

## The Scoping Review of Strengths and Weaknesses in Applying Green Leadership in Schools

Rifan Shodikin<sup>1\*</sup>, Asep Sudarsyah<sup>2</sup>, Aan Komariah<sup>3</sup>, Mochammad Devi Cahya Ruhimat<sup>4</sup>, Wu Jiwei<sup>5</sup>

<sup>1-4</sup> Educational Administration Department, Universitas Pendidikan Indonesia, Bandung, Indonesia.

<sup>5</sup> Hefei Parida Education Technology, He Fei Shi, China

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\*Corresponding Author Email:

[suratrifan@upi.edu](mailto:suratrifan@upi.edu)

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**Abstract:** This research aims to identify the strengths and weaknesses of green leadership implementation in school environments as a response to the increasingly pressing climate crisis today. Using a qualitative approach with a scoping review method, this study successfully analyzed eight selected scientific articles obtained from the Scopus and Google Scholar databases based on strict inclusion and exclusion criteria. The analysis results indicate that green leadership practices significantly positively impact various aspects of education, such as improving student academic achievement, teacher collaboration, equalizing access to education, and strengthening a culture of environmental care. However, this study also reveals challenges in measuring effectiveness due to the lack of comprehensive implementation guidelines. Therefore, the development of a systematic sustainable leadership strategy is needed to prevent managerial chaos and support a consistent vision of sustainability in the school environment.

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## INTRODUCTION

In an increasingly complex and dynamic global era, the issue of the environmental crisis has become a matter of serious concern (Kissling and Bell, 2020). With unprecedented globalization (Kobrin, 2020), our natural resources are increasingly being depleted (Majeed et al., 2022). This is due to human actions and technological advancements that continuously make the Earth's climate change faster than ever before (Driga & Drigas, 2019; Trenberth, 2018). It must be acknowledged that sacrificing our vulnerable climate will not allow for progress (Caney, 2017), that have shown negative impacts on the environment. There are many definitions of climate change (Brusseau, 2019) defined as several sustained weather changes in a specific location or the world as a whole. Because it has changed over millions of years, climate change is not a new phenomenon (Naz et al., 2022). However, this change has been accelerated by humans (Hoegh-Guldberg et al., 2019), which causes droughts, heat waves, cyclones, flash floods, and other environmental disasters (Erickson et al., 2019). Many studies support the idea that if someone wants to avoid serious climate disasters, they must adopt appropriate climate mitigation and adaptation features (Abbass et al., 2022). This unprecedented climate change is impacting the education system, especially for school principals, as they are the leaders of education (Dare & Saleem, 2022).

In facing increasingly evident climate challenges, the role of educational institutions has become increasingly strategic, not merely as places for transferring knowledge, but also as agents of social and ecological change (Feinstein & Mach, 2020). School principals, as central figures in educational leadership, can no longer separate academic responsibilities from environmental responsibilities (Connolly et al., 2017). They are required to have a high level of ecological awareness and be able to integrate sustainability principles into the school's vision, mission, and managerial practices (Goldman et al., 2018). This challenge is not merely technical but also ethical, as school leaders can instill

environmental awareness among teachers, students, and the surrounding community while maintaining the quality of education. In this context, Maher and Jackson (2025) state that leadership responsive to environmental issues requires new skills, the ability to read the dynamics of ecological crises holistically, make future-oriented decisions, and build a school culture that is adaptive to climate change. In other words, the global environmental crisis demands a transformation in how we view education, not merely as a space for achieving academic outcomes, but also as an arena for fostering concern, collective responsibility, and concrete action in addressing the climate crisis (Constantino et al., 2022).

Education is considered responsible for climate change and promotes socio-economic development (Hariram et al., 2023). Considering the impending threat of climate change and the limited natural resources (Kushawaha et al., 2021), Of course, the role of education cannot be overlooked. Students and the general public can understand the impact of global warming through meaningful climate change education. This will help them adapt to climate change-related trends while also safeguarding the interests of future generations (Albers, 2018). Education plays a key role in encouraging and helping students make the right choices and decisions related to their activities. Horner et al., (2017) In his research, he mentioned that the classroom is the most important unit in the implementation of the education system, because it is where all educational policies are ultimately implemented. Achieving quality education for all is the main goal of all governments (Qureshi et al., 2020), and school leaders need awareness and proper leadership training so that they can transform their peers into environmentally conscious leaders (Constantia et al., 2022).

In this context, school principals' responsibility as education leaders becomes even more crucial. They are not only tasked with managing school operations, but also play a strategic role in instilling values of sustainability in the entire school community (Y. Zhao et al., 2024). Visionary and environmentally-conscious leadership is needed so that education does not merely become a means of imparting knowledge, but also a vehicle for transforming awareness (Miao & Nduneseokwu, 2024). School principals must be able to build a school ecosystem that supports contextual learning about climate issues, from waste management to action-based projects in the surrounding environment (Ruiz-Mallén et al., 2022). In other words, they need to create learning spaces that foster ecological habits and social responsibility among students from an early age. This cannot be achieved without relevant leadership training, progressive policy support, and active community involvement. When school leaders are equipped with a strong understanding of the urgency of climate change, they can drive a more responsive curriculum, empower teachers as agents of change, and facilitate students to become environmentally conscious individuals capable of making decisions that positively impact the future (Gitmiwati, 2024).

This research aims to identify and map the strengths and weaknesses in the implementation of green leadership in school environments through a scoping review approach. Considering the urgency of the environmental crisis that impacts various sectors, including education, this research specifically aims to explore how the concept of green leadership is implemented by school principals in responding to the challenges of climate change and environmental degradation. Furthermore, this research aims to examine the leadership strategies that have been used to build environmental awareness within the school environment. Thus, the results of this research are expected to provide theoretical and practical contributions to the development of sustainability-oriented educational leadership and to foster the creation of an environmentally conscious school culture.

In order to achieve these goals, it is important to understand that the implementation of green leadership in schools does not take place in a vacuum. It is greatly influenced by the social and cultural context and prevailing education policies (Tomlinson, 2017). School principals who wish to adopt this approach need to consider various factors, ranging from the readiness of human resources and the support of the school community to the flexibility of the curriculum, which allows for the integration of environmental issues into teaching and learning activities (Boarin and Martinez-Molina, 2022). This is where leadership plays a vital role, not merely in managing but inspiring and mobilizing the entire school ecosystem toward change. The strategies employed can vary, ranging from developing school programs based on the environment, training teachers in sustainable education, to actively involving students in activities that foster care for nature (Walshe et al., 2023). Through a scoping review approach, this research aims to identify best practices and challenges faced in implementing green leadership. The

results will not only enrich academic literature but also provide practical guidance for education stakeholders in realizing schools as spaces that not only educate but also nurture life and the future of the Earth.

The Earth's climate naturally changes over time, and the changes are very rapid (Zalasiewicz & Williams, 2021). The unprecedented impact of climate change demands that the current generation be informed about it (Scott, 2021). The majority of recent research supports the practice of green leadership in schools (Shafait & Huang, 2024). On one hand, theoretical analysis shows that green leadership is an effective school leadership model in today's schools. However, on the other hand, some examples show the opposite, of course, this needs to be investigated further if there is evidence to the contrary. This gap has become a domain that is quite important to research. If not addressed, the understanding of the implementation of green leadership in schools can be misguided. Moreover, an inappropriate leadership style can cause serious chaos in school management activities.

Therefore, it is important for this study to highlight ideal green leadership practices and explore the real challenges faced in the field. Not all school principals have the understanding, skills, or adequate support to consistently apply sustainability principles. In some cases, green leadership becomes mere administrative jargon without substantial implementation or is even misinterpreted as merely ceremonial environmental activities. This can lead to a disconnect between policy and practice at the school level. On the other hand, schools that successfully implement green leadership comprehensively typically have leaders who not only deeply understand environmental issues but also can translate them into managerial strategies relevant to the local context. Therefore, exploring this complexity is important to avoid getting stuck in generalizations or assumptions. Through systematic mapping, we can better understand where the strengths and barriers lie, enabling a more realistic, effective, and sustainable approach to green leadership in schools.

## METHOD

This research uses a qualitative approach (Busetto et al., 2020), scoping review (Tricco et al., 2016) is the method used in this research (Munn et al., 2018). By observing the characteristics of the analyzed research problems, we focus on reviewing relevant research report findings (Zhu et al., 2018). So that the results can provide unbiased information regarding the implementation of green leadership in schools. By exploring both strengths and weaknesses simultaneously (Caldwell, 2023; Huang, 2018; Suryapermana et al., 2022). This framework establishes that the data source for this research is journal articles (Austin et al., 2017) that have been published by an accredited journal publisher. We determined the Scopus database (Montoya et al., 2018) and Google Scholar as the main data sources (Delgado López-Cózar et al., 2019). The process of searching for articles begins with reviewing articles through the Google Scholar and Scopus portals. From the beginning, we visited the official article pages to rigorously select trustworthy sources from the start. At this stage, we produced a total of 105 articles. Next, we repeated the article selection process based on inclusion and exclusion criteria. See Table 1.

**Table 1.** Inclusion and Exclusion Criteria in Literature Source Screening

Aspect	Inclusion	Exclusion
Source Type	Journal articles from the Scopus and Google Scholar databases	Book, Conference Paper, Publication Article Without DOI, Without URL Link, or corrupt file Publication of notes and duplicate articles
Publication Year	Journal articles published in the years 2015- April 2025	Journal articles published before 2015
Language	English	Other languages (India, China, Spain, etc.)
Context	Green Leadership in Schools	Green Leadership is not in schools. (for example, in financial institutions and others)
Theme	Concept of Education	Not an Educational Concept

Source: Adapted from : (Dai & Ke, 2022)

After the initial screening process, the next stage focused on a more rigorous selection process to ensure that only articles that were truly relevant and met high methodological quality standards were included in the analysis. The inclusion criteria we established include articles that explicitly discuss green leadership in the context of education, are written in English, and were published within the last ten years to ensure the timeliness of the data. Meanwhile, articles that are opinion-based, have not undergone peer review, or do not provide traceable empirical information are excluded from the analysis. This selection process was conducted systematically and repeatedly to minimize subjective bias, including through discussions among researchers to reach consensus when encountering questionable articles. From the initial 105 articles, several articles were ultimately selected for in-depth analysis. The selected articles were then reviewed to identify key themes, implementation patterns, challenges, and opportunities in green leadership practices within school environments. With this approach, we aim to present a comprehensive and balanced mapping that highlights successes and reveals the limitations and real-world complexities encountered in practice.

Strict selection using inclusion and exclusion criteria was conducted to obtain suitable literature sources (Amundsen et al., 2018). At this stage, we have successfully published 48 articles. Next, the remaining 57 articles were thoroughly reviewed as part of the final selection process. In this process, we focused on selecting articles with discussions that truly align with the research objectives. Finally, 49 articles were discarded, and 8 other articles were designated as journal articles that met the criteria. These 8 articles were then analyzed in depth. The metadata from the articles were collected in a table that includes the results of the article analysis and mapping of the author's name and publication year, title, type of research and data source, as well as the assessment generated from the research on the implementation of green leadership in schools.

An in-depth analysis of eight selected articles enabled us to develop a clearer picture of the dynamics of green leadership implementation in schools. Using metadata tables as a tool, we were able to examine not only the content and results of each study but also the methodological trends, thematic focus, and geographical context of these studies. This information is crucial for understanding how the concept of green leadership is interpreted and implemented across various educational settings. For example, there are variations in the approaches taken by some studies, which emphasize the role of school principals in shaping a sustainable school culture, while others focus more on structural challenges and policies that hinder progress. By analyzing the data comparatively, we can identify common patterns and uncover gaps that require further investigation. This approach provides a strong foundation for our research to objectively conclude how green leadership practices evolve, what factors support and hinder them, and how this model can be further developed in a broader educational context.

## RESULT

Green leadership focuses on creating and promoting sustainable and environmentally friendly practices (Ullah Khan et al., 2023) in an organization or community (Boeske, 2023). More than just compliance with the environment (Woo & Kang, 2020). In his research "Environmental Issues As an Indispensable Aspect of Sustainable Leadership," he mentions that green leadership involves a long-term vision, deep commitment, and the ability to inspire and motivate others to participate in environmental preservation efforts. The basic concept of green leadership is prioritizing sustainability in every aspect of decision-making and operations (Fry & Egel, 2021; Khaddage-Soboh et al., 2024). This means that every action is taken with consideration of the long-term environmental impact, not just short-term economic gains. (Gabler et al., 2023) mentioning that a green leader has a clear vision of what will happen in the future and can translate it into goals and strategies for their organization or community. We see green leadership as a leadership style that first developed in the environmental and nature conservation sector (Sołoducho-Pelc & Sulich, 2022).

Over time, the concept of green leadership is no longer limited to the environmental or nature conservation sectors, but has begun to be widely adopted in various sectors, including education (Al-Zawahreh et al., 2019). In schools, green leadership is becoming increasingly relevant because

educational institutions play a strategic role in shaping the mindsets and behaviors of future generations. School principals who embrace green leadership not only manage administrative activities but also act as agents of change, promoting an environmentally conscious culture within the school environment. They integrate sustainability values into school policies, teaching methods, and extracurricular activities that encourage active student involvement in environmental issues (Garrecht et al., 2018). Additionally, green leaders in schools demonstrate leadership through lifestyles and policies consistent with sustainability values, such as energy use, waste management, or the utilization of green open spaces. Green leadership is not merely an environmental management strategy but also an educational approach that fosters moral and social awareness, shaping collective consciousness.

The findings from our analysis of the articles show that although green leadership brings a number of positive potentials to the world of education, its implementation does not always run smoothly in the field. Some of the main challenges identified include a lack of deep conceptual understanding among school leaders, limited supporting resources, and a lack of specific training that equips education leaders with environmentally-conscious leadership competencies. Additionally, cultural and structural resistance remains, making the transformation toward sustainable schools difficult to achieve comprehensively. In some cases, efforts to implement green leadership tend to be symbolic or limited to incidental programs without integration into the school's strategic vision. This highlights a gap between the idealistic concept and its practical implementation. Therefore, it is important for policymakers and education stakeholders to not only promote the adoption of green leadership in a normative manner but also provide concrete support that enables school principals to implement it sustainably and contextually. This support can take the form of training, funding, cross-sector partnerships, and the development of policies that encompass environmentally friendly educational practices at all levels.

The internalization of a leadership concept from the environmental and nature conservation sector to the education sector is inseparable from the advancements in educational science driven by relevant research, as well as the high expectations held by educational leaders regarding their ability to accelerate the achievement of the goals of the institutions they lead. The application of green leadership in educational institutions is believed to enhance growth and build environmental awareness, create a healthy learning environment, prepare future generations, encourage innovation and creativity, and support sustainable development (Ren et al., 2018). Nevertheless, several studies have highlighted some anticipated shortcomings. Here are the results of the article analysis we have conducted. See Table 2.

**Table 2.** Article Analysis Results

Author (Publication Year)	Research Title	Type of Research & Data Sources	Research Results and Studies on Green Leadership Practices in Schools
Vakalis et al., (2021)	Can green schools influence academic performance?	Systematic Review; data sources: 28 new studies + 101 studies from 15 previous reviews	Green Leadership practices through the implementation of LEED-based green school design, focusing on improving indoor air quality and acoustics to enhance students' academic performance.
Zhao et al., (2019)	Environmental Justice and Green Schools—Assessing Students and Communities' Access to Green Schools	Quantitative research (Logit Model); data sources: school enrollment data, LEED data, and the 2010 US census data	The practice of Green Leadership is reflected in the equitable access to green schools for minority and low-income communities, supporting the principle of environmental justice.

Author (Publication Year)	Research Title	Type of Research & Data Sources	Research Results and Studies on Green Leadership Practices in Schools
Landa & Donaldson, (2022)	Teacher Leadership Roles and Teacher Collaboration: Evidence From Green Hills Public Schools Pay for Performance System	Mixed Methods; data sources: survey (n=523) and interviews (n=47) with teachers	Green Leadership is realized in empowering teachers through leadership roles that encourage collaboration, learning innovation, and a work environment that supports sustainability.
Sterrett (2016)	From Cortez to Crozet: Voices on Leading and Learning in Two Green Schools	Narrative case study; data sources: observation and interviews	Green Leadership is reflected in the development of a green culture in schools, including the management of outdoor learning gardens, recycling projects, and the integration of environment-based learning.
Pebriantika et al., (2020)	Leadership in Green School Practices: A Case Study of the Principal's Roles Towards Reducing Global Warming Risk in Lampung, Indonesia	Qualitative Study (Case Study); data sources: interviews, observations, document analysis	The Green Leadership practice is implemented by the principal by fostering an environmentally caring culture, integrating clean, healthy, and environmentally responsible behaviors into the daily lives of students and school staff.
Radwan & Issa, (2017)	An Evaluation of Indoor Environmental Quality and Occupant Well-being in Manitoba School Buildings	Exploratory Study; data sources: indoor environmental quality measurements and teacher surveys	Green Leadership practices are represented in efforts to improve air quality, natural lighting, and acoustics in the new LEED-certified school building, which contributes to the well-being of teachers and students.
Ledi et al. (2024)	Environmental performance reclaimed: unleashing the power of green transformational leadership and dynamic capability	Quantitative research; data sources: survey (n=306) and Structural Equation Modeling (SEM)	Although the focus is on business organizations, the Green Leadership principles being studied are green transformational leadership that drives green innovation, which is relevant to be contextualized in green school management.
Prabawani et al. (2022)	Systems Thinking and Leadership of Teachers in Education for Sustainable Development: A Scale Development	Instrument development research; data source: teacher survey in 4 schools	The practice of Green Leadership is reflected in strengthening the competencies of systems thinking and teacher leadership in education for sustainable development (ESD), encompassing social, economic, and environmental aspects.

## DISCUSSION

We reviewed that there are diverse research findings and perspectives on the implementation of green leadership in schools. Of course, this is not separate from the objectives and areas of each research topic. Nevertheless, in general, the research we reviewed has presented findings that affirm the effectiveness of green leadership and the positive implications of implementing green leadership on various aspects of school organization.

These findings indicate that green leadership is not merely a managerial approach that is responsive to environmental issues, but also a transformative strategy that can drive organizational cultural change in schools. Leaders who adopt sustainability values tend to create a more collaborative work environment, encourage active participation from school members, and strengthen ecological awareness in daily practices. In some contexts, green leadership even serves as a catalyst for the emergence of more inclusive and long-term policy innovations. Therefore, despite differing research approaches and focuses, the common thread that can be drawn is that green leadership significantly contributes to achieving sustainable education goals.

Vakalis et al (2021) found that green leadership positively influences the improvement of students' academic performance, due to the good indoor air quality. Zhao et al (2019) highlighting green leadership to ensure that everyone, including small groups or those economically disadvantaged, has the same opportunity to attend environmentally conscious schools. Landa & Donaldson (2022) seeking the positive impact of green leadership from the principal on both teachers and students. The principal encourages teachers to collaborate and create an environmentally conscious work environment.

These findings show that green leadership not only plays a role in creating a healthy physical school environment but also touches on aspects of social justice and the quality of relationships between school members. Vakalis et al (2021) emphasize the importance of environmental factors such as air quality in supporting student academic achievement, which may have been overlooked in the discourse on educational leadership. Meanwhile, Zhao et al. (2019) demonstrate that green leadership has an inclusive dimension, where advocacy for vulnerable groups is part of a vision of an equitable environment. In another context, Landa and Donaldson (2022) highlights the role of school principals as drivers of a collaborative work culture that prioritizes sustainability. In other words, green leadership impacts students as beneficiaries and strengthens teachers' capacity as agents of change within the school ecosystem. This finding underscores that green leadership has the potential to build schools that are more equitable, healthy, and collectively empowered.

In line with Landa & Donaldson (2022), Pebriantika et al (2020) finding the positive impact of green leadership implemented by the school principal. The difference is in Landa & Donaldson (2022) seeing the impact of collaborative efforts among teachers, Pebriantika et al (2020) seeing its impact on the aspect of school community commitment. The qualitative case study approach in his research also explains that the principal who implements "Green Leadership" is like building good habits of environmental care in the school. The way to do this is by making everyone at the school; students, teachers, and staff, accustomed to living cleanly, healthily, and responsibly towards the environment every day.

The findings Pebriantika et al. (2020) reinforce the understanding that green leadership works holistically, not only encouraging change at the policy or formal structure level, but also touching on the realm of culture and daily behavior at school. In this case, collective commitment is key, and the role of the principal as a role model and facilitator of change is very important. This exemplary role is reflected in concrete, repetitive actions, such as encouraging school community members to maintain environmental cleanliness, sort waste, and care for the school garden. Unlike Landa and Donaldson (2022), who emphasizes collaboration among teachers, the study by Pebriantika et al. (2020) demonstrates how green leadership instills ecological responsibility as part of the school community's identity.

Meanwhile Radwan & Issa (2017), witnessing that Green Leadership is realized in the physical construction of a new school building. This environmentally conscious leadership is reflected in efforts to improve three important aspects within the building: air quality, natural lighting, and acoustics.

Furthermore, this new school building has LEED green certification. LEED (Leadership in Energy and Environmental Design) is an internationally recognized green building rating system. Obtaining LEED certification indicates that the design and construction of the building meet certain standards in terms of energy efficiency, resource use, indoor environmental quality, and other sustainability aspects.

Ledi et al (2024) mentioning that the principles of green leadership, particularly green transformational leadership that encourages environmentally friendly innovation, are highly relevant to be applied in the management of green schools. Transformational leadership style can inspire and encourage people to go beyond their personal interests to achieve greater goals. School leaders who implement green leadership should encourage innovation in various areas, from curriculum and learning approaches that integrate environmental issues to sustainable resource management practices. By incorporating these principles into education, schools can build a strong culture that cares for the environment and produce graduates who are aware and capable of contributing to a greener future.

The green transformational leadership approach, as proposed by Ledi et al. (2024) opens up great opportunities for schools to become agents of change in facing the global environmental crisis. When a school leader inspires its citizens to think beyond short-term interests and focus on sustainability, it creates a space that encourages collaboration, creativity, and collective responsibility. Innovation is no longer understood solely as the introduction of new technology, but also as a change in thinking and behavior toward the environment, both in daily practices such as waste and energy management, and in curriculum development that instills eco-pedagogical values. Green schools led through transformational leadership also tend to develop a strong institutional identity, where sustainability becomes an integral part of the school's vision, mission, and culture. In this context, green leadership is not merely an administrative strategy but also an ethical form of leadership that positions sustainability as the moral compass and direction for educational development in the era of climate change.

In another case, Prabawani et al (2022) findings show that Green Leadership practices in schools are significantly reflected in efforts to empower teachers through strengthening their systems thinking and leadership competencies in the context of Education for Sustainable Development (ESD). This means that school leaders who implement Green Leadership recognize the importance of equipping teachers with the ability to understand the complex relationships between social, economic, and environmental factors. They must also be able to inspire and lead sustainability initiatives at the school. Teachers with system thinking skills can help students comprehensively understand sustainability challenges and find ways to address them.

From the 8 studies, we identified that the implementation of green leadership in schools provides 10 benefits for teachers, students, educational staff, and school performance, including: (1) Improvement in student academic performance (2) Equal educational opportunities (3) Increased collaboration among teachers (4) Creation of an environmentally caring work atmosphere (5) Enhanced commitment of school community members (6) Formation of good environmental care habits (7) Improvement in the quality of the school's physical environment (8) Innovative green school management (9) Strengthening the culture of environmental care (10) Empowerment of teachers in education for sustainable education.

In our analysis, they provided a strict assessment of the identified leadership models. But within that diversity, Zhong et al (2025) sees that each of them certainly has a tendency towards green leadership. Their research results show that the implementation of green leadership contributes positively to sustainable education, but there are difficulties in measuring it because there are no detailed guidelines on the applied green leadership. Additionally, there is a possibility that different leadership styles will emerge.

Indeed, the lack of comprehensive guidelines on specific leadership practices within the organization increases the likelihood of chaos. Therefore, it is very important to establish guidelines to prevent potential chaos (Otegui, 2024). Especially in the green leadership model that emphasizes environmental responsibility and sustainability. If the authority of each organization member is too biased, power tends to shift from the leader to the organization members who are more environmentally conscious. Members of the organization with more influence over sustainability policies can cause an imbalance in leadership and threaten the organization's environmental vision (Ahsan & Khawaja, 2024). By enhancing the organization's commitment to transforming the sustainability culture and developing



green-oriented professional practices, this threat can be avoided. One way is to refer to structured and detailed sustainability policies and strategic guidelines (Sun et al., 2024).

## CONCLUSION

A literature review of eight selected articles examining green leadership practices in schools from various countries in Dubai found that, overall, the implementation of green leadership in schools has a significant positive impact on various aspects of the educational environment. It has been proven that green leadership improves students' academic performance, enhances teacher collaboration, increases access to better education, creates an environmentally friendly work environment, and makes school residents more concerned about sustainability. Green leadership also improves the school environment, encourages new methods for managing green schools, creates an environmentally conscious culture, and encourages teachers to be sustainable. However, since there are no clear guidelines or implementation models yet, these studies also found it difficult to measure how effective green leadership is. This indicates that the development of comprehensive strategic guidelines is necessary to prevent misguided leadership and ensure a consistent sustainability vision.

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