a comprehensive representation of diverse perspectives. The present study draws on the same qualitative data set that underpinned our earlier work (Balonier & Huber, 2025). In that article, we explored educational stakeholder perspectives on an ideal governance of the implementation of ESD. The present research addresses a different research question regarding the inhibiting and promoting factors for the integration of ESD in schools by applying new analytical techniques, including a novel code scheme and a restriction to the specific sections of the interview guide that investigate the factors influencing the implementation of ESD. The study was waived for ethical review by the Institutional Committee of JKU Linz.

4.1. Data Collection

Semi-standardised problem-centred narrative interviews (Hussy et al., 2013) were conducted with educational stakeholders, following a semi-structured interview guide. Key themes and questions were iteratively refined through discussion among the research team. They inquire into factors contributing to differing degrees of integration, and effective interventions, as well as inertia-causing frictions for implementing ESD in schools. The interviews were conducted in August and September 2023 with either one (S.B.) or two researchers (S.B., S.G.H.) online via Zoom. The duration was 30 to 50 min.

4.2. Data Analysis

Transcription of interviews was performed using the software f4x, which is based on artificial intelligence, and manually reviewed. Predefined transcription rules were used, and transcripts were paraphrased (Mayring, 2015). Qualitative findings related to the research questions were analysed using deductive–inductive qualitative content analysis via MAXQDA 2022 and 24 (Rädiker & Kuckartz, 2019).

4.3. Sample

The data set comprises 11 semi-structured interviews conducted with actors from various federal states (Bavaria, North Rhine-Westphalia, Saxony-Anhalt, and Schleswig-Holstein) and occupying diverse positions within the multi-level system (see Table 2), allowing us to capture a broad and practically relevant perspective on ESD governance. A purposive sampling strategy was employed. The rationale and profile of the sample are described in detail in our earlier article (Balonier & Huber, 2025). In brief, the sampling was designed to capture a wide spectrum of views on the challenges and strategies of ESD governance with deliberative selection of individuals in different positions within the educational system.

Table 2. Anonymised professional positions and federal states of the interviewees. The number following the position is equivalent to the number allocated to the interview.

Level	Federal State 1	Federal State 2	Federal State 3	Federal State 4
Ministry		Management level (3)	ESD responsibility (2)	Management level (7)
State institute	Middle level, ESD expertise (6)	Management level (4; two persons together)	ESD responsibility (10)	
Association			Management level (1)	
School practice		ESD project: management level (8)	Head of secondary school (5) and primary school (9)	ESD project: management level (11)

5. Results

The results in this section are presented and structured according to the coding scheme (see Table 1).

5.1. The Level of the Innovation ESD Itself

Firstly, the results of the interviews are presented and analysed with regard to frictions and success factors in the implementation, integration and transfer of ESD in connection with ESD as an innovation itself.

- Need for holistic integration with a high degree of urgency: The relevance of a holistic and integrative approach was noted across all levels (1, 3, 8, 9). A "major overhaul" (8) and a "change of attitude" (9) among stakeholders is necessary so that ESD is

not perceived as an additional task (add-on), but is addressed as a fundamental task at all levels of the education system (6). The urgency is not as acute as is the case with digitality (6), but ESD is necessary for modern education (4) and should be the "baseline of our education" (6). Existing structures in the school system are a hindrance (3), but addressing the SDGs as a school task offers the potential to change the school structure. An integrative treatment of ESD requires lessons that are action-, project-, problem-, process- and future-orientated (4, 7).

- High degree of complexity and problem of operationalizability: School practitioners in particular, cited the complexity of ESD and a whole school approach as a major obstacle (5, 10). The meaning of the term ESD is difficult to grasp and explain (2, 5). ESD is often unknown, including to those with an affinity for sustainability (9), and is therefore often only weakly or monothematically implemented (2). For example, the social dimension of ESD is rarely addressed (5). The complexity of the topic leads to a high amount of time being spent on the subject by teachers and, in combination with a lack of understanding, to them being overwhelmed (5). However, the SDGs offer the opportunity to break ESD down into individual aspects, preferably corresponding to the strengths of the school, and then automatically move on to the other SDGs due to their interdependencies (2, 7). In addition, the operationalisation of ESD is challenging, as it is a normatively charged concept and the targeted competencies are more difficult to verify (11).
- Utilisation of synergy effects and networking: There is potential for synergy effects in ESD, such as higher motivation and a greater sense of self-efficacy among pupils through self-directed learning or the creation of meaning through value formation, which could make work easier and more enjoyable for teachers (10). These effects could also be used in communication about ESD, as a positive framing of the issue in general could be promising (10). A "culture of sharing" is essential for the successful implementation of ESD (4): networking between those involved, for example, through collaborations with best practice schools, helps to avoid redundancies and promotes success (10).

The difficulties inherent in ESD are recognised at all levels of the school system that were interviewed here. As a thesis, it can be proposed that successful implementation can only be achieved with great effort and a holistic approach. This approach enables modern teaching and usable synergy effects.

5.2. The School Level

In the following, the core statements of the interviewees are presented with reference to the factors of failure and success at the school level. The aspects are grouped into the categories of school structure, subject teaching, school stakeholders and further school development tasks.

5.2.1. School Structure

- Need for change: At all levels surveyed, the structure of the school, which should enable school development towards ESD, was named as a decisive factor (1, 2, 4–6, 8–11). It is essential to break away from previous structures and focus on values, competencies and educational goals (4). ESD must be structurally anchored (1, 6, 11), and there is also an opportunity in the current education crisis, in which the dynamics of change can be used to focus on the essentials of ESD (1, 9). Actors could "realise via the sustainability goals that this is the task of schools and then think about reorganising schools" (1).

- Relevance of resources: In particular, resources must be made available for ESD, without which the reason for ESD as an additional, but unrewarded task is unclear for many (5, 6, 8, 10). Commitment to ESD must be recognised (8). Staffing freedoms would be provided through relief or credit hours for teachers, which would require a change in the teacher working time model and change the current, unsustainable working conditions of teachers (2, 4, 5, 8). Financial resources being made available could, for example, enable ESD officers to be present at each school, which would also strengthen the regional level of ESD and provide a contact person for the Ministry of Education (2, 5). It was also noted that the omnipresent lack of resources must be realistically taken into account (10), but that it is essential, including for the well-being of the people, "that schools are also a positive place that also has resources" (8).

The summarised thesis that is supported by all levels is that an urgently needed change in school structure, in particular towards more resources being made available, is closely linked to a successful integration of ESD into schools.

5.2.2. Subject Teaching

- Dissolution of the focus on individual subjects: People from school practice in particular emphasise that subject teaching should ideally be restructured and that the outdated understanding of a subject canon and examination focus should be replaced by an interdisciplinary orientation towards topics and projects (7, 8). At the moment, the subjects deal with ESD in different ways, for example, by focusing on different dimensions of sustainability. In primary schools, having one class teacher is advantageous for interdisciplinary work (9).
- Commitment through anchoring in curricula: According to the school and state institute levels, a binding treatment of ESD is achieved by anchoring the topics and the teaching principle in curricula, textbooks and other materials (5, 6, 9). One difficulty lies in the fact that the subject requirements are already very extensive and complex even without ESD (8), and the Ministry of Education "cannot [...] control the reality on the ground one-to-one with documents alone", according to a person from a ministry (7).

Far-reaching changes in the organisation of subject teaching and a structural anchoring of ESD are therefore necessary.

5.2.3. School Stakeholders

- Relevance of individuals and especially school management: Across all levels, the interviewees mentioned the great importance of individuals and their attitudes in the successful implementation of ESD (1–3, 5–7, 9–11). In addition to determined, ambitious teachers, a school management that is open to ESD or at least favourably neutral and aware of it is essential for an innovation-friendly climate and for the support and motivation of the teaching staff (1–3, 5–7, 9). Committed teachers are dependent on the school management: "Of course I have to release teachers [for ESD projects], who then have to be deputised for. And as a school principal, you also have to put up with that, because of course there are complaints among the teaching staff" (5). In addition, interested pupils have the potential to initiate projects within the framework of ESD, but must also be open and appreciative of the projects (2, 5).
- Skills development of teachers with regard to ESD and the resulting participation and opportunities: The interviewees from educational practice thought that the development of various competencies is essential for teachers and that they need further development (5, 8, 9, 11). Building on a reflection on their own understanding of sustainability, they suggested that the lack of knowledge about the complex ESD content

and the lack of understanding of the concept, which makes ESD appear superfluous or additional, must be counteracted (5, 9, 11). In addition, a human tendency among teachers to insist on the old and an inertia towards the new is proving to be a hindrance, as is the fact that ESD has little relevance for the assessment and careers of teachers (5, 8). Teachers need to enable pupils to participate in decision-making processes and recognise the opportunity that lies therein, for example, in the training of systems thinking (8, 9). Pupils should be treated with respect (8). It is crucial "that students and teachers think much more in terms of 'we', so together, and treat each other more as equals, so that teachers also understand that they must be learners in such a system" (8). Opportunities for pupils to participate improve their well-being, enthusiasm and inventiveness, which in turn is beneficial for the motivation of teachers: "[T]hen teaching is also much more fun again and as a teacher I then have more nice moments in everyday school life again and that of course promotes the whole thing" (9).

- Deficits in pupils' competencies: Along with well-being, the most important aspect is that the pupils are "successful in the sense that they don't drop out of school, but do well at school and are then able to shape their lives and, in an economic sense, end up being taxpayers and productive members of society" (8). According to school practice, pupils still need to acquire central competencies, such as self-directed learning, for ESD to function in the classroom (8, 10). At the same time, the low motivational willingness of young people to make long-term commitments is an obstacle to systemic change (8, 10). More attractive formats with a manageable time commitment and high potential for self-efficacy should therefore be offered (8).

It can be concluded that, from the respondents' point of view, the ESD-related competencies of all those involved in school life must be promoted, and the individuals relevant to the successful implementation of ESD must be given special consideration. It is essential to promote open-mindedness, motivation, willingness to participate, cooperation and knowledge of ESD among school stakeholders, whereby everyone can benefit from successful integration.

5.2.4. Further School Development Tasks

- Shortage of teaching staff: The influence of other school development tasks was mentioned across all levels, including, above all, the prevailing shortage of teachers (1, 2, 6, 8, 10). Under current working conditions, teachers are too focused on coping with everyday life, are exposed to a flood of information, and are then overwhelmed by the field of ESD (8–11). This is perceived as an additional task, but this can be avoided if ESD is anchored in the curriculum: "[T]he sustainability goals are of course also included in the curricula, so [...] actually that's a bit of an excuse" (3).
- Innovation backlog due to large number of tasks: In addition to the shortage of teachers, development tasks such as digitalisation, internal school development, extended school management with tasks such as individual support, the consequences of the COVID pandemic, the war in Ukraine and the associated task of integrating refugee pupils were mentioned as factors in everyday school life that led to excessive demands and fatigue towards innovations (1, 2, 9). There is a backlog of innovation, while old principles are maintained, which is also an obstacle to the transfer of ESD:

> *"[T]his we have it all in the analysis, but we don't have it in the implementation is to my mind because we have not yet integrated too much from the past. [...] [I]t shows me that we are hanging on to so much in the past, to old principles, methods, goals and also teaching styles"*
>
> (1)

At the same time, the schools' ability to develop, as demonstrated by the transition to digitalisation, is hopeful (2). Bureaucracy must be reduced and the focus placed on the essentials, i.e., teaching (1, 10).

- Concern for disadvantaged pupils: The greatest need for ESD lies with socially disadvantaged young people, who are often less able to develop visions of the future due to other problems (7). There is also a risk that open lesson formats could leave lower-performing pupils behind (7), especially because many of them do not meet the minimum standards for basic skills: "[T]hen the children can no longer read, calculate and write, but they would know what participation is" (1).

It can be stated that the challenge of integrating ESD cannot be viewed in isolation from other school development tasks and is also partially hindered by them. However, digitalisation has shown that the school system is capable of innovation. Further postponement would inevitably lead to even greater problems in the future.

5.3. The System Level

At the system level, which includes the categories of the school system structure, education policies, ministries of education, school authorities, support systems, teacher education, teacher in-service development, and civil society, the following factors inhibit and promote the implementation of ESD.

5.3.1. School System Structure

- Reorganisation of the school system and lack of resources: In addition to the necessary changes to the school structure described above, according to school practice, a major change is needed in the school system, which needs to be scrutinised as a whole (8). For example, the multi-tiered system, divided into grammar schools and other school types, prevents an exchange between academic and non-academic children (8). The lack of financial resources, in particular, is one reason for the precarious situation in which the school system currently finds itself (8, 11).

> *"There is already a certain crisis in the education system, which has to do with resources and which, of course, does not exactly promote the [...] establishment of ESD. [...] [W]e would simply have to put more money and more resources into education, which is, of course, difficult"*
>
> (11)

- Successful communication between the levels for efficiency: In addition to sufficient resources, communication between the system levels is a decisive factor, according to a person at the ministry level (3). The dialogue between schools and the Ministry of Education or the school supervisory authority is not active enough and is not conducted on an equal footing (3). Decisions or guidelines from the Ministry of Education sometimes do not reach the school authorities, and therefore, schools criticise a person from the school practice level (9). The schools also need more courage to "sound out how far the other person will go" (3). Networking between ESD stakeholders is also key, with smaller federal states having an advantage here (4).

There are therefore parallels between the challenges at the structural level of individual schools and the system as a whole: there is a need for available resources, communication between stakeholders and comprehensive structural change to enable successful ESD.

5.3.2. Education Politics

- The unfavourable position of ESD in education politics: Interviewees from educational practice and ministries (2, 8) added the following assessments with regard to education

politics: the topic of ESD has green connotations and is therefore not addressed by centrist parties in election campaigns. Additionally, education topics are not very suitable for election campaigns, and ESD is not seen as an innovation that is honoured by the electorate (2, 8). Politicians and education committees are said to lack expertise in relation to ESD (5, 9). According to one association representative, top-down policy regulations, for example, with regard to school structure, are not very effective in any case; school development needs to work the other way around, i.e., bottom-up (1). However, there is a danger that a conservative political attitude, a "[clinging] to the historical, to the old, to the seemingly tried and tested" (1), also legitimises and favours an attitude among teachers that is sluggish towards innovation (1).

- Political impulses for more visibility and a common departure: Politicians, on the other hand, have the task of initiating a major reform in the direction of ESD with a holistic approach, not just isolated efforts, and clearly expressing the political will to do so (7, 8). The demand must be accompanied by support, so that the problem is not shifted from politicians to teachers and pupils, and, in particular, be accompanied by a sense of trust, cooperation and a positive narrative (8):

> *"[T]his feeling that we are setting off somewhere together […] where the whole thing will get better. This is something that […] has to be communicated well and has to be thought of and realised as a whole. […] And I think it's important that this system is organised in such a way that people [can] trust each other, that there can be a social 'we', that people say, yes, we're doing this together and I'm doing my bit and I want to, because there's a lot of potential in these people who work in schools. Most of them really want to do it, but you have to take them seriously. You have to put them in a place where they can feel comfortable. They have to have the feeling that I am capable of, am allowed and really want to make a good contribution here, and then it can work out. And perhaps that is the most important thing of all"*
>
> (8)

  None of the parties in Germany demands such an implementation of ESD; Denmark, for example, could provide an orientation (8). Politicians also need to ensure social sustainability and equal opportunities, and for successful inclusion, an integrated all-day programme needs to be implemented with a lot of external support (8). Education politicians should also be involved in ESD events organised by schools so that the topic gains more visibility at this level (6).
- NAP ESD as a successful strategy: Education policies can be successful in transferring ESD and anchoring it in the long term. They should not prescribe a catalogue of measures or models of ESD, but rather point out options for concrete fields of action of ESD that support individual solution finding and focus on concrete ESD content for teaching (11). The National Action Plan (NAP) ESD was cited as an example of this strategy (11).

There is, therefore, a lot of catching up to do in the current political attitude towards ESD; its signalling effect is likely to be significant, and it is central in terms of the framework conditions set, the motivation of all stakeholders, and the requirements placed on schools. However, as the development of ESD must take place at the level of educational practice, its influence is also limited.

5.3.3. Ministries of Education

- Creation of resources: The ministries of education could provide more resources in their role for ESD and create positions, for example, in the form of ESD state coordinators in the ministry, according to demands from both the school practice and ministry levels

(2, 5, 11). These coordinators would have to work together with teachers and pupils on an equal footing and are seen as successful measures in states where they are already implemented (7, 8, 11). The omnipresence of ESD for schools is promising through the creation of resources, a legal framework, prizes and programmes, and opens up different approaches to ESD for schools (2). The aim is to "show schools from several sides [...] that the topic is important. Please move in the direction [...] that you simply realise, oops, somehow I can't get past this topic" (2).

- Cooperation between the levels: It is also crucial that schools and ministries work together on school development from the outset:

> *"[W]e all know the effect. Someone comes up with a project, already has the blueprint in their head, so to speak. And then he says, 'Oh [...], don't you want to join in? And then [the person] first says, 'Oh no, [...] I wasn't there from the start [...] you've already thought of something'"*
>
> (3)

Cooperation between the various ministries of a federal state and the subordinate authorities is essential, especially if responsibility for ESD is divided between the Ministry of the Environment, the Ministry of Education and the Ministry of Social Affairs (2, 9). ESD is also anchored twice in one federal state and is therefore too vague, being implemented on the one hand as an overarching educational goal and on the other hand in specialised curricula (2).

- The relevance of ESD papers: A state strategy, as exists in some federal states, provides a plan for implementing ESD in all areas of education and politics with the involvement of environmental and business organisations (2, 3, 6). Changes to the curricula, which have a half-life of around ten years, could also be demanded in this way (11). One promising measure mentioned across all interviewed levels within one federal state is the bottom-up-initiated, so-called experimentation clause, with which teaching is to be changed towards ESD with the participation of schools, but this is only the beginning of a process that will take years or decades (3, 4, 8). The clause would even allow the freedom to teach without a canon of subjects, but this would be very unusual for schools and is therefore not to be expected (3).
- Need for development in ESD programmes: With regard to the various ESD-related labels and seals for schools, school practitioners criticised the fact that they were not yet sufficiently available (8), and that they were too confusing and not low-threshold enough (9). Some are thematically too narrowly focused, for example, by focusing too strongly on the environmental dimension (9). Finally, according to a person working in a ministry, external impetus for ESD programmes, such as the "Freiday" initiative, must be supported and steered by the school system, otherwise "things develop as part of a grassroots movement. It's very, very difficult to catch them again without giving the impression that we want to curtail the legitimate interests of pupils" (7).
- The tasks of the school supervisory authority: One person working in a state institute called for greater co-operation between their own institution and the school supervisory authority as the administrative body (6). In one federal state, one person in the school supervisory authority is responsible for ESD in each administrative district (7). In another federal state, a state institute prepares a data sheet for each school, which the school supervisory authority can use to advise school management on school development with regard to ESD and provide feedback (4).
- The influence of the Standing Conference of the Ministers of Education and Cultural Affairs (BMK): In the opinion of a person working in a state institute, the BMK should place a greater focus on ESD by addressing the topic more strongly in documents and working groups (6). So far, the BMK has only provided the key points of an ESD

strategy, for example, in the Global Development Orientation Framework (Schreiber et al., 2016). A binding and visible strategy paper with an underlying competency model, such as the one that exists for digitality, would be helpful and would have an advantage in that all federal states would have to agree on it (6). The BMK is characterised by unanimity in its decisions, but this could also have a detrimental effect, for example, on innovations (11).

The ministries of education are therefore primarily responsible for providing the resources for the implementation of ESD, which has been called for many times before, and for providing incentives. The willingness to do so must be underlined by corresponding BMK papers and ESD programmes, but this must not only be directed from above; impulses from educational practice must also be taken into account.

5.3.4. School Authorities

- Overcoming the separation of internal and external school matters: The school authority, which is often the local authority, must take up ESD and the whole school approach as a topic and work more closely with schools and the school supervisory authority due to the interlinking of tasks (11). School operations cannot be separated from pedagogy when it comes to ESD (11). The school authorities should provide unbureaucratic financial resources for ESD projects at the request of members of the school practice (5). Building standards for schools should also be formulated, and information provided about them (5).

Here, it becomes clear that the goal of strengthening ESD in the classroom cannot be considered independently of the school and the educational landscape surrounding the school, and that the whole school approach is particularly dependent on the school authority.

5.3.5. Support System

- Support from non-school stakeholders: The support system, including external partners, societal actors, advisors, state institutes and associations, could provide resources for the successful, efficient integration of ESD into schools and help to prevent excessive demands. Schools could work together with multi-professional teams in schools and extracurricular learning centres, as well as various social actors, with a low-threshold ESD teaching offer (1, 2, 4, 5, 6, 7, 10). However, according to criticism from the ministry level, the partners develop too slowly in some cases and therefore offer little added value (3). In one state, an ESD pact consisting of relevant associations and providers is being established with the aim of exerting political influence (2). In addition, a network of advisors consisting of 50 teachers, who are remunerated with credit hours, is being established. Each type of school is represented in these teams, and it is their task to promote the whole school approach more specifically in schools (2). However, in addition to institutions and organisations, competent and well-networked individuals are often crucial in the support system (3).
- State institutes in key positions: According to their own assessment, educational state institutes, as authorities subordinate to the ministries, have the advantage of being positioned at many interfaces and could therefore play an important role in a cross-cutting task such as the implementation of ESD (4). However, ESD is also less well staffed at these authorities than digitality, for example (6). The governance of successful ESD implementation at state institutes looks like the following: promising ideas often come from individual schools, the state institute then takes up the ideas, develops them further, creates the necessary structures and formulates requirements for schools, while at the same time highlighting examples of solutions, which is particularly helpful for smaller, less resourced schools (4). The implementation of the requirements by

the schools must then be demanded; schools should find individual solutions and be supported in doing so: "[From] the top and let them develop from below. That is actually a strategy that has to go together" (4). Finally, the state institute must evaluate its own measures by means of surveys (4).

- ESD material: The educational state institutes provide ESD-related materials for lessons (7). According to the state institute level, these materials are helpful and also available in large quantities (6). According to the ministry level, for example, overviews of any project schools in the vicinity of other schools are provided so that other schools can learn from them (3). A map links schools with extracurricular partners, and the ESD portal (Bundesministerium für Bildung und Forschung, 2024) provides an overview of all ESD-related content, materials and portals (2, 3). However, respondents from school practice criticised that the number of offers was too confusing, that some schools were not aware of them, and that more information about the availability of extracurricular learning locations would be desirable (5, 9).

The support system can therefore also counteract the scarcity of resources. It is important that the support is available, up-to-date, and tailored to the needs of the schools. State institutes can also be helpful in structurally anchoring ESD through successful governance.

5.3.6. Teacher Education

- Inertia of autonomous universities: The development of teachers' skills is seen as a decisive factor in the successful integration of ESD into educational processes. This is due to the fact that it ensures that teachers are committed to ESD, and because this objective cannot be rapidly accomplished solely through in-service development (4). However, the interviewees agreed that the universities responsible for the initial development phase for teachers were hesitant to take up ESD due to their autonomy, although the subject areas were also open to different approaches (3, 11). ESD should also be taken into account as a principle in teacher education, for example, in the form of student participation (9), and integration could be promoted through pressure from prospective teachers, better networks, mutual inspiration and anchoring ESD in the teacher examination regulations, according to people from school practice (10).
- The relevance of academia for the integration of ESD into educational processes: In addition, school practitioners called for better scientific support for the development of ESD, which could and should also be achieved through the demands of stakeholders, considering the autonomy of universities (8, 11):

> *"[W]e want to do things in an evidence- and science-based way, because we don't think everything up ourselves […], we can't do things by virtue of our own arrogance, but because it is of course about being as good as possible and using what there is in terms of scientific research findings on these topics"*
>
> (8)

Consequently, teacher education is regarded as a sector in which ESD integration can be achieved more via individual endeavour than via guidelines. Universities play a pivotal role in the implementation of ESD as a site of innovation, scientific evaluation and education for the teachers who disseminate ESD into schools.

5.3.7. In-Service Teacher Development

- Improvement potential in terms of resources and scope: More personnel and time resources are also required for in-service teacher development, and ESD must receive political support here (7, 11). According to one person working in the sector, some of their programmes are suitable for teacher education, as well, and should therefore

be made available to teachers during their traineeship, i.e., the last period of teacher education. This is not common for in-service teacher development, but is already permitted for digital formats (10). The demand for in-service teacher development in ESD is increasing, and a broader positioning, for example, in the form of online self-study courses, as well as greater visibility with an improved platform that is oriented towards the interests of the users is necessary for an even greater reach: "[T]his UX design, this orientation towards the user, is also important for education and for in-service teacher development, and please do it professionally and with as much leverage as possible" (10). Another problem is the admission restriction: despite the opportunity to convey examples of ESD in schools and lessons through in-service development and thus encourage individual solution finding and attitude change, teachers are sometimes not admitted to further development due to jeopardised lesson coverage (10).

If adequately funded and staffed, the development institutions can thus support in-service teacher development, but they themselves need to catch up in the design of their programmes.

5.3.8. Civil Society

- Initiating change through society: According to the school practice level, the demand for more ESD should come from civil society.

> *"It has to come from us, […] it has to come from the students, it has to come from within, from the academics, from the university teachers and university lecturers, it has to come from society. And there are still total deficits"*
>
> (11)

  However, the psychological strain in society is not equally distributed, and therefore those who are in favour of maintaining the status quo win out, according to one person from an association (1). For example, there is no discussion about abolishing the secondary school "Gymnasium" in favour of comprehensive schools, as Gymnasium parents are in favour of maintaining it, and community school parents would not take part in the debate, according to school practice (8).
- The influence of personal attitudes towards sustainability: A certain weariness towards the topic of sustainability has been observed at the ministry level following the coronavirus crisis (7). Working methods also reflect personal attitudes towards ESD or sustainability, which are sometimes polarised and prevent concrete measures from being taken (5, 6). For example, ESD is confronted with accusations of being ideological (7). In addition, the socio-cultural bubble that surrounds a person has a considerable influence on their own attitudes (10). A school that is strongly networked with extracurricular partners can also act as a role model for sustainable development in the region: "Then something like a model project is created, which then also has an influence on civil society" (11).

The relevance and also the potential of civil society actors become clear here: the personal attitude, which is linked to one's own perception of the topic of sustainability, legitimises the stagnation of development and at the same time can provide the necessary impetus for change.

Table 3 visualises the main findings, categorised by the different dimensions impacting the implementation of ESD.

Table 3. Overview of the key results. The main frictions and success factors of ESD implementation, indicated via a "-" or a "+", are presented under the respective dimensions that influence their implementation.

ESD Itself	School Structure	Subject Teaching	School Stakeholders
+ holistic integration + synergy effects - high urgency and complexity	+ resource availability - prevailing structural frictions	+ structural anchoring - mono-disciplinary subject focus	+ promotive management + teachers' skill development - pupils' competencies
Further School Development Tasks	**School System Structure**	**Education Politics**	**Ministries of Education**
- staff shortage - innovation backlog - exclusion of disadvantaged pupils	+ structural reorganisation + inter-level communication - resource shortage	+ clear political intention + successful strategy "NAP" - unpopularity of ESD	+ provision of resources + generation of ESD papers and programmes + strategy paper by the BMK
School Authorities	**Support System**	**Teacher Education and In-service Development**	**Civil Society**
- separation of internal and external school matters	+ supportive non-school actors, esp. state institutes + ESD material availability	+ improved teacher development offer - Inert university education	+ society-initiated change - polarisation of attitudes

6. Discussion and Conclusions

The hindering and driving factors influencing the integration of ESD into education practices, schools and the school system can be summarised in the three aspects of the actors' skills, structural factors and perception of ESD.

6.1. Personnel Characteristics

Firstly, the commitment and attitude of individuals, above all school management (Mogren & Gericke, 2019; U. Müller et al., 2022), and the knowledge and skills of teachers (Opuni-Frimpong et al., 2022; Pihen González & Arya, 2022) and students with regard to ESD in the classroom and transformation processes are highly relevant. In-service teacher development institutions can compensate for the inadequate treatment of ESD in teacher education, which is also rooted in university autonomy, although the range of courses on offer needs to be further developed. Opportunities lie in mutual encounters on an equal footing and in the practice of participation and cooperation (see also Grobler & Dittrich, 2024), both within schools and across system levels, for example, in cases where the distribution of responsibilities has an inhibiting effect.

6.2. Organisational Characteristics

Secondly, the lack of resources at the school and system level, as well as the lack of teachers which we observed over the last couple of years, is seen as a central friction. The ministries of education of the federal states and the BMK could define a clear strategy and provide the necessary resources by means of binding documents. In addition, the existing school structure is an obstacle, whereas the integration of ESD into educational processes can be promoted through mandatory anchoring and interdisciplinary treatment of the topics (Annan-Diab & Molinari, 2017). In terms of the design of school subjects, it was suggested that teaching could incorporate systems thinking to better address issues related to sustainable development (Marcelino et al., 2019). According to Williams-McBean (2023), the format of performance assessments also needs to be adapted. There is great potential in the support of schools by extracurricular partners, with a special role being played by the state institutes, which are located at central interfaces in the school system.

6.3. Interaction of Personnel and Organisational Characteristics: Social Perception and Value of ESD

The third aspect can be seen as linking the first two characteristics mentioned above: Although ESD is perceived as complex and normatively charged, integrated approaches at the school level build on concrete synergies, such as greater pupil motivation and self-efficacy through self-directed learning, meaning through value formation, and a culture of sharing that avoids redundancies. The subordinate position of ESD in education politics and its lack of a clear stance regarding the relevance of ESD—not only in Germany (Pihen González & Arya, 2022)—which could convey a sense of tackling the development task together, is an additional complicating factor. The National Action Plan ESD, on the other hand, is considered a positive example of a successful education policy approach. Finally, civil society and the personal attitudes of individuals towards sustainability can promote the integration of ESD into the school system by legitimising or demanding ESD.

6.4. Whole System Approach

The relevance of a whole school approach has become clear, and a whole system approach is also clearly required given the results of this study. This would result in ESD being strategically, systemically and systematically anchored in the multi-level system across all stakeholders, institutions and system levels. This is done with clear objectives and catalogues of measures, with correspondingly available resources and with accompanying professionalisation measures, which allows ESD to become more and more concrete from level to level.

According to Rosenbusch's (2005) organisational pedagogy, the focus is on systemic coherence and perspective adjustment: lessons, schools and all system levels must be designed in such a way that the educational goals for pupils are supported in the best possible way. Rosenbusch argues that the school as an organisation (and therefore also the school system) should be a model for its educational goals.

Michael Fullan has developed a three-level concept that focuses on changes at the school or community, district and overall system level, which corresponds to our conceptual approach to educational processes, schools and the school system, embedded in the overall social system (Fullan et al., 2005). He argues that sustainable reforms are only successful if all levels work together (cross-level) and at the same time, development takes place at the individual levels (intra-level). This promotes intelligent and systemic responsibility. It is about promoting values while keeping an eye on short- and long-term results (Fullan, 2004).

For the implementation, we suggest the concept of responsible leadership as we already see that school leadership plays an important role for ensuring and increasing the quality of schools and education (Hallinger & Huber, 2012; Huber, 2022, 2027). It is the coordination of action by developing and implementing strategies which are aim and resource oriented and fit the respective context. ESD should therefore play an important topic in leadership development that could lead to a faster spread of competencies to promote personnel and organisational characteristics for a whole school and whole system approach (Huber & Schneider, 2022).

6.5. Limitations and Outlook

This paper has two main limitations: as the study follows a qualitative and explorative approach, the statements cannot be used in an explanatory and generalising way and must be considered against the background of the interviewees' reality as well as the national context. Furthermore, the collected data was coded by only one researcher, but the codes were discussed in detail among the authors.

The qualitative findings collected here can provide suggestions for theses and hypotheses that can be tested in further quantitative research (Costa & Taube, 2024). Larger sample sizes and interviews with stakeholders in all German federal states can increase the significance of the statements and highlight differences. Focused questions should be investigated using hypothesis-testing approaches. This study, therefore, serves as an exploratory approach. A detailed, specific research focus could be placed on individual areas of education and school organisation and, in particular, the implementation of ESD. Longitudinal studies on the transfer and integration of ESD into schools could provide information on the effectiveness of the measures on the educational outcomes for pupils in their skills development; comparisons across legislative periods may be of interest. In addition, detailed analyses of best practice cases of ESD transfer can be carried out in an international context with regard to school system transformation, or nationally and internationally with regard to school organisation transformation.

As we can see at the moment, there is an increase in the popularity of far-right political parties in many countries on many continents. We must observe how this will impact political rhetoric and policy information and implementation, as well as the discourse at school level.

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Abbreviations

The following abbreviations are used in this manuscript:

ESD	Education for Sustainable Development
NAP	National Action Plan
BMK	Standing Conference of the Ministers of Education and Cultural Affairs

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