








## Whole-school sustainability at the core of quality education: Wished for by principals but requiring collective and structural action

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### ARTICLE INFO

#### Keywords:

Sustainability education  
School development  
Whole institution approach  
Whole school approach  
Leadership  
Quality education

### ABSTRACT

In the face of global challenges, sustainability has become a defining concern of the 21st century and hence a critical pillar of quality education. Principals, as pivotal actors in school development, can provide important perspectives on the current state and future developments of whole-school sustainability. However, while their role in promoting sustainability is widely recognized, systematic, national-scale insights concerning their views on sustainability in schools and the school system remain scarce. Drawing on qualitative content analysis of 80 semi-structured interviews and a representative survey ( $n = 1310$ ) with principals in Germany, the article provides an in-depth and large-scale assessment of leaders' perspectives on the current and wished-for status, challenges, and drivers of sustainability at schools. We find that 80 % of principals wish for sustainability to be a core element of school education, yet 62 % describe the current status quo as non-existent, isolated or an occasional add-on. Perceived challenges include a lack of resources, structural integration, as well as prevailing rule-systems and mindsets that hinder sustainability (e.g., normality of unsustainability, strong performance- and grade-orientation, systemic inertia). To overcome current challenges, the principals point to a need for considerably higher prioritization of sustainability by decision-makers at all levels. Overall, the findings indicate that sustainability in school education is currently limited by a system in which sustainability is an additive, not a default, and where responsibility for sustainability is often individualized, fragmented and diffused. In light of the findings, we discuss the relevance of more collective, structure-oriented and political sustainability learning, which is prioritized as a core feature of quality education.

### 1. Introduction: whole-school sustainability and the (missing) perspectives of principals

In times of mounting social and ecological crises, sustainability has become an ever more pressing concern also within education. As Klafki (1996, p. 154) has argued, general quality education needs to be closely linked to the “key problems, that globally interweave our individual and political-societal existence”. In the face of continuous transgressions of the Earth system limits (Pörtner et al., 2023; Rockström et al., 2023) and large-scale social injustices, it is clear that current human unsustainability is one of the defining epochal key challenges (Kvamme, 2021). Yet, research on education has shown that to date, sustainability is often

approached at the project level or as an additive to an otherwise mostly unchanged system (Holst et al., 2024b; Wals and Benavot, 2017; Wals and Mathie, 2022). In consideration of the depth of changes associated with achieving sustainability (Sachs et al., 2019; UN General Assembly, 2015), scholars, practitioners, (inter-)national organizations and policy-makers have instead called for a whole-system approach, emphasizing that effective sustainability education implies integrating and practicing sustainability at all system levels (e.g., Buckler and Creech, 2014; Sterling, 2003; UNESCO, 2021).

With a focus on the level of learning environments in school education, the concept of Whole School Approach (WSA) describes a participatory and continuous process of mainstreaming sustainability as

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a default into all areas of school action and culture (e.g., Barth et al., 2012; Hargreaves, 2008; Henderson and Tilbury, 2004; Holst, 2023; Wals et al., 2024). Such experience of sustainability in educational institutions was found to be highly effective in terms of empowering and motivating learners and educators for sustainability (Holst et al., 2024a). Over the past decades, various guidelines and programs were initiated to support the implementation of WSAs (e.g., Barr et al., 2014; Education Scotland, 2017; Progress, 2024; Tilbury and Galvin, 2022). Internationally, the implementation has been recommended by UNESCO (2020, 2021), UNECE (2005) and the European Union (Council of the European Union, 2022), amongst others. In the federal education system of Germany, where the 16 states hold the primary responsibility for education, the realization of a WSA was recommended by the central coordination body for the development of the school system (Standing Conference of the Ministers of Education and Cultural Affairs, 2024) and committed to in the National Action Plan on Education for Sustainable Development (ESD) (Nationale Plattform BNE c/o BMBF, 2017). Although whole-school sustainability has thus been found to be effective and is aimed for in educational policies, systematic knowledge on its implementation within school systems as well as on associated challenges and drivers remains scarce (e.g., Tilbury and Galvin, 2022; Holst et al., 2024a).

Considering that realizing a WSA requires close linkage with general school improvement and quality development (Henderson and Tilbury, 2004; Mogren et al., 2019; Müller et al., 2020), school leaders (principals) hold a central position in the process of implementation (e.g., Birney and Reed, 2009; Derqui et al., 2020; Müller et al., 2020): They facilitate school development processes, communicate norms and give direction to other members of the school community, amongst others (Leo and Wickenberg, 2013; Mogren and Gericke, 2017; Zachariou and Kadji-Beltran, 2009). The perspectives and perceptions of principals on sustainability are therefore highly relevant to identify the current state of WSA realization (status quo indicator), recurring patterns within current educational practice as well as challenges to and drivers of change (facilitative process indicators) (Tilbury and Janousek, 2006). However, previous studies on the status and process of sustainability education have mostly focused at learners and educators (e.g., Timm and Barth, 2021; Holst et al., 2024a). The available research on principals (see section 2) focuses on characteristics of sustainability-effective leadership, roles of principals and barriers to sustainability in schools, often relying on small samples and case-studies (e.g., Evans et al., 2012; Forssten Seiser et al., 2023; Iliško and Badyanova, 2014; Mogren and Gericke, 2019; cf. Cebrián et al., 2022; Müller et al., 2020). As such, there is a gap when it comes to systematic knowledge of principals' views on sustainability across all school forms and the various socio-demographic contexts in full school systems. In light of the importance of principals' leadership qualities and their visions for change (e.g., Sagala et al., 2019), such knowledge is relevant to design effective policies and professional development programs for principals as well as to improve school development practice.

With the aim to develop a systematic knowledge basis regarding principals' perspectives on whole-school sustainability, this article draws on representative survey data and interviews from one school system (Germany), and discusses implications not only for Germany, but also other countries and international bodies. In light of the knowledge gap, we ask: What preconceptions do principals have regarding sustainability? What do they view as the current status of sustainability at their schools, and how do they envision an ideal state of sustainability in future schools? What challenges and drivers do they describe as being most relevant for sustainability in school development? To lay the theoretical groundwork for answering these questions, the following section first provides an overview of the state of research on school leaders in sustainability-oriented school development. We then lay out methods and findings from a mixed-method analysis including (i) 80 interviews with principals from all German federal states, school types (primary, secondary, vocational) and different socio-demographic

contexts as well as (ii) data from a subsequent representative quantitative survey with 1310 principals in Germany. Lastly, we discuss recurring patterns in the data and derive key implications for future policy, research and practice.

## 2. Principals in sustainability-oriented school development: state of research

Through their communication and actions, e.g., in human resource management and participative governance, principals set widely perceived norms and influence organizational culture (Leo and Wickenberg, 2013), motivate individuals (Müller et al., 2020) and contribute to vision-building among school members (e.g., Bosevska and Kriewaldt, 2020; Kadji-Beltran et al., 2013). Sustainability-effective principals organize collaboration and participation within the school and local community (Mogren and Gericke, 2017, 2019; e.g), foster distributed and collective leadership (Kadji-Beltran et al., 2013; Leo and Wickenberg, 2013), support direct and open communication and develop space for pluralistic and critical viewpoints (e.g., Forssten Seiser et al., 2023). Such proactive leadership is described to include building structures and routines around sustainability (Leo and Wickenberg, 2013; Mogren et al., 2024), institutionalizing what has been achieved and legitimizing further developments (Mogren and Gericke, 2019). While sustainable leadership is considered critical (Verhelst et al., 2023), there is currently no agreed-upon leadership framework for sustainability at schools (cf. Cebrián et al., 2022).

While a large part of research on principals focuses on such sustainability-effective leadership in general, Forssten Seiser et al. (2023) and Müller et al. (2020) identified specific roles for principals in different phases of sustainability in school development. In an initiative phase, the focus lies on vision building, supporting engaged early-adopters and facilitating a participative process in which assessments are made, goals are defined, projects and groups are initiated and nurtured, and funding and support are organized (ibid.). In an implementation phase, schools move from projects to integrating sustainability into their structure, involving the broader school community and all areas of action. Here, leaders are described as motivating and supporting, facilitating participation, but also providing direction and defending and institutionalizing what has been achieved, for example by anchoring sustainability in school programs and consolidating steering groups and/or coordinators. The third phase (institutionalization) is described to be about ongoing development and continuous, recurring learning.

Despite studies focusing on leadership and roles of principles, few have addressed challenges and drivers from their perspective. In these, a lack of structural integration of sustainability, overloaded curricula, and the combination of multiple programs were described to make it difficult for school leaders to prioritize (Zachariou and Kadji-Beltran, 2009). Also, some studies describe bureaucracy as slowing down sustainable school development (Müller et al., 2021), and strong standardization as impeding context-specific approaches (Zachariou and Kadji-Beltran, 2009). Further, several studies identified a lack of time and financial resources as structural hinderances (Cebrián et al., 2022; Evans et al., 2012; Müller et al., 2021) and point to the principals' own lack of professional development as a barrier to sustainability at schools (e.g., Leo and Wickenberg, 2013; Zachariou et al., 2013; Zachariou and Kadji-Beltran, 2009). While in summary, there has been research on sustainability-effective leadership, roles in different phases and to some extent challenges, the current knowledge basis relies on smaller samples, mostly in specific sub-sections of education systems, and consequently does not capture large-scale patterns and trends. There is thus a considerable gap when it comes to system-wide knowledge on principals' perceptions on the state of sustainability at schools, visions for future schools as well as of recurring key challenges and drivers.

### 3. Methods

To systematically assess the perspectives of principals on sustainability in school education at the level of a full education system (Germany), we conducted a mixed-method analysis in which we triangulated data from 80 semi-structured interviews and a representative survey of school leaders ( $n = 1310$ ). For context, it is relevant to note that the German school system is highly decentralized with responsibilities largely shared between the 16 federal states (overseeing, for example, curricula, school types, graduation standards, employment, examination) and local authorities (e.g., responsible for school infrastructure, facility management, transportation, support staff) (cf. Huber et al., 2017).

#### 3.1. Interviews

As part of the German national monitoring on ESD, a total of 80 interviews were conducted with an average length of around 30 min. The interviewees were sampled according to four predefined criteria: (i) representation of all federal states relative to the size of each state, (ii) representation of different types of school relative to the total number of schools (e.g., primary schools, non-selective secondary schools, selective secondary schools, vocational schools), (iii) different locations (rural, small towns, urban areas of different sizes) and (iv) proportion of parents receiving government assistance (socio-economic indicator). A descriptive overview is attached in the appendix. Random sampling from a large database of school leaders as well as data collection and initial coding was commissioned to a service provider (Forsa). Taking into consideration the current state of research outlined above (e.g., Forssten-Seiser et al., 2023; Mogren and Gericke, 2019; Zachariou and Kadji-Beltran, 2009; Holst, 2023), a semi-structured questionnaire (cf. appendix) with six subsections was developed to standardize and guide the interviews:

1. Personal preconceptions of sustainability
2. Current and wished-for status of sustainability integration at school
3. Visions for ideal schools
4. Drivers
5. Challenges
6. Further relevant conditions

The interview guide contained open-ended questions as well as quantitative scales about the current and wished-for status of sustainability at the school. Five interviewers were involved in the interviews, all of whom participated in two interview training sessions and several feedback rounds to ensure a standardized procedure. The 80 interviews were conducted between November 14, 2022 and January 16, 2023 (9 via telephone, 69 online, 2 mixed). All audio data was recorded and transcribed.

A structuring content analysis was conducted on the qualitative data, drawing on Kuckartz and Rädiker (2022) for the deductive-inductive development of categories. A code plan with coding-rules was developed and iteratively refined. The coding structure for the first-order codes follows the main categories of the questionnaire (preconceptions, current and wished-for status, visions, challenges, drivers). For the current status, the WSA-heuristic by Holst (2023) (areas of action, core principles) was used as deductive second-order categories. Within the deductive categories, sub-categories were inductively developed in three rounds of coding. The segments within the sub-categories were synthesized, and the main categories with the relevant findings are reported below.

#### 3.2. Representative quantitative survey

Based on the findings from the interviews, a representative survey was conducted to quantify the perceptions of school leaders across the

German school system ( $n = 1310$ ). The representative sample was drawn from a population of all school principals in Germany (3008 principals were contacted; response rate: 43.6 %; overview of school types attached in the appendix). To triangulate the findings from the interviews and thus allow for greater generalizability, the survey covers key elements identified in the interviews as potentially important as well as aspects highlighted in the literature (e.g., Grund and Brock, 2022; Cebrián et al., 2022; Zachariou and Kadji-Beltran, 2009). It was developed by the authors with feedback from the German Education Association (Verband Bildung und Erziehung, VBE) and Forsa. The questionnaire contains quantitative scales on (1) the current and (2) the wished-for status of sustainability at the school, using the same scales as in the interviews, as well as on (3) drivers of and (4) challenges to sustainability and ESD in schools and school development. The full scales as well as descriptive statistics can be found in the appendix. Sampling and data collection was again commissioned to a service provider (Forsa) in cooperation with VBE. The mean age of respondents was 52.5 years (standard deviation = 7.4 years), with 60.2 % of principals identifying as female and 39.1 % as male (0.7 % diverse). The higher number of female participants can be explained by the representativity of the sample: 51.8 % of schools in the sample are primary schools, where the large majority of principals identify as female. We report both descriptive results for each scale and findings from exploratory correlation analyses (Spearman's rank correlation).

### 4. Results

To offer a system-wide perspective on principals' views on sustainability in school education, the following sections jointly report on the findings from the interviews and the representative survey on preconceptions, the current and desired status, visions as well as challenges and drivers.

#### 4.1. Principals' preconceptions of sustainability

The 80 interviews began with an open-ended question on personal preconceptions of sustainability. With a few exceptions, principals associated the concept with environmental or social issues that require changes in the course of action. Responses were clustered within (i) individual-centered changes in behavior and (ii) collective and structural changes. Most principals focused primarily on the first, individual level changes, such as waste separation, energy saving or gardening. In doing so, they tended to focus on easy to implement actions and in many cases did not address 'key points' in behavioral changes towards sustainability (e.g., nutrition, mobility, buildings). Most examples focused on environmental aspects, fewer on social sustainability. A smaller group of principals linked sustainability directly to the need for collective and structural changes, e.g., large-scale shifts in societal values and collective action. These principals referred to intergenerational responsibility, viewed sustainability as a collective task, and called for shifts in the economic and political system. In a few instances, leaders directly linked sustainability to political participation, which can be learned in schools through the experience of democratic participation. After this exploration of preconceptions, a working definition was presented, describing sustainability as an environmentally sustainable and socially and economically just world for all, now and in the future. Also, it was explained that the interview focuses on sustainability in school development, including all areas of action, from teaching to procurement, operations, grounds, communication and cooperation.

#### 4.2. Status quo of sustainability integration at schools and envisioned futures

In both the representative survey and the interviews, school leaders were asked to describe the status quo at their schools as well as the ideal, wished-for status using a 6-point scale to assess the quantity and depth of

whole-school sustainability. In the representative survey, 80 % of school leaders in Germany described the ideal school as one which is moving towards whole-school integration of sustainability (Fig. 1). One third of all principals responded that sustainability should be a topic in all subjects and shape everyday school life as a guiding orientation. At the same time, 62 % of principals described the current degree of sustainability integration as non-existent, isolated, or an occasional add-on (Fig. 1). Overall, a large discrepancy was found between the current and wished-for status (mean difference of 1.3 points; standard deviation: 1.3). Explorative correlation analyses revealed that principals who describe the current status as higher report slightly higher on job satisfaction ( $r = 0.087^{**}$ ) and would be more likely to recommend their job to others ( $r = 0.108^{**}$ ). In the 80 interviews, responses were slightly higher both for the current- and wished-for status, which could be an effect of more socially desirable answering in the open interview setting and/or of a possible self-selection bias.

In the interviews, principals were subsequently asked to elaborate on the current status of their schools and what they envision for an ideal school. Responses on the current status were clustered into the action areas of a WSA (governance, curriculum, campus, community, communication, capacity building, organizational culture; Holst, 2023). Principals primarily focused on aspects related to school operations, teaching, and, to a lesser degree, on cooperation with partners, school culture and governance processes. A strong emphasis was found on waste separation, nutrition at school, energy saving and gardening, among others. In contrast, few respondents focused specifically on capacity building (e.g., through teacher training, human resource management) or school communication. As with the preconceptions of sustainability, the descriptions of the current status tended by and large to focus on projects and behavioral changes by individuals at the schools.

In contrast, we found that principals' ascribed visions of ideal schools were more collective in nature. Specifically, principals recurrently

described their vision for future schools as one in which sustainability becoming the 'natural' or 'default' guiding principle for all actions and activities. This is manifested, among other things, in a school that is itself organized as a circular and sustainable system, involves all members of the school community, is embedded in the regional environment and networks, and has a strong collaboration with stakeholders around it (e.g., local authorities). As one principal put it:

*"Sustainability is like, the sentence order of subject, predicate, object. Everyone knows what that is. That you don't have to name it as a headline. But that it is implicit and you say okay, we've done some good things here."* (Participant 1 (P-1), Position (Pos.) 29)

The metaphors used by principals – another also referred to sustainability as *"the DNA of everyone involved"* (P-2) – suggest that sustainability in an ideal school is understood as an indispensable and vital organizing principle. In the visions of many of the school leaders interviewed, schools would aim to empower future generations and to provide a space in which sustainability could be practiced and learned. This is linked to the development of supportive frameworks for future education through structural integration of sustainability and ESD in laws, curricula and guiding quality development systems. Leaders further describe the ideal school as embedded in a societal system that prioritizes sustainable over unsustainable actions and, through such prioritization, allocates the required resources and supports sustainable school development. Although their visions contained more collective elements and systemic changes, school leaders often reverted to individual behavioral changes and addressed fewer structural aspects when concretely discussing specific future schools – such as changed school missions and development plans, institutional curricula, environmental management systems, and governance structures.

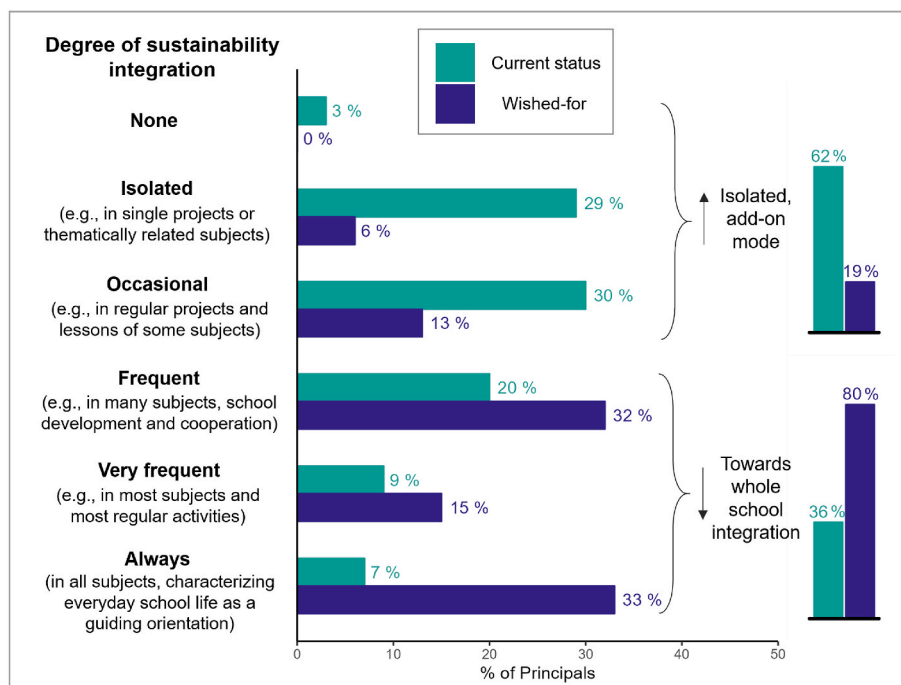


Fig. 1. Current and wished-for sustainability integration in schools from the perspective of principals (n = 1310, representative for Germany). No answer was given by 2 % of principals to the question on the current and 1 % on the wished-for status.

### 4.3. Challenges for whole-school sustainability

Subsequently, principals were asked to identify barriers, hurdles and challenges for whole-school sustainability. In the following, we first provide insights into the results from the interview study by summarizing the main coded categories. We then quantify the occurrence of key challenges through the representative survey.

Repeatedly, school leaders cited a **lack of resources (personnel, time, budgets)** as a critical challenge to greater integration of sustainability in schools. Interestingly, lack of personnel and time were more frequently mentioned than lack of financial resources. Especially with regard to educational policy making and administration, the interviews revealed considerable frustration, as exemplified by the following statement by one of the principals:

*“I am not at all interested in impulses from politics. Excuse me for saying that so clearly. I’m sick of all this talk. Either they give us what we need – teachers’ posts, budgets, facilities – or they should keep quiet. (...) It may well be that politicians are for sustainability or against it. What interests me is what they do for or against it. So no, I can understand that the children are so desperately calling for Fridays for Future and are getting angrier.”* (P-3, Pos. 44)

A second set of main barriers referred to by principals is a **lack of awareness among stakeholders** (e.g., parents, students, teachers, authorities) and **specific attitudes that hinder progress toward sustainability**. Regarding the latter, some described direct or indirect resistance to change, mainly among teachers and parents, while others referred more generally to a sense of **demotivation and frustration in an overloaded system, lack of motivation, fear of change, and a mindset of cost reduction** as the primary objective. In this context, principals also described hindering factors in school cultures, such as an **attitude of taking the path of least resistance** (e.g., for reasons of convenience), the perceived **normality of non-sustainability** (e.g., in catering, cleaning, purchasing), pervasive resignation, tiredness, a sense of being torn between demands and conflicting goals, and a mindset that sees sustainability as something that needs to come “from above”. Combining some of these aspects, one principal stated:

*“Convenience also plays a role, I think. [I]t’s really difficult to leave familiar paths when you are already feeling stressed. Then maybe you also say oh, that’s no good, this whole attitude is no good anyway. The children won’t go along with it. Which is not true, but it is used as an argument for not joining in yourself.”* (P-4, Pos. 28)

Further, and in line with the perceived ‘overload’, respondents repeatedly pointed to **distractions from other issues that are being pushed into the system**, as well as **other external demands** on the school system (e.g., adaptation to other multiple crises, such as the COVID-19 pandemic or rising inequalities). Moreover, from the perspective of principals, a **lack of flexibility in the school system** (e.g., restricted decision-making power), **bureaucratic demands, rigid standards and systemic inertia** add to the difficulties of organizing change-processes toward more sustainable schools. In this, principals described themselves and their **schools as dependent** on, for example, the local authorities responsible for school operations and grounds in Germany. One principal describes the situation as follows:

*“I might want to have photovoltaics to produce our own electricity or a wind turbine on the grounds. Or something like that. But somehow, I can’t make it happen. I have no chance of implementing it. If the local school authority doesn’t go along with it, it won’t happen.”* (P-5, Pos. 20).

Such perceived dependency which at times prevents the principals from acting, was also described with respect to regional partners (e.g., cleaning companies, food providers), educational administration and ministries. Regarding the latter, the principals see the **lack of a deep and systemic integration of sustainability and ESD in laws, curricula and quality standards for school education** as a

considerable obstacle. As a result, sustainability efforts were often described as highly dependent on individual motivated and committed members of the school community and as such, as lacking coherence and longevity (e.g., susceptibility to fluctuations in personnel). Principals not only said that sustainability is not integrated in curricula, they also described **curriculum overcrowding** as a problem.

With regard to the systemic environment, principals repeatedly emphasized that the **current strong performance and grade-orientation is a barrier to sustainability** in schools and prevents the development of future competencies. One principal illustrated this in the following way:

*“Some colleagues also cause friction on this. Because they have simply internalized this performance mindset so much and need measurable results. With ESD, I don’t necessarily have really measurable results that I can then ask about in a test. And where I can then say 1, 2, 3, 4, 5 (...). The [colleagues] really have this total performance flash.”* (P-6, Pos. 51)

In this quote, the ‘performance flash’ was attributed to teachers, while other principals more directly focused on the strong grade and performance orientation in the school system. Further, the leaders themselves described a **lack of expertise and knowledge**. Lastly, the **specificities of different school types** (e.g., high fluctuation of students in vocational schools), regional contexts (e.g., socio-economic context, rural or urban) and the **condition of buildings and grounds** (e.g., modernization, age, heritage protection) were mentioned as context-specific challenges.

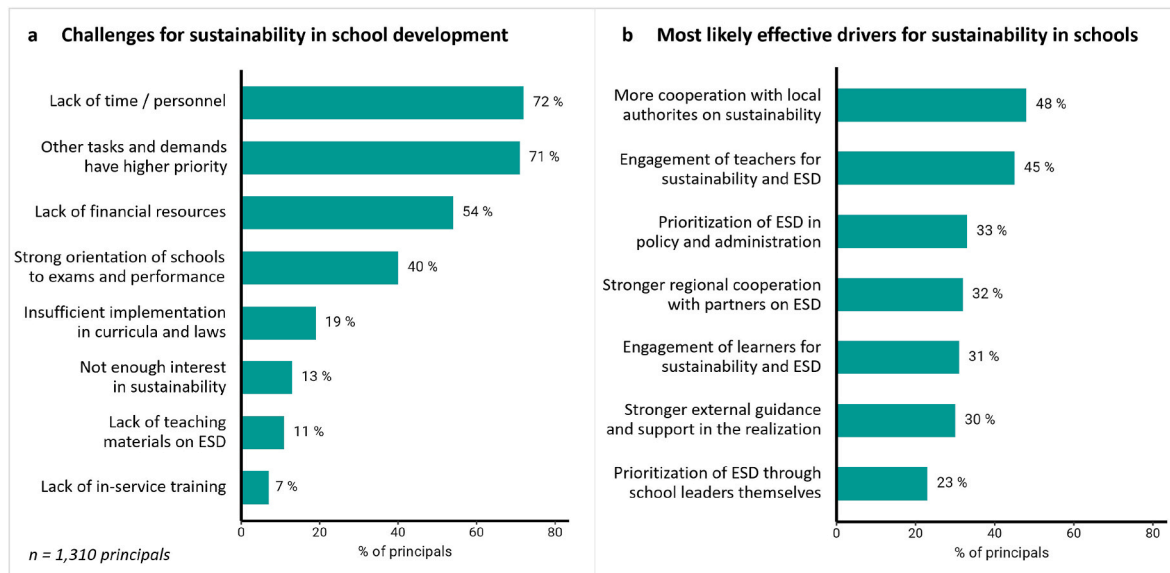
To quantify the occurrence of key challenges for sustainability in school development, the findings from the interviews were used to design the representative survey. As the number of items were restricted, the survey focused on a set of frequently mentioned challenges (Fig. 2). As shown in Fig. 2a, more than 70 % of principals agreed that a lack of time and personnel and the higher prioritization of other issues and demands is an important challenge for sustainability and ESD in school development. Lack of financial resources was seen as an obstacle by 54 % of principals, and 40 % agreed that a strong exam and performance orientation is a barrier to sustainability. In contrast to the perspective of educators (e.g., Grund and Brock, 2022), a much smaller proportion of principals agreed that non-integration in curricula and laws (19 %), and lack of interest (13 %), materials (11 %) or training (7 %) are challenges to the implementation of sustainability and ESD.

### 4.4. Drivers of change

In the interviews, the perceived need for **considerably greater prioritization of sustainability by policymakers, administrators, school leaders and local authorities** was strongly highlighted by the principals. They referred to the ‘political will’ in education ministries and policymaking to consistently integrate sustainability into education, pointed to their own responsibility in the setting of priorities at their schools and highlighted the importance of prioritizing sustainability in local authorities, particularly if the latter are responsible for school operations. Such prioritization (e.g., in the allocation of material resources and personnel, the setting of school-wide norms) is tied to the underlying paradigms and goals with which education is approached. As one principal stated:

*“Well, I think the decision-makers need a shift in their mindset, a different attitude. And I think it’s changing slowly now.”* (P-7, Pos. 24)

Concerning specific drivers, we found three overarching clusters: (i) stakeholder-related drivers within and (ii) outside the organization, and (iii) general (not stakeholder-specific) drivers (e.g., governance-arrangements, attitudes, activities, favorable windows of opportunity). In terms of **stakeholders within schools**, principals most often referred to themselves, teachers and learners. **Principals** described themselves as responsible for creating the conditions (‘setting the arena’) so that the



**Fig. 2.** Results from the representative survey of German school principals ( $n = 1310$ ). (a) Occurrence of challenges for sustainability and Education for Sustainable Development (ESD) in school development from the perspective from principals in Germany. (b) Most likely effective drivers for sustainability and ESD in school development from the perspective of principals in Germany.

school community has the opportunity to engage in sustainability-oriented school development. In this, they characterized themselves as role-models and in a position to put sustainability on the agenda, create space for others to act, organize participatory processes, develop cooperation, reorient operations, support initiatives and projects, foster the self-efficacy experiences of members of the school community, ensure that activities are visible, organize constructive evaluation, and mediate conflicts.

As one leader described it:

*„As with every school, this must be the school leaders. They are the drivers, the engines that have to push their team, their teaching staff, in a steering group or whatever. They have to act as models in negotiations with the parents’ council, with the pupils, and initiate these impulses, otherwise it won’t work.”* (P-8, Pos. 28)

When it comes to **teachers**, many principals viewed the intrinsic motivation of committed individuals as critical to change: Teachers were described to act as drivers by integrating sustainability into their teaching, going beyond the scope of current curricula, and by contributing to sustainability practice in everyday school life. Principals ascribed less responsibility to **learners**, although in many cases they emphasized the potential impact of their participation. Here, they referred not only to formal context such as school councils, but also more broadly to bringing new topics and perspectives into schools, e.g., through protests or other forms of engagement. With respect to the **general school community**, principals described living and modeling a culture of sustainability as well as continuous, collaborative reflection, among others, as drivers. While some principals also pointed to parents as co-constituents of sustainability-related change, few focused on non-teaching staff (e.g., caretakers, internal administration).

In terms of **stakeholder-specific drivers outside the school**, principals recurrently referred to education policymakers, ministries of education, and (local) authorities. Focusing first on **education policy and ministries**, a number of school leaders called for a major reorganization and rebalancing of the role that sustainability plays in education. This ties into calls by many school leaders for more substantial integration of ESD and sustainability into laws, curricula, teacher training and other policy documents as well as in incentive and quality development systems. Principals also described the need for **better communication between ministries and educational practice**, more

sharing of good practice, and better **cooperation with local authorities**. Concerning the latter, numerous principals believed it is crucial for whole-school sustainability to better integrate operations and campus management, which in Germany are mostly in the responsibility of local authorities, with educational processes and objectives related to sustainability. Regarding **other relevant stakeholders**, the leaders identified higher education institutions (e.g., for concept development, scientific advice), media that influence societal discourses, social movements, other educational institutions (e.g., for exchange and inspiration), and NGOs (e.g., for external support, cooperation) as drivers.

As a third cluster, principals pointed to **non-stakeholder-specific drivers**. In terms of **governance arrangements**, a large group of school leaders described more ‘leeway’ for schools to self-organize as a possible driver (e.g., in decisions regarding buildings and grounds or the content and structure of learning). At the same time, several principals took the position that more central steering (e.g., mandatory sustainability that would legitimize prioritization) would be needed. This goes hand in hand with calls to create lasting structures rather than ever new projects. As one principal put this:

*“Sustainability should not be dependent on changing political constellations. Sustainability needs to be designed for the long term. (...) [T]hat’s what the system actually needs, what we would need on the ground.”* (P-9, Pos. 66)

Such a structural orientation is consistent with principals’ description of the close integration of school sustainability with overall school quality management. Related to this, principals referred to the **(societal) valuation of education, and specifically sustainability in education**, which is also linked to both the public visibility funding of ESD. In the context of general quality education, several principals also pointed to the connection between sustainability learning and innovative didactic approaches (e.g., real-world learning, action orientation, educators as facilitators) and viewed the integration of sustainability in quality development as a driver. In terms of **windows of opportunity**, a recurring theme was that crises (e.g., pandemic, wars, climate crisis) can provide opportunities for a more fundamental reorganization of the aims and pathways for quality education. Specific school problems and other pressing issues (e.g., digitalization, reducing social inequalities, inclusion) were also seen as drivers if they are linked to sustainability

objectives. In terms of **favorable supportive structures**, the principals pointed to the availability of context-specific programs, external support (advice, facilitation, experts for specific events) and teacher training on sustainability and ESD.

The recurring drivers in the interview study were, as with key challenges, selected to quantify which drivers principals believe are most likely move the school toward whole-school sustainability. As Fig. 2b indicates, the responses were spread over a relatively widely range. Overall, the largest group of principals agreed that stronger cooperation with local authorities responsible for school operations on sustainability (48 %) and teacher commitment to sustainability and ESD (45 %) are critical drivers for whole-school sustainability. Fewer principals viewed their own prioritization of ESD as the most likely impactful driver. The spread of responses points to the importance of interpreting the results in light of the specific question (most likely effective drivers), which leads to relative rather than absolute answering. The wide range of responses suggests that the importance of different drivers may vary strongly according to specific contexts.

## 5. Discussion

The large-scale mixed-methods study was designed to provide systematic insights into principals' perspectives on the current and wished-for status, visions, challenges, and drivers of whole-school sustainability. The analysis of 80 interviews and a subsequent representative survey of 1310 principals revealed that a large proportion of school leaders in Germany wishes for sustainability to become a central guiding principle for quality school education. In the representative survey, 80 % of school leaders state that sustainability should be incorporated into the teaching of most or all subjects and become a fundamental part of school development. At least in Germany, this is currently not the case: Principals report that the current status of sustainability integration in their schools is considerably lower than they would wish for. This discrepancy is consistent with the strong desire of learners and educators for more ESD in formal education, which is evident both in Germany (Grund and Brock, 2022) and internationally (e.g., Kadji-Beltran et al., 2013; Simovska and Prösch, 2016).

The question then is how to address this discrepancy. In terms of barriers to and drivers of change, previous studies have focused particularly on the perspective of educators (e.g., Grund and Brock, 2022; Timm and Barth, 2021) or relied on relatively small samples of principals (e.g., Evans et al., 2012; Forssten Seiser et al., 2023; Iliško and Badyanova, 2014; Mogren and Gericke, 2019). In the following sections, we discuss the specific findings on visions, challenges, and drivers along four overarching and strongly interconnected patterns that we see in the analyzed data:

- (i) a focus on single and often fragmented actions,
- (ii) an individualization and diffusion of responsibility,
- (iii) a perceived lack of personnel, time, and other resources, and
- (iv) a paradigm of approaching sustainability as an additive.

Based on these patterns, we discuss possible learnings and implications not only for Germany, but also other international contexts (e.g., other countries, UN bodies). We subsequently reflect on our methodological approach and describe ways forward for research, practice and policy-making.

### 5.1. Recurring patterns and derived implications for sustainability in education

#### 5.1.1. From single and fragmented actions towards structural changes

When asked about what is currently being done in their schools on sustainability, a large proportion of principals in the interview study reported on single, often fragmented activities, e.g., waste separation, energy usage, gardening, tree planting, or other projects, often as one-off

interventions without systemic integration into 'default'-practice. This is consistent with the representative survey, in which a total of 62 % of school leaders responded that efforts to implement sustainability are currently either nonexistent (3 %), isolated instances (29 %), or occur occasionally in some projects and subjects (30 %). In terms of specific types of action, we found that principals not only mostly focused at single, fragmented actions, but on behavioral "low-cost" and easy-to-implement activities rather than high-impact 'key points' (e.g., Bilharz and Schmitt, 2011; IPCC, 2022). This focus on single and low-cost instead of structural and high-impact actions can, to some extent, be viewed as mirroring challenges the principals face in the school system, e.g., dependence on the states and local authorities, a lack of resources and systemic underprioritization of sustainability and ESD (see the following sections; cf. Huber et al. (2017) on the German school system). At the same time, the data indicates that the school leaders view changes to the underlying structural unsustainability (e.g., infrastructures, norms, incentives) as a crucial driver for sustainability within schools and describe ideal schools as ones in which sustainability is normalized as the default. This would, however, require more structure-oriented approaches both within institutions and in the policy environment (German Council for Sustainable Development, 2024; Rau et al., 2024). Such a focus would be in line with psychological research showing that behavioral costs of sustainable actions are higher when existing structures (e.g., rule systems, infrastructures) do not favor sustainability (e.g., Steg, 2023) and that access to behavioral options and habits are crucial determinants of action (Albarracín et al., 2024). This implies that redesigning the self-reinforcing and routine-creating (infra-)structures and norms at educational institutions can create an opportunity environment for sustainability learning and sustainable actions (ibid.; Cebrián et al., 2022; Mogren et al., 2024) and help mitigate the effects of single-action biases (Clayton et al., 2015; Wagner and Zeckhauser, 2012). Moreover, given that people tend to underestimate the willingness of others to act for sustainability (Andre et al., 2024; Bouman et al., 2020; Steg, 2023), a more structure-oriented approach can support individuals to become active themselves (Holst et al., 2024a).

#### 5.1.2. From individualized and diffused responsibility towards collective action

Closely related to the first pattern, we found considerable individualization and diffused responsibility in the analyzed data. This is evident, for example, in the perceived normality of reliance on committed individuals, the diffusion of responsibility among stakeholders and in the way in which principals portray sustainability-related activities at their schools as often based on behavioral changes by individuals. While we found that principals described the envisioned future as one characterized by considerably more collective action, they also here often focused on (collective) footprint reductions at the institutions and focused less on collective actions towards the above-mentioned structural changes. In this context, it is important to consider what Grund and Brock (2019) call the question of 'epistemic fit': the extent to which a set of possible actions (e.g., individual behavioral changes or collective and structural actions) fits the scale of the problem (in this case, structural unsustainability). In other words, fully shifting the responsibility for "solving" widespread, structural unsustainability to individuals and their behavior without addressing the structural causes would be equivalent with a discursive displacement of responsibility. This ties in with Niebert (2021, 2019), who emphasizes the importance of empowering learners as political actors capable of challenging the decisions and systems that have created the current unsustainability and engaging in the relevant political processes. In this context, Kranz et al. (2022) link effective climate change education to the development of political literacy to contribute to structural changes at the collective level and Heitfeld and Reif (2020) highlight the relevance of empowerment for political participation, experiences of efficacy, and strengthening of democratic principles. This notion of collective action and democratic participation is closely related to a

WSA, in which the participatory and political nature of learning how to design and realize sustainability in a ‘microcosm’ is embraced (Holst et al., 2024a; Sterling, 2003). Such collective action also means broadening the scope of engaged stakeholders to actively include ones which are not yet sufficiently involved (e.g., local authorities, caretakers; cf. Liebhauer et al., 2023).

### 5.1.3. From a lack of resources towards prioritization of sustainability at all levels

Recurringly, principals pointed to a lack of resources (personnel, time, budgets) as a barrier to sustainability at schools. We found considerable frustration among interviewees about the state of the German school system in this regard. In the representative survey, 72 % of principals in Germany agreed that lack of personnel and time is an important barrier, and 54 % came to the same conclusion with respect to available budgets. This is consistent with several other international studies (Cebrián et al., 2022; Evans et al., 2012; Veronese and Kensler, 2013) and links to the relevance of sufficiently financed and well-trained personnel for whole-school sustainability (Ferreira et al., 2006; Fischer et al., 2022). Aside from the lack of time and personnel which is also linked to curriculum overcrowding (Cebrián et al., 2022; Evans et al., 2012), 71 % of leaders agree that other demands currently have higher priority in their schools, which is also mirrored in the interviews. These elements point to an overarching and frequently highlighted driver for change: a stronger prioritization of sustainability by decision-makers at all levels. The interviewed school leaders repeatedly spoke of the lack of political will to pursue even already agreed-upon targets (e.g., SDGs, national and state action plans and laws), and even less to further prioritize sustainability to a degree commensurate with the scale of the problem. This mismatch is described not only in terms of policymaking (e.g., structural integration, allocation of personnel and funding), but also with respect to local authorities (operations) and, not least, in terms of principals and educators themselves. As found in other studies, there is a considerable gap between high attributions of importance to sustainability and real-world prioritization (e.g., Jackson et al., 2007; Kadji-Beltran et al., 2013; Simovska and Prösch, 2016; Grund and Brock, 2020).

### 5.1.4. From sustainability as an additive towards integration with quality education

As a fourth overarching pattern in the data, sustainability is described in depictions of current status, barriers and drivers as an additive, but not as an integral feature of school education. As a first example, leaders described the level of structural integration of sustainability in the education system as low and call for changes in this regard. Despite dynamism in recent years, this is in line with a large-scale document analysis, which concluded that sustainability and ESD are still a structural ‘add-on’ to the German education system (Holst et al., 2024b). Less directly visible, the additive paradigm recurs when principals talked about cultural aspects such as a perceived normality of unsustainability outside of specific projects, feelings of being torn between conflicting targets and demands or a tendency to take the path of least resistance. Also, 40 % of principals described a strong grade orientation and performance pressure in the school system as a key barrier to sustainability, which is in line with findings from international case studies on the realization of WSAs (Mathie and Wals, 2022). Further, school leaders recurrently highlighted that other demands are systematically being given higher priority. All of this may be linked to what Wals (2020) calls the “hidden curriculum of unsustainability”, through which school education often unintentionally prepares learners for a life in which sustainability is another issue, but not a guiding principle. However, principals in the interview study did not stop at this narrative of the present, but depicted a possibly different future: Many described sustainability at ideal schools as a self-reinforcing normality, expressed the wish to empower future generations and embedded this ideal in more sustainable societal systems. This vision links back to the

question on the relationship between sustainability and quality education: echoing Klafki (1996), quality education ultimately means to empower learners with the abilities required to address the key societal problems of their time (on links between sustainability and quality education, see also Laurie et al., 2016; Nikel and Lowe, 2010). Such an integration would show, amongst others, in the general quality assessment systems and instruments (e.g., quality standards, targets for sustainable learning environments). First developments in this regard can be seen, for instance, in international education studies such as PISA addressing questions concerning agency in the Anthropocene (White et al., 2023).

## 5.2. Ways forward

The present study offers a national-scale assessment of the status, visions, challenges and drivers of whole-school sustainability from the perspective of principals in an exemplary context (Germany). In terms of limitations, a small self-selection bias among the 80 interviewees can be assumed despite the systematic sampling according to representativeness criteria. Also, a non-quantifiable degree of socially desirable response must be considered, especially in qualitative interview settings. Future research could focus on the conditions under which whole-school sustainability is (not) realized, and examine in depth the resistances, target-conflicts, and lock-ins in sustainability-related school development. Also, the 6-point scale for assessing current and wished-for sustainability integration can be used as an indicator for whole-school sustainability in addition to, for instance, surveys with learners and educators. Moreover, further large-scale studies in other education systems could help to identify overlaps and differences among recurring patterns internationally.

As per the volume of analyzed data, the study allows for a birds-eye perspective on sustainability in the federal school system of Germany through the lenses of school principals. Some of the learnings from the recurring patterns (single actions, individualization, lack of prioritization, add-on paradigm) connected with the wish of principals for structural and practical change may be relevant also in other (inter-)national contexts. While many countries have committed themselves to sustainability in education (e.g., Council of the European Union, 2022; UN General Assembly, 2023; UNESCO, 2021), the study indicates that this commitment does not necessarily mirror in sufficient prioritization, manifestation in structures and emphasis on empowering learners to become engaged citizens. Structural change and transformative action are, however, core objectives of the UNESCO program ESD for 2030 and as well as international declarations (UNESCO, 2021, 2020). Building on this, future (inter-)national recommendations and strategies on sustainability in education may strengthen the importance of collective, structural and high-impact action and focus on developing learning environments in which sustainability is not only experienced, but approached as a collaborative and political field of action. Resonating with Niebert (2019, 2021) and Kranz et al. (2022), this means addressing schools as participatory, experiential spaces for learning active citizenship and acquiring political literacy. As principals themselves are in a position to initiate and facilitate structural change, but often share the above-mentioned perceptions of sustainability as an underprioritized additive, we concur with other studies (Cebrián et al., 2022; Simovska and Prösch, 2016; Zachariou et al., 2013) in pointing to the high relevance of professional development programs for principals. In our view, such programs may focus particularly on organizing systemic, structural change toward sustainability that becomes a self-reinforcing norm, and focus on high-impact sustainability-related actions.

## 6. Conclusion

The national-scale mixed-method study on principals’ views on sustainability showed that in Germany, there is a strong wish by

principals for sustainability to become a core feature of school education. However, principals describe a considerably lower status quo in practice and indicate challenges such as prevailing rule-systems and mindsets that hinder sustainability (e.g., strong performance- and grade-orientation, normality of unsustainability), a lack of resources and structural integration as well as dependence on state and local authorities. Drivers include, amongst others, considerably stronger prioritization of sustainability at all levels, for example, through integration in quality standards and laws, school improvement plans, infrastructure development and school-specific priority setting. Also, the findings on effective drivers suggest high context-specificity, particularly in decentralized school systems such as in Germany (cf. Huber et al., 2017), which is relevant to consider when aiming for effective policies. As part of the synthesis, four overarching patterns were identified in the data: a focus on single, often fragmented and low-impact actions, individualization and diffusion of responsibility, a considerable lack of resources and political prioritization as well as a paradigm of approaching sustainability as an additive. In consideration of these patterns and the national and international commitments on sustainability in education (e.g., [Standing Conference of the Ministers of Education and Cultural Affairs, 2024](#) in Germany; [UN General Assembly, 2023](#); [UNESCO, 2021](#)), we derived key implications and recommendations for future policy-making and educational practice. Based on the large-scale data from the case study of Germany, we suggest for sustainability-oriented education to place a stronger emphasis on collective and political learning as well as on actions towards structural changes. This implies, for example, collaborative social learning through co-development of actions toward infrastructure change, as well as rule systems and incentives that set sustainability as the default rather than individualizing responsibility (cf. [Dyball et al., 2007](#)). In line with this, the study points to the importance of prioritizing sustainability as an integral feature of general quality education ([Klafki, 1996](#); [Kvamme, 2021](#)). While the responsibility for addressing unsustainability clearly lies in the hands of current decision-makers rather than with young and future generations, educational institutions can thereby become spaces where unsustainability can be critically assessed, (political) participation in the design of more sustainable systems can be learned, and, in a microcosm, a more socially and ecologically just society can be experienced.

### CRedit authorship contribution statement

**Jorrit Holst:** Writing – review & editing (lead), Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization (lead). **Antje Brock:** Writing – review & editing (supporting), Conceptualization (supporting). **Julius Grund:** Writing – review & editing (supporting), Conceptualization (supporting). **Ann-Kathrin Schlieszus:** Writing – review & editing (supporting), Conceptualization (supporting). **Mandy Singer-Brodowski:** Writing – review & editing (supporting), Conceptualization (supporting).

### Funding

This research was funded by the German Federal Ministry of Education and Research (BMBF) (Grants 01JO2004 and 01JO2305).

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Acknowledgement

We would like to thank the cooperation partner for the representative survey (Verband Bildung und Erziehung), in particular Anne Roewer, as well as the commissioned team at Forsa (service provider), in

particular Aleksa Möntmann and Franziska Jahn.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jclepro.2025.145897>.

### Data availability

Data supporting the results of this study can be requested from the corresponding author.

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