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Leadership Traits in Environmental Education: Insights from Johor Schools

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Abstract

This study investigates how school leaders interpret and mobilize the traits and competencies required to initiate Education for Sustainable Development (ESD) in school contexts. Using a qualitative single-case study design, semi-structured interviews were conducted with eight school leaders involved in the Johor Sustainable Education Action Plan (JSEAP). Thematic analysis reveals three interrelated dimensions of leadership practice: a positive orientation towards change, substantive ESD-related knowledge and interpersonal competence. Rather than operating as static attributes, these dimensions emerge as relational and contextually shaped capacities, developed through leaders' ongoing engagement with institutional constraints, policy expectations and school-level realities. The findings suggest that early-stage ESD leadership is less a matter of technical readiness than a process of situated sense-making, in which leaders negotiate meaning, capability and context simultaneously. This study advances ESD scholarship beyond competency frameworks towards a more complex understanding of how sustainability-oriented change is initiated in schools.

Keywords: Education for Sustainable Development; environmental education; ESD competencies; school leaders; sustainable development

Introduction

The 21st century presents interlinked challenges – resource depletion, widening socio-economic disparities, climate change and biodiversity loss – which demand educational responses that foster long-term sustainability. Education for Sustainable Development (ESD) seeks to equip young people with the knowledge, skills, attitudes and values necessary to engage with these challenges (UNESCO, 2014). While policy discourse increasingly recognizes school leadership as pivotal for embedding ESD across curricula and whole-school practices, empirical evidence on which leadership traits operate and how leaders operationalize them during the early stages of implementation remains limited (UNESCO & Educational International, 2021; Verhelst *et al.*, 2023). This study examines this gap by exploring how school leaders involved in the Johor Sustainable Education Action Plan (JSEAP) perceive and prepare to develop the traits and competencies required to initiate ESD in their schools.

ESD calls for school administrators' active involvement and commitment to promote a sustainability culture. The importance of school leaders in fostering students' environmental awareness has grown in recent decades (Verhelst *et al.*, 2023), and school leaders play a central role in driving ESD initiatives within their institutions and the wider community (UNESCO, 2021). Their responsibilities include promoting environmental awareness and spearheading

collaborative initiatives among students and teachers to integrate sustainability principles. The UNESCO global ESD report has guided this study on how school leaders perceive practices, knowledge and strategies for leading students and teachers to achieve ESD goals collectively. More reports and guidelines developed by UNESCO on school leaders' traits and qualities in ESD have been published or are under development (Elfert, 2019; UNESCO, 2014, 2021).

Although the specification of school leaders' traits in ESD is a significant step towards successful ESD implementation, educationists still encounter resistance and the concept of ESD remains poorly understood (Mochizuki & Fadeeva, 2010; Timm & Barth, 2020). A study by Kadji-Beltran *et al.* (2013) suggests that various constraints limit principals' commitment to ESD, including the need for targeted professional development, a focus on staff empowerment, critical evaluation of existing practices and exploration of alternative approaches in curriculum, pedagogy and policy. Addressing these challenges is crucial to equipping school leaders with the fundamental qualities to drive effective ESD initiatives and create impactful learning environments. Studies on ESD and school leaders have identified several limitations, with most research primarily focusing on higher education, green jobs and skills acquisition (Bianchi, 2020).

However, there is a notable scarcity of studies examining the role of school leaders in implementing ESD. Research at the school level, specifically addressing the roles and attributes of school leaders, remains limited and emphasizes the need for further investigation in this area (Leo & Wickenberg, 2013). There is a shortage of empirical evidence demonstrating the successful development of ESD initiatives (Redman *et al.*, 2021). Research efforts must be directed towards sustaining these initiatives and developing tools to measure and evaluate the traits and qualities of school leaders (Cebrián *et al.*, 2022). Significant knowledge gaps exist regarding various issues related to ESD implementation, particularly from the perspectives of school leaders and teachers involved in integrating new curricula and their roles within the educational environment (Müller *et al.*, 2020; Redman *et al.*, 2021; Timm & Barth, 2020). Müller *et al.* (2020) acknowledge that empirical studies on the importance of ideal school leaders in promoting sustainability and ESD in schools have seldom been conducted. In this study, the terms "traits" and "competencies" are used interchangeably to reflect both dispositional and skill-based dimensions of leadership.

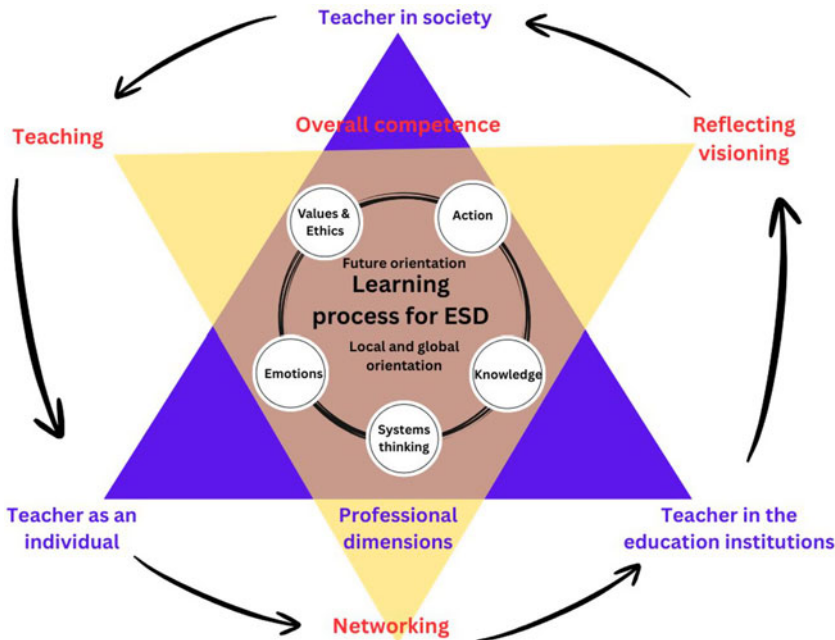
The study highlights the critical need for research on ESD leadership traits, particularly within school settings where empirical evidence remains scarce. While existing work has focused on wider aspects of ESD, the role of school leaders in implementing ESD is largely underexplored. This paper addresses these gaps by investigating how school leaders perceive and develop ESD traits, aiming to provide valuable insights into fostering environmental educational practices. Thus, to gain insight into this concern, this study was guided by the following research questions:

1. How do school leaders perceive the traits and competencies required for the early implementation of ESD in schools?
2. How do school leaders prepare themselves to navigate the challenges associated with initiating ESD practices?

Literature review

ESD has emerged as a global priority as education systems respond to escalating environmental and socio-economic challenges. International frameworks, including the UNESCO Roadmap, emphasize a transformative role for ESD in cultivating learners' critical thinking, systems thinking, problem-solving and ethical decision-making capacities (UNESCO, 2014, 2021). Scholars highlight that ESD requires a shift towards holistic, competency-driven learning experiences that prepare individuals to navigate the complexities of sustainable development (Bianchi, 2020; Glavič, 2020; Redman *et al.*, 2021). Comparative and cross-national analyses

Figure 1. The dynamic model of ESD (Sleurs, 2008).



similarly demonstrate increasing policy commitments to embedding sustainability principles in national curricula (Elfert, 2019; Fekih *et al.*, 2021).

Within this broader landscape, school leadership is consistently identified as a decisive factor in whether ESD becomes meaningfully embedded in school practices or remains superficial. School leaders shape institutional priorities, influence school culture, mobilize resources and support pedagogical innovation – making their role central in translating ESD ideals into practice (Cebrián *et al.*, 2022; Müller, 2022; Zachariou *et al.*, 2013). Studies show that leadership practices significantly affect the extent to which sustainability values are integrated into whole-school approaches, affect teacher engagement and influence student competencies (Scharenberg *et al.*, 2021; Seiser *et al.*, 2022).

An important strand of research focuses on the traits and competencies required of school leaders to implement ESD effectively. Competency models, including the Dynamic Model of ESD (as in Figure 1) and related frameworks, identify critical areas such as normative competence, collaborative capacity, pedagogical knowledge and action-oriented leadership (Bianchi, 2020; Corres *et al.*, 2024; Mochizuki & Fadeeva, 2010). The Dynamic Model of ESD proposed by the CSCT (Curriculum, Sustainable Development, Competences, Teacher Training) project (2008) provides a robust theoretical foundation for examining leadership traits in environmental education. The CSCT model reconceptualizes the educator’s role from a mere “communicator of knowledge” to an agent embedded in “a dynamic relationship with their students, their colleagues, and the wider society” while “confronting issues of sustainability.” This relational and competency-driven orientation – encompassing the five domains of knowledge, systems thinking, emotions, ethics and values and action – maps directly onto the leadership dispositions that school leaders must cultivate to drive environmental education forward.

School principals and teachers who demonstrate these competencies are better positioned to foster inquiry-based, value-laden and action-oriented environmental learning cultures within their institutions. Moreover, the model’s professional dimensions, which are teaching, reflection

and networking, parallel the strategic and collaborative leadership behaviours that effective environmental education leaders are expected to embody. Thus, the CSCT Dynamic Model of ESD serves as both a diagnostic lens and a prescriptive framework for understanding how leadership traits translate into meaningful environmental education practices at the school level. The competencies enable leaders to navigate the uncertainties and tensions often associated with sustainability reforms (Timm & Barth, 2020). Leadership traits such as optimism, resilience, openness to innovation and the ability to build interpersonal trust are documented as important in facilitating sustainable school improvement (Cristóvão *et al.*, 2023; Ferguson *et al.*, 2022; Parry & Metzger, 2023; Şemin, 2019).

In the Malaysian context, national and state-level initiatives reflect a growing commitment to sustainability in education, including the JSEAP and various low-carbon awareness programs (Mokthsim & Salleh, 2014; Phang, 2019). Policy analyses show increasing integration of Sustainable Development Goals (SDG)-related values in curricular reforms, although implementation remains uneven across schools (Balakrishnan, 2021; Gnanamalar *et al.*, 2022; Kanapathy *et al.*, 2021; Zakaria *et al.*, 2021). Research suggests that Malaysian school leaders face a rapidly evolving sustainability agenda but often navigate these expectations with limited training or support structures (Zainal *et al.*, 2023).

Despite the growing literature, a significant gap persists at the school leadership level. Systematic reviews note that most ESD research remains policy-oriented or teacher-focused, with insufficient attention to the experiences and readiness of principals tasked with leading early implementation (Edwards *et al.*, 2020; Minott, 2023). Even within leadership research, studies tend to analyse whole-school approaches or organizational effectiveness rather than the specific traits and competencies leaders believe they need when initiating (Sasaki *et al.*, 2024; Verhelst *et al.*, 2023). Recent Malaysian studies further emphasize the lack of empirical insights into how leaders interpret ESD expectations and prepare themselves for the challenges of implementation (Zainal Abidin *et al.*, 2023).

Given these gaps, this study examines school leaders' perceptions of the traits and competencies required for early ESD implementation and explores how leaders prepare themselves to navigate dynamic challenges. This focus strengthens the evidence base on ESD leadership – an area crucial to realizing sustainability aspirations at the school level.

Methodology

Research design

This study employs a qualitative research design and a single-case study approach, with data collected through semi-structured interviews. The single-case study approach is advantageous when an in-depth understanding of an issue, event or phenomenon of interest is needed in its natural, real-life setting. In a single-case study, researchers examined a case to understand the similarities and differences between the units of analysis. A single-case study focuses on a single case (the JSEAP program) rather than multiple cases. (Mills *et al.*, 2010) suggested that a multiple-case study can only be used when researchers want to provide greater insight into propositions and replicate the findings using contrasting observations.

However, a single-case study focusing on school leaders who participated in JSEAP is used in this study because it enables the identification of similarities and potential replication. These characteristics are useful in examining the undiscovered domain of ESD traits from the perspective of school leaders. This approach calls for the researcher to be present during the event being investigated and to listen intently, with a critical comprehension of what is being said and a sensitivity to what is being heard (the case study approach is relational). The case study approach involves “participation from within” (Knapik, 2006). For instance, conclusions can be drawn from the information gathered through interviews and other input sources. The primary idea behind

case study research is that cases are naturally selected for inclusion based on a principle or set of principles that accounts for their uniqueness and importance (Schoch, 2016).

Informants for this qualitative study were selected through non-probability purposive sampling. In case study research, purposive sampling is the ideal technique because subjects are chosen based on their representativeness (Etikan *et al.*, 2016) and allows the researchers to sample cases or individuals that differ in some characteristics or traits and display different dimensions of those traits (Crowe *et al.*, 2011). A series of interviews with school leaders who participated in JSEAP was conducted until saturation was reached. Because the JSEAP program is specifically developed for schools in Johor and has not yet been made available in other states, the study's boundary is within Johor's schools.

An interview protocol was prepared to guide the semi-structured interviews. Interviews ranged from 32 to 77 minutes (mean $\approx$ 54.5 minutes), including a brief social conversation. The interviews used open-ended questions to explore school leaders' roles, qualities, characteristics and strategies in ESD. Pseudonyms were used to represent the informants (Rose, Zack, Sally, Haliza, Addy, Huda, Ong, Asri). The questions allowed open discussion among all participants, and the researchers used probing questions to elicit more in-depth information. This study's central question is: "What are the key roles and characteristics that school leaders need in implementing ESD?" The informants were also asked about their concepts of ESD, ESD practices and ESD competencies. This process can enhance the effectiveness of interview questions, promote a natural flow in the interview and ensure its significance in achieving the study's aim (Creswell & Creswell, 2018).

Data analysis

The raw audio data were transcribed for analysis and analysed using reflexive thematic analysis. In the first step of the reflexive theme analysis, the researchers categorized all recurrent codes into patterns that ran concurrently and iteratively. Coding marks data segments with symbols, descriptive words or category names (Miles *et al.*, 2014). The data coding process was conducted iteratively and reflexively, progressively leading to a refined focus and understanding of the research objectives. ATLAS.ti, a platform for rich text analysis, supported the data analysis. The codes were then assessed and defined in the code assessment stage. Guided by the research question, the themes were interpreted and narrated in the findings.

Results

This study explored the leadership traits that school leaders identified as effective for integrating ESD in their schools. A total of 22 subcodes were identified in the principals' responses, which were then grouped into seven primary codes and three broad themes: positive attitudes, high ESD knowledge and interpersonal skills (see Table 1). The interpretation of the codes resulted in the emergence of three themes, namely positive attitude, high ESD-related knowledge and interpersonal skill.

Theme 1: positive attitude

The study indicated that school leaders with a positive attitude towards implementing ESD possess several subcodes that contribute to this attitude. Three subcodes for this theme are accepting positively, facing challenges positively and moving forward. The principals generally expressed an optimistic orientation towards the early introduction of ESD, although the intensity of this optimism varied across schools. While most leaders emphasized the importance of sustaining a positive outlook to motivate teachers and frame ESD as an opportunity rather than a burden, this sentiment was shaped by their local contexts and levels of existing support.

Table 1. Emerging themes

Subcodes	Primary codes	Themes	
Accept positively	Positive actions	Positive attitude	
Face the challenges			
Moving forward			
Positive impact on students			
Empower teachers	Leaders as motivators	High ESD-related knowledge	
Role model			
Passion and interest	Passion and responsibility		
Work together			
Grit	Commitment and efforts	Knowledgeable leader in ESD	
Prioritizing tasks			
Ability to introduce the importance of ESD	Transfer of knowledge		
Sharing ideas and concepts of ESD			
Able to disseminate to people	Knowledgeable leader in ESD	Interpersonal skills	
Critical reflection			
Must know first			
Reading on ESD			
Buy-in	Convincing skill	Interpersonal skills	
Develop perception			
Envisioning skill			
Writing convincing			
Verbal communication			

Rather than being uniform, a positive attitude emerged as a recurring but context-dependent trait that helped leaders navigate uncertainties during the initiation phase. Accepting positively in this subcode is viewed as recognizing the importance of ESD, recognizing the need for change and taking responsibility for leading the change, as in the excerpt, “*Whatever program we want to introduce at school, the leader must be proactive. Must be started by the leader* (Rose:18).

The interpretation of the informants’ responses indicates that responsibility for leading the change is accepted positively. They explain the reasons for the change, its benefits and how it aligns with the school’s overall goals. The researcher probed, “To change, is it necessary to have passion and interest in the school leaders?” and the informants answered, “*First interest, then responsibility. At school, the most important thing is the principal’s positive attitude towards the direction of change he brings* (Sally: 26). The study also found that school leaders’ positive actions positively impact students. They are achieved through leadership style, vision and strategies that foster student involvement. For example, when the researcher asked about the ESD program’s impact on the students, an informant noted a positive increase in student attendance, as Haliza stated, “I can see the impact when the attendance before is 70%, now it has risen to 88% (Haliza: 52).”

Findings from positive actions by school leaders in ESD have steered them to become good motivators. The study interpreted leaders’ capabilities as motivators through two actions: empowering people and becoming role models. The informants view empowering people as

requiring effort to instil appreciation and motivate teachers and students in ESD. *"I believe that appreciation is very important. This strategy ensures that the program gets support and motivation from both the teacher and the student. This way, they will be more interested"* (Huda: 24).

Another subcode for leaders as a motivator is becoming *role models*. The context of exemplary role models extends beyond the school level to include competent principals themselves. The process of becoming a role model to the teachers requires them to be able to explain the concept and idea of the new program on board, as highlighted by Asri: *"If I manage to (play the role) explain and understand the teacher, ESD may be more successful"* (Asri: 47). School leaders' passion and responsibility in implementing ESD at school can significantly influence the success of ESD programs, as mentioned by Rose: *"If I don't share the same passion, the same attitude or same idea to others, the teachers might just nod, by the time I leave, it's end"* (Rose: 30).

The study found that school leaders' passions are interdependent factors that can encourage their commitment to the ESD program. School leaders actively involved in the program and taking responsibility for its success are likely to develop a sense of ownership. Haliza noted, *"If I take responsibility for ESD, I'm more likely to be committed to it, and my commitment will inspire others to join the movement"* (Haliza: 33). They believe passion is not enough without commitment and effort. These two codes are interconnected. The study found that school leaders' commitment and effort are essential to fostering their dedication to ESD programs.

Theme 2: high ESD-related knowledge

This theme emerged from two primary codes: (1) Transfer of knowledge and (2) Knowledgeable leader in ESD. Participants consistently highlighted the importance of strengthening their ESD-related knowledge; however, the depth and focus of this knowledge differed among schools. Although several principals described actively seeking out training, reading policy documents or learning through professional networks, others reported more limited exposure and relied heavily on external facilitators. Thus, rather than suggesting that all leaders possessed similar levels of ESD understanding, the theme reflects a shared recognition that improving ESD knowledge was necessary, even if the extent of that knowledge varied across contexts.

Highly knowledgeable school leaders can influence teachers and empower them to incorporate ESD into their teaching practices. Introducing ESD is not a sheer interpolation into the curriculum. School leaders understand ESD as an integrated approach rather than a separate subject . . . *even there, we have embedded it into the learning to align with the current syllabus. This is important because it will be easier to understand the concept of ESD if we do it practically* (Addy: 30). A deep understanding and knowledge of sustainability principles contributed to their ability to share ESD ideas and concepts with teachers and students. Sally explained her ten years of experience in sharing the concept of ESD and admitted it is a complex but essential effort to comprehend ESD concepts and knowledge . . . *how far or to what extent do they want to work all out to ensure that the head of school is well versed in ESD and understands the concept'* (Sally: 129).

The study asserts that sharing ESD ideas and concepts requires a deep understanding of the subject. It can be obtained through extensive reading on ESD or the personal experience of the school leaders. They are convinced that gathering knowledge by reading is necessary to understand ESD concepts before sharing them, as described by Zack: *'The leader has to know it first. I'm the type of person who likes it if I get something to read first, even if it's not there, we just Google it* (Zack: 12). The knowledge they received from reading allowed them to expand on their opinions on ESD by increasing their self-awareness of the environment through critical reflections. The interview gives insight into how critical reflection contributes to becoming a knowledgeable leader. The researcher first observed the pattern of answering questions and found that all of them offered a critical view of the issues, problems and strategies and provided a

meaningful description of the probed situations. This pattern was accumulated to mark their deep understanding of ESD and relate to their school programs. The excerpts below exemplify the observed patterns: *The earth is old. Look at the pollution. Moreover, we have seen a major flood caused by humans* (Haliza: 147).

Theme 3: interpersonal skills

Most principals emphasized the value of interpersonal competence, particularly communication, relationship-building and managing resistance, as essential when introducing ESD. While this emphasis was common across interviews, leaders used different strategies depending on school culture and staff readiness. The multitude of strategies suggests that interpersonal skills were widely regarded as important yet enacted in ways shaped by each school's unique environment. The theme, therefore, represents a recurring pattern rather than a universal or identical approach. Given the broad scope of interpersonal skills, this study identified two highly relevant skills that recorded the highest number of subcode occurrences during analysis. The subcodes were further refined to find similarities. Two primary codes associated with Interpersonal skills in ESD are (i) Convincing Skills and (ii) Critical Decision-Making Skills.

The first subcode, convincing skills, refers to pleading or arguing in favour of something, such as a course, idea or policy, to successfully influence someone through written or vocal communication. However, this study broadens the context of convincing skills by adding three additional related codes, along with the existing writing and verbal convincing codes in the literature.

The other three subcodes clustered under the convincing skill are developing good perception, creating a sense of purpose and buy-in understanding. Verbal convincing is the most popular way school leaders use it, especially during the early introduction of ESD. This skill is effectively communicating and influencing others through spoken language. They see convincing verbal skills as a gift to boost their effort in making people understand the vision of ESD, as stated in their speech: *"I have the competence to persuade. Maybe others don't. You got it, right? And that is an advantage* (Sally: 132) and *"... but you must be good at speaking. It's like when there is a meeting, you have to be good when you want to convey ideas to people, especially a new program such as the ESD* (Huda: 62). Effective verbal convincing involves persuading others of your point of view and creating a collaborative and respectful environment that fosters open dialogue and understanding. Zack described her experience convincing teachers, which eventually gained attention after a few attempts. He uses a few minutes in every meeting for a session of awareness-sharing and for giving examples of the outcomes they want. The practice is simple but impactful, and the teachers eventually know the importance of ESD.

The findings show that when school leaders feel a sense of commitment to the school, they have a stronger sense of belonging to the ESD project. For teachers, a commitment to work and school fosters a positive relationship and creates a sense of purpose. These were remarks made multiple times by the informants. Teachers often ask what the purpose is to attract students to the school. For example, *... so what is the purpose? (Mimicking teacher's response) I don't see the purpose or need for sustainability* (Asri: 20). Managing the ESD program involves taking calculated risks. School leaders must be skilled at identifying sustainability-related challenges and analysing their root causes.

An experienced school leader is viewed as capable of assessing potential risks associated with different courses of action and implementing strategies to mitigate those risks. The capability includes evaluating the potential impacts of decisions and developing contingency plans. To do this, they must gather relevant data, consider multiple perspectives and critically evaluate the information to understand the problem fully. *You must dare to be different. But you must have the conviction ... conviction is thinking that whatever you do is for the student's benefit* (Sally: 274).

Rose agreed that the different courses of action could mitigate those risks, as he said, “...and from that will determine the next courses of action” (Rose: 18).

Discussion

This study examines how Malaysian school leaders understand and enact the traits required to introduce ESD in their schools. The findings illuminate how leaders navigated the early stages of ESD implementation, particularly regarding their attitudes, knowledge and interpersonal competencies. Rather than treating these traits as fixed or isolated, participants’ experiences show how these dimensions interact dynamically to shape leaders’ readiness and capacity to lead ESD-focused change. The findings show how school leaders balance policy, curriculum and community needs, offering practical and theoretical perspectives on ESD leadership.

The research reveals that school leaders’ competencies significantly influence the effectiveness of ESD in schools. Leaders with strong pedagogical and managerial knowledge were more likely to embed ESD principles across curricula and extracurricular activities (Kadji-Beltran *et al.*, 2013; Müller *et al.*, 2021; Şemin, 2019). However, these competencies were not uniformly distributed; variations across schools suggest that local context, prior experience and access to professional development shape leaders’ capacity to enact ESD. This observation tempers absolute claims about high ESD-related knowledge across all schools (Theme 2), acknowledging that competencies are contingent on multiple factors. These findings extend existing literature by empirically demonstrating the interplay between leadership capacity and school-level ESD enactment (Leo & Wickenberg, 2013).

School-level challenges, such as limited resources, competing administrative priorities and varying teacher readiness, emerged as critical factors mediating ESD implementation. These factors align with prior studies emphasizing that school context shapes sustainability outcomes (Campbell, 2010; Cebrián *et al.*, 2022; Seiser *et al.*, 2022). Notably, while some leaders adopted innovative strategies to overcome these barriers, others faced structural constraints that hindered the adoption of comprehensive ESD. The multifaceted structural constraints underscore that ESD is not a one-size-fits-all process; it is dynamically negotiated within each school’s ecosystem. The findings contribute to theory by highlighting the situational nature of leadership in sustainable education, supporting a more context-sensitive interpretation of ESD leadership models (Müller *et al.*, 2021; Zainal *et al.*, 2024).

School leaders perceive three interrelated themes as foundational: (a) a positive/optimistic attitude towards change and sustainability, (b) substantive ESD-related knowledge that enables knowledge transfer and critical reflection and (c) interpersonal competencies. These themes closely align with the Dynamic Model of ESD (Sleurs, 2008), which foregrounds competence mapping across the affective, cognitive and social domains. The study’s findings illustrate how the ESD dynamic model manifests in real-world school settings. Leaders acted as mediators of sustainability values, translating policy and curriculum guidance into actionable strategies. For example, school leaders facilitated professional learning opportunities, engaged students in sustainability projects and fostered partnerships with local communities – practices that reflect the model’s iterative and interconnected processes (Ferguson *et al.*, 2022; Minott, 2023; Potter-Nelson & O’Neil, 2019; Zürich *et al.*, 2008). Importantly, these activities were not linear; rather, they emerged through cycles of reflection, adaptation and stakeholder negotiation.

This dynamic reinforces the theoretical assertion that ESD implementation is a complex, contextually embedded process rather than a standardized procedure (Fekih Zguir *et al.*, 2021; UNESCO, 2025). Additionally, effective professional development in ESD helps teachers help students gain knowledge, skills and dispositions, including interpersonal skills, to support sustainable communities (Parry & Metzger, 2023; Potter-Nelson & O’Neil, 2019). The referenced

sources collectively substantiate the claim that strong interpersonal skills are a key characteristic of ESD, enabling school leaders to communicate effectively and address vision-related challenges. It also aligns with the study's finding that effectively communicating, engaging and maintaining connections with stakeholders are crucial to successfully implementing ESD operations.

The discussion situates the findings within broader ESD scholarship. Consistent with global research, Malaysian school leaders recognize the importance of sustainability competencies and whole-school approaches (Seiser *et al.*, 2022; Timm & Barth, 2020). However, the study extends this literature by demonstrating the specific ways in which school leaders in Malaysia navigate policy–practice gaps, particularly in under-researched school-level contexts (Balakrishnan, 2021; Mokshein, 2019). This contribution emphasizes the need for context-sensitive frameworks that account for local policy environments, resource availability and leadership capacity, advancing theoretical discourse beyond general competence lists to relational and situational dynamics of ESD leadership.

This study makes theoretical contributions in three ways. First, it operationalizes leadership as both an enabler and negotiator of ESD, emphasizing relational and context-driven dimensions. Second, it demonstrates how school leaders' knowledge and competencies interact with institutional and environmental constraints, highlighting conditional mechanisms rather than deterministic outcomes. Third, the study bridges the gap between ESD theory and school practice, offering a framework for understanding how policy, leadership and school context coalesce in shaping sustainability outcomes (Müller *et al.*, 2020; UNESCO, 2021; Zainal Abidin *et al.*, 2024).

While the study provides significant insights, the findings must be interpreted with limitations in mind. The purposive sampling approach (Etikan *et al.*, 2016) may limit generalizability, and self-reported data from school leaders may reflect aspirational rather than enacted practices. Nonetheless, these limitations underscore the value of qualitative, context-sensitive inquiry in uncovering nuanced patterns and theoretical mechanisms. Future research could expand the model by integrating teachers' and students' perspectives, offering a multi-level understanding of ESD enactment.

This study demonstrates that ESD implementation is mediated by school leaders' competencies, contextual factors and dynamic engagement processes. The connection between empirical observations and the dynamic model of ESD, the discussion illuminates the theoretical pathways through which school-level leadership shapes sustainability outcomes. A grounded framework for future research, policy design and practical interventions in Malaysian and global contexts further strengthens the theoretical contribution of ESD scholarship. These findings suggest that early-stage ESD leadership is less a matter of technical readiness and more a process of situated sense-making, where leaders negotiate meaning, capacity and context simultaneously.

Conclusion

This study examined how school leaders understand the traits and competencies required when ESD is first introduced in schools. Through a qualitative single-case study involving principals engaged in the JSEAP, the findings illustrate that early-stage implementation is shaped by three interrelated traits: maintaining a positive attitude, developing substantive ESD knowledge and cultivating interpersonal competence. These traits influenced how leaders interpreted ESD expectations, mobilized support within their schools and positioned themselves to respond to emerging challenges.

Theoretically, the study offers a deep understanding of what constitutes leadership readiness for ESD. Existing ESD competency frameworks emphasize normative, collaborative and pedagogical dimensions, yet the present findings suggest that readiness is also deeply tied to affective and relational dispositions. The optimism expressed by principals signals an

emotional–motivational capacity that helps sustain momentum during the uncertain beginnings of sustainability reform. Their emphasis on substantive ESD knowledge reinforces the cognitive anchor that leaders need to translate abstract sustainability discourse into school-level strategies. Meanwhile, interpersonal competence reflects the relational foundation necessary to cultivate trust, negotiate resistance and foster a culture supportive of ESD. Taken together, these traits extend current theoretical models by demonstrating that readiness for ESD is not solely technical but also anchored in leaders' dispositions, identities and the social dynamics they navigate.

Beyond theory, the findings carry practical implications for educational systems aspiring to institutionalize ESD. Professional learning programs may benefit from foregrounding dispositions such as optimism and relational leadership alongside technical training in sustainability concepts. Policymakers may also consider the early-phase burden placed on school leaders as they bridge global ESD mandates with local realities, especially in contexts where sustainability initiatives are still evolving. For Malaysian schools, the study highlights the importance of targeted support structures to ensure that principals are not only knowledgeable about ESD but also emotionally and relationally equipped to lead change.

As a context-specific qualitative inquiry, the study does not claim generalizability. Nonetheless, it offers a conceptual foundation that may inform future research in similar settings. Comparative studies could explore whether the traits identified here manifest similarly in other national systems or whether additional forms of readiness emerge in different sociocultural contexts. This study adds to the expanding literature that conceptualizes leadership as a dynamic, values-oriented process critical to advancing sustainability in schools. The examination of school leaders' practical experiences during the initial phase of ESD implementation shifts the perspective beyond treating leadership solely as an administrative function.

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Ethical statement. This study involved interviews with school leaders. Informed consent was obtained from all participants before data collection. No personal or sensitive data were collected, and all data were anonymized. In accordance with institutional guidelines, formal ethical approval was not required. All procedures adhered to relevant institutional and research standards.

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