Reimagining Children's Environmental Engagement in Indonesia through a Posthuman Approach

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Declaration

I, Dewi Shinta Wulan Dini Soebari Putri, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the work.

Abstract

This thesis explores environmental education in Indonesia from a posthuman perspective, addressing the gap in integrating the agency of nonhuman elements in environmental processes. This aspect is often overlooked in favour of human-centred approaches. The thesis aims to develop a conceptual framework that recognises and integrates both human and nonhuman actors to facilitate children's environmental participation in Indonesia.

The thesis objectives include defining key concepts, assessing the interactions between human and nonhuman entities in a specific children's environmental initiative, and developing a conceptual framework that incorporates posthuman perspectives into environmental education. A qualitative case study was conducted on the Aksiku Project in Bandung, Indonesia, using ethnographic methods such as observations, interviews, and focus groups. Aksiku used digital tools and interactive modules to engage children during the coronavirus disease 2019 (COVID-19) pandemic, employing a participatory approach that encouraged hands-on problem-solving and action-based learning.

Key findings demonstrate that nonhuman elements significantly influence children's understanding of environmental issues, and that engagement with the material surroundings fosters connections to broader environmental concerns. The findings also emphasise the opportunities and challenges of remote participation, highlighting how technology, spatial dynamics, and children's emotional engagement intersect in educational practices. Additionally, the findings underscore the role of teachers in navigating institutional barriers and promoting environmental education, even with shifting educational priorities and systemic constraints. Lastly, the findings emphasise the dynamics involved in maintaining the integrity of environmental education projects during changing conditions and difficult times, stressing the role of reflexivity in organising this project.

This thesis makes three primary contributions: (1) proposing a framework that emphasises the interconnectedness of elements for a more systemic engagement with environmental issues; (2) examining how material realities, technological mediations, policy frameworks, and organisational strategies shape children's environmental involvement; (3) generating empirical knowledge of environmental education in Indonesia, thus offering insights into children's participation in environmental sustainability, and the role of adults and technology in educational spaces.

Impact Statement

This thesis offers an empirically grounded framework for transforming environmental education through a posthuman perspective, particularly in the Indonesian context. It explores how the integration of material elements, digital technologies, societal roles, and organisational practices can enhance the engagement of children and adults in environmental issues. The impact of this research extends beyond academia and holds significant implications for non-academic stakeholders, including educational practitioners, policymakers, and community leaders, both locally and globally.

Within academia, this research contributes to the fields of environmental education and children's geography. It recommends strategies for integrating posthuman thinking into environmental education to create participatory and transformative learning environments. The findings emphasise the need to adopt approaches that recognise the agency of both human and nonhuman actors in educational settings, thereby enriching current educational methodologies and fostering interdisciplinary research.

This thesis introduces novel methodological frameworks that employ an ethnographic approach in the context of the global COVID-19 pandemic, enabling a deeper understanding of the interactions between children, adults, and their environments during times of unprecedented change. These methodologies provide robust tools for researchers exploring the dynamics of learning and participation across different places and spaces.

The impact of this thesis extends to practice, policy, participants, and broader social life. By challenging the dominance of humanist approaches, this thesis transforms how children's participation is understood at a practical level while also encouraging policy discussions on how children's participation should be better considered. It emphasises the need for policies that go beyond the rhetoric of 'representing children's voices' to account for the contexts that shape their engagement. Such

rhetoric often reduces participation to verbal expression, overlooking the relational, material, and institutional conditions in which it occurs. Adopting a posthuman perspective, this thesis frames participation as an emergent, co-produced process involving both human and nonhuman actors within situated assemblages. The research can serve as a reference for implementing post-anthropocentric curricula, using technology and emotional approaches, and developing collaborative schemes with communities. It provides data-driven recommendations to create safe spaces for children to participate and voice their concerns. This thesis offers recommendations for incorporating environmental education into educational policies, improving curricula, strengthening teacher training programmes, and encouraging cross-sector collaboration and resource sharing. Lastly, the Aksiku project directly impacted 26 children in 2020 and 150 children in 2019. The project creates social impact by challenging exploitative mindsets toward the environment, incorporating nonhuman rights into everyday practices and fostering a more equitable relationship between humans and the environment.

In conclusion, this thesis seeks to catalyse broader societal and environmental changes, going beyond advancing academic knowledge in environmental education. Moreover, my work with Aksiku has allowed me to turn these ideas into real-world action and bring about meaningful impact, establishing a connection between academic research and practical engagements.

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Table of Contents

Declaration i

Abstract ii

Impact Statement iv

Acknowledgements vi

Table of Contents vii

List of Figures xi

List of Tables xi

Chapter 1 Redefining Young People's Environmental Involvement

1.1 Indonesia's environmental problems and young people's role *1*

1.2 Integrating posthuman thinking: Core concepts *7*

Humans and nature 9

Humans and technology 11

Nonhuman agency 12

Knowledge production and subjectivity 14

Reality as a complex process 16

1.3 Research on children and the environment *18*

1.4 The thesis: Assembling environmental education in Bandung, Indonesia *25*

1.5 Thesis contributions *28*

1.6 Overview of the thesis structure *31*

Chapter 2 Assembling Environmental Education

2.1 Introduction *34*

2.2 Understanding environmental education *35*

Empowerment 35

Transformative learning 37

Participatory spaces 39

2.3 Conceptualising environmental education assemblage *43*
Assemblage thinking 44
2.4 Conclusion *48*

Chapter 3 Research Methodology: Tracing How an Environmental Education Project has Evolved Before and During the COVID-19 Pandemic

3.1 Introduction *51*
3.2 Data collection methods: Ethnographic tracing *52*
3.2.1 Participant observation 54
The origins of the Aksiku project 56
Pre-pandemic project phases 60
Project adaptations during the pandemic 73
3.2.2 Semi-structured interviews 90
3.2.3 Focus groups discussions 90
3.2.4 Research adaptation 91
3.3 Ethical principles *94*
3.4 Thematic analysis *96*
3.5 Conclusion *99*

Chapter 4 From Home Confinement to Collective Awareness: The Journey of Children's Environmental Learning

4.1 Introduction *102*
4.2 Pathways to children's transformations and empowerment *104*
4.2.1 Immersing in material contexts 104
4.2.2 The social aspect of research and information-gathering 111
Social media and the internet 112
Peers, family, and experts 113
Various related networks 116
4.2.3 Transformative learning experiences 119
Shifting personal understanding 119
Changing the self and inviting others 121
Navigating cultural contexts 126
Creating change on a larger scale 129

4.2.4 Empowerment processes: Children's micropolitical practises 134

4.3 Conclusion *140*

Chapter 5 Beyond Screens: Understanding Children's Remote Participation

5.1 Introduction *143*

5.2 Technology and spatial contexts in participation *144*

5.2.1 Distributed agency of technology 144

Digital tools 144

The role of different elements in the Aksiku learning process 147

5.2.2 Spatial considerations 159

At home during the COVID-19 pandemic 159

Space adaptation 162

5.2.3 Navigating power dynamics 165

Managing feelings 166

The dual role of technology 171

5.3 Conclusion *174*

Chapter 6 The Struggle for Environmental Education in Schools

6.1 Introduction *177*

6.2 Examining teachers and state processes *178*

6.2.1 Teachers as agents of environmental education and social reproduction 178

Practising environmental education 178

Materiality in environmental education 183

6.2.2 Institutional tensions in environmental education 187

School curricula 188

Extracurricular programmes 191

Adiwiyata 192

Barriers to environmental education 195

6.2.3 Teachers' non-oppositional approaches to effecting change 200

Working within the system 200

Leveraging networks and alliances for environmental advocacy 204

Embedding environmental topics across subjects 206

The role of affect and ethics in sustaining engagement 207

6.3 Conclusion *214*

Chapter 7 Collaboration and Adaptation during Times of Crisis

7.1 Introduction *217*

7.2 Navigating an environmental education organisation amidst disruptions *218*

7.2.1 Organising environmental education as a social enterprise 218

Framing a social enterprise approach 218

Organisational assemblages and reflexivity 221

7.2.2 Crisis, adaptation, and reflexivity in organisational practices 224

The fragility of remote teamwork 224

Adapting facilitation practices in a digital context 230

7.2.3 Reflexivity, care work, and learning from organisational tensions 237

The politics of care and reflexivity 237

Rethinking failure 239

7.3 Conclusion *246*

Chapter 8 Conclusion

8.1 Summary of results and findings *249*

8.2 Academic contributions *256*

8.3 Practical implications *260*

8.4 Limitations and recommendations for future research *261*

8.5 Final thoughts *263*

References **266**

Appendix A: Information Sheet for Child Participants **295**

Appendix B: Focus Group Protocol for Children **300**

Appendix C: Sample Transcripts from the Teachers' Focus Group **302**

Appendix D: Extracts from Journals **304**

Appendix E: Preliminary Themes for Children **308**

List of Figures

Figure 1-1 The posthuman framework of children's participation 29

Figure 8-1 The posthuman framework of children's participation within the Indonesian context 250

List of Tables

Table 3-1 Key methodological details 54

Chapter 1 Redefining Young People's Environmental Involvement

1.1 Indonesia's environmental problems and young people's role

Salsabila Khairunnisa, known as Abil, is deeply moved by the exploitation of natural resources (including the palm oil industry) and the struggles of the Kinipan indigenous community in Kalimantan (Khairunnisa & Maimunah, 2021). Determined to make a difference, this high school student from Jakarta, Indonesia, founded the 'Jaga Rimba' (meaning 'Protect the Forests') movement to raise awareness about environmental protection. On 13 January 2020, she began the 'School Strike for the Forests' by skipping school to demonstrate at the Ministry of Environment and Forestry in Jakarta. Through 'Jaga Rimba,' Abil and her friends discussed environmental issues, including the challenges faced by indigenous communities in Laman Kinipan. This customary forest in Central Kalimantan, one of the last rainforests on the island, is home to rich biodiversity that is threatened by the expansion of oil palm plantations (Baskoro, 2021). These young people focused on campaigns such as #SaveKinipan, which aimed to protect indigenous forests and communities from exploitation. One of Abil's notable successes came from an audience with the Deputy Minister on 5 February 2020, wherein she and Jaga Rimba voiced concerns to policymakers and raised awareness about critical environmental issues (BBC, 2020).

During her journey, Abil was joined by Siti Maimunah, also known as Mai, an advocate for environmental justice. The urgency of collective action and systemic change to address climate issues became especially evident after their return from COP26, a significant climate conference held in Glasgow in 2021. There, they learned about the slogan 'System change, not climate change' through discussions at alternative forums organised by the COP26 Coalition and street protests. During the conference, Greta Thunberg, the Swedish climate activist, advocated for systemic change to combat climate change and address its root causes; effectively tackling the climate crisis would necessitate changes in existing political, economic, and social systems (Cannon, 2019). Together, Abil and Mai set out to build networks and fight for justice, demonstrating that even small actions could have a significant impact. They believed

in the importance of collective action and systemic change to combat the climate crisis.

Abil's environmental initiatives highlights Indonesia's broader ecological struggles, where indigenous communities are rampantly displaced by agribusiness and infrastructure projects, while activists confront corporate interests and political resistance. As a microcosm of global environmental challenges, Indonesia grapples with the tensions between rapid urbanisation, technological advancements, and ecological crises (Roberts et al., 2019). Although environmental sustainability is increasingly promoted through instruments such as the revised Nationally Determined Contributions (NDC) and the G20 theme of Sustainable Energy Transition in 2022, domestic policy continues to prioritise extractive industries as engines of national growth. The 2020 Omnibus Law, for instance, has weakened environmental protections in favour of investment, drawing criticism for contributing to deforestation and rising carbon emissions. Meanwhile, economic pressures at the household level often push environmental concerns aside, and youth activism often faces apathy or resistance. In this contested and uneven landscape, young people's environmental engagement should not be seen as isolated acts, but as practices shaped by broader political, institutional, and socio-economic forces.

Most importantly, Abil's case encourages us to look at how young people respond to environmental challenges. Building on the efforts of young advocates like Abil, this thesis aims to develop a framework for children's participation in environmental matters within the Indonesian context. In this thesis, the terms *participation, involvement,* and *engagement* are used interchangeably to capture the complexity of children's participation in environmental issues. This will be explored further in the following sections. This thesis seeks to explore and expand on how young people's initiatives contribute to broader environmental change. Furthermore, it seeks to enhance our understanding of the systemic efforts required to involve young people in addressing environmental challenges.

Abil's efforts exemplify the significant impact that youth-led initiatives can have in raising awareness and promoting action for environmental protection. Beyond the notion of giving children a voice or viewing them merely as future stewards of the planet, it is crucial to recognise their active and situated involvement in the complexities of environmental issues. Children are already embedded in social, political, and ecological relations that influence both their present and future, making it essential to examine how their actions, practices, and knowledge production both shape and are shaped by ongoing environmental transformations. At the same time, Abil's experience also reveal the complexity surrounding young people's involvement in environmental advocacy. To better understand this, it is necessary to first address the limitations of dominant human-centric perspectives. Traditional humanist thinking often portrays children as developing into fully autonomous, rational individuals, idealising participation as a uniform process centred on individual agency and voice. This framing risks oversimplifying children's engagement by ignoring the broader arrangements—material, institutional, technological, and ecological—that shape their capacity to act. In Abil's case, viewing her activism purely through the lens of personal agency overlooks the enabling conditions that made her actions possible: the support of parents, teachers, and peers; digital infrastructures and social media platforms; alliances with adult activists such as Siti Maimunah; and access to public discourse. These elements co-produced the context in which her advocacy gained meaning and influence. Similarly, tools that mediate learning, urban infrastructures that shape mobility and perception, and ecological materials like water or waste that evoke ethical and emotional responses—all contribute to the way children engage with environmental issues. Reducing participation to individual initiative also obscures the diversity of children's lived contexts, experiences, and abilities, as well as the systemic forces that shape their involvement. For instance, Abil's visible actions—organising campaigns, speaking at policy forums, and raising awareness—were not just expressions of autonomy but the outcome of relational networks of support. This thesis argues that children's participation does not emerge solely from individual or collective human agency but is shaped by intricate networks of material, social, technological, and ecological relations. When children's engagement is

celebrated solely as personal initiative, there is a risk of obscuring the broader relational conditions that enable or constrain their actions. Such narratives may depoliticise participation by detaching it from the collective networks through which children's agency is produced, sustained, and made meaningful.

Furthermore, reflecting on the challenges of involving children and young people in environmental issues, this thesis criticises prevailing attitudes of separateness, reductionism, and technological determinism. Such attitudes often perceive humans and nature as distinct and separate entities, leading to a disconnect from the natural world that undermines humans' role in a larger ecological network. These attitudes tend to fragment complex environmental problems into smaller, isolated parts, neglecting their systemic, interrelated nature and thereby encouraging simplistic solutions that fail to address the social, ecological, and political dimensions of environmental crises. Moreover, an over-reliance on technology as the primary solution to environmental problems reinforces the belief that technological advancements will inevitably determine the future of human–environment interactions. This framing risks depoliticising environmental crises by reducing them to technical challenges, sidelining crucial issues of justice, ethics, and participation—including the role of children—and neglecting the broader transformations that are urgently required.

My research focuses on children's participation, adopting a critical stance on predominantly human-centric approaches and narratives—particularly the emphasis on "children's voices" as the primary marker of participation. An overreliance on voice often obscures the complex, co-produced nature of participation and fails to confront the power dynamics shaping children's knowledge. For example, children's involvement in many urban programmes is often limited to being invited to express their needs while attending planning meetings or forums—without dismantling the structural power relations that constrain their influence. Furthermore, children's knowledge and capacity to act are frequently mediated by adults, institutions, and technological infrastructures that shape what they can say, do, and be recognised for. Addressing these power imbalances requires acknowledging the role of adultism,

which tends to privilege adult perspectives and overlooks the distinct ways children engage with the world. My research seeks to expand and complement the rhetoric of voice by addressing the relational and contextual complexities that shape children's participation in environmental issues, arguing that their participation extends beyond the mere production of voices to encompass a more intricate process. Such a process includes how children construct and express their concerns, what makes them aware of certain issues over others, and how mechanisms—such as institutional structures, technological mediations, adult facilitation, and peer dynamics—enable or constrain meaningful engagement. It also involves how children perceive themselves and the outcomes of their participation. Furthermore, my research shows the role of emotional connections, sense of discovery, and meaningful experiences. It demonstrates that children's participation depends on the spaces they inhabit—not just traditional physical spaces like classrooms, but also enabling environments that support children in developing and articulating their perspectives. The sustainability of their participation is contingent on access to legitimate, well-resourced spaces where they feel secured, valued, and heard. To summarise, my research calls for a shift from a narrow focus on 'children's voices' toward a broader understanding of children's knowledge-making process—one that recognises participation as a contextual, collaborative, and materially embedded process shaped by relationships, resources, technologies, spaces, and methodological choices.

In addition, this research argues for a paradigm shift that embraces the interconnectedness inherent in our most current environmental challenges. Its goal is to establish a new conceptual framework for engaging Indonesian children in environmental matters, one that goes beyond traditional humanist perspectives and acknowledges the complexity, breadth and interconnectedness of these challenges. It suggests that empowering young people necessitates an appreciation of the systemic characteristics of environmental responses. This requires closing the gap in human-centred thinking to a more integrated perspective.

Building on this critique of human-centric approaches and the inherent interconnectedness of environmental challenges, this thesis aims to uncover the overlooked factors that influence children's engagement with environmental issues and calls for a shift in how their roles are conceptualised. When these factors are ignored, efforts to involve children risk becoming superficial or exclusionary, reinforcing narrow and individualised models of participation that fail to consider the relational, material, and systemic conditions influencing their capacity to act. A posthuman perspective serves as the foundation for this new framework, advocating for a nuanced understanding of the complexity of children's experiences while acknowledging the interconnectedness of human, technological, and nonhuman relationships in environmental issues. Beyond positioning humans as autonomous and superior, posthuman thinking emphasises relationality and co-constitution—seeing children not as isolated agents but as participants embedded within dynamic networks of social, material, ecological, and institutional forces. The central question of this thesis is: "how can the involvement of Indonesian children in environmental issues be reimagined to integrate posthuman perspectives, acknowledging the dynamic interaction of human and nonhuman actors in shaping environmental participation?" Through this question, this thesis seeks to develop a posthuman framework for environmental engagement, with the goal of reshaping how young Indonesians interact with the environment and enhancing their capacity to make a positive difference.

The empirical research in this thesis consists of a case study of the Aksiku Project in Bandung, Indonesia. This project targets high school students, specifically those aged 15–16, and offers a programme of activities aimed at empowering them to address environmental issues. A more detailed discussion of this project will be presented later in the chapter. The project serves as a practical example of the posthuman framework, providing an opportunity to observe how children interact with human and nonhuman elements in urban environmental challenges such as pollution, waste, and resource use linked to daily urban life. This investigation delves into the complexities of children's experiences. Furthermore, Aksiku is built upon

collaboration across different sectors, bringing together a range of participants, including schools, teachers, communities, and local authorities. This engagement with multiple stakeholders allows for an exploration of how interrelated systems impact children's involvement.

1.2 Integrating posthuman thinking: Core concepts

Building on its initial aim, this thesis explores the challenges children face in engaging with their environment. It does so by drawing on posthuman thinking, with a particular focus on posthuman knowledge. The contribution of posthuman thought to the conversation around children's participation lies in its ability to recognise the reciprocal influence of all entities involved in knowledge production, suggesting that knowledge production is a relational process rather than a human-dominated one.

While 'posthuman' serves as an overarching term that includes various intellectual movements contesting human-centred thinking (Ferrando, 2019), this thesis specifically employs Braidotti's (2019) concept of posthuman knowledge. Braidotti's notion of posthuman knowledge is anchored in the posthuman condition, which combines two key critiques: post-humanism, which questions human universalism, and post-anthropocentrism, which critiques the primacy of humans as agents in the world. Her perspective understands humans as inherently interconnected with nonhuman entities—including animals, technologies, ecosystems, and material objects—which actively shape their experiences. I will elaborate on this in the subsection about knowledge production. Moreover, Braidotti (2019) identifies "missing peoples" as marginalised groups excluded from mainstream knowledge systems, such as women, indigenous communities, and individuals with disabilities. Nonetheless, while her theory challenges human exceptionalism, it overlooks children's contributions to knowledge creation, failing to address the impact of age on power dynamics (Murris, 2020).

One key concept in posthuman knowledge is planetary subjectivity. As articulated by Braidotti (2019), it emphasises the interrelation between humans and nonhumans

within a wider planetary framework. This concept emerges at the intersection of global technological progress (such as digital innovations and automation) and ecological challenges (including climate change and the decline of biodiversity). Planetary subjectivity acknowledges that humans are part of a complex planetary system, where their actions, thoughts, and relationships are deeply influenced by this interconnected reality. By acknowledging planetary subjectivity, posthuman knowledge calls for new ways of thinking, living, and interacting that break away from traditional human-centred paradigms. These emerging frameworks are described as "yet to be fully realised," suggesting the need for continuous exploration and adaptation in response to global challenges.

Building on the planetary perspective, transformation becomes a key concept in posthuman knowledge. It depicts the active process of reshaping our understanding of ourselves and our relationships to build a fairer and more sustainable way of living. Rather than treating knowledge as static or fixed, posthuman knowledge prioritises continuous transformation, recognising that learning and adaptation emerge through interactions between material, social, and ecological systems.

Power shapes how knowledge is produced and how children engage with environmental issues. Power, in this context, is described as relational and fluid, rather than solely centralised or fixed within formal structures such as the state, law, or institutions. It operates at multiple levels, including small-scale, local, and relational dynamics. This perspective acknowledges that power is both restrictive and productive, influencing processes of transformation and change.

Building on these foundations, the thesis reconceptualises children's participation by examining the interactions between human and nonhuman elements that influence their engagement with environmental issues. To do so, it draws on various theories and concepts to extend Rosi Braidotti's theory of posthuman knowledge production. While theoretically rich, Braidotti's work tends to remain abstract and does not provide detailed guidance for practical application or analysis, particularly in areas such as children's participation. This limitation affects its direct applicability to

empirical research. To address these gaps, this thesis integrates Braidotti's philosophical insights with practical concepts and empirical approaches, creating a more grounded framework for analysing children's participation.

By integrating Braidotti's philosophy with other theories, this thesis expands the foundation of posthuman knowledge, developing a concrete framework for studying children's transformative engagement with environmental issues. The following subsections outline key ideas that shape how this thesis understands posthuman knowledge, focusing on nonhuman agency, human–technology interactions, the ethics of human–environment relationships, and environmental knowledge production as a dynamic and complex process.

Humans and nature

An assessment of the relationship between humans and nonhumans, specifically in how they interact with nature, is crucial. Plumwood's (1993) critique challenges the dualistic worldview of the West. She argues that this worldview not only creates a separation between humans and nature but also contributes to the oppression of women and the exploitation of nature. Plumwood's critique focuses on the way that the dualistic worldview leads to the mastery and domination of nature, which she argues is based on the erroneous belief that humans are separate from, and superior to, nature. Plumwood (2002) then broadens her critique of the dualistic worldview to include the ongoing ecological crisis. This is part of a broader scholarly discourse that challenges the nature–culture divide. For instance, Urry (2000) discusses the divide's implications in the context of social theory, highlighting how the boundary constructed between society and the environment is both artificial and detrimental. Similarly, Latour (1993) argues against the separation of nature and culture in the context of science studies, proposing a more integrated approach to understanding the interplay between humans and nonhumans.

Plumwood (2002) argues that the dualistic worldview, along with the doctrine of rationalism, has contributed to the ecological crisis by creating an anthropocentric perspective that prioritises human interests over those of other species and

ecosystems. Rationalism is a specific doctrine regarding the role and supremacy of reason in human life. For example, economic rationalism views natural resources as inessential and replaceable; therefore, it seeks to exploit them in the most efficient and profitable manner possible. Rationalism shapes prevailing types of reasoning into a monological approach, which prioritises human-centred logic. Plumwood suggests that monological thinking is unable to adapt to the complex and diverse world around us, as it recognises the 'Other' (in this case, nature or nonhuman entities) only in a one-way manner. It has created cultural ideals and human identities that emphasise distance from, control over, and ruthlessness towards nature. As a result, this way of thinking distorts how we understand our relationship with nature and each other. Nature is viewed as the 'Other'—separate from and subordinate to humans—often perceived as passive and limitless, making it easy to exploit. Plumwood argues that the ways we think about and use reason in society—such as in economics, politics, science, and ethics—are flawed because they are based on this distorted thinking. Ultimately, such distorted thinking leads to devastation in the world under the guise of reason.

Plumwood's critique serves as a foundation for understanding the harmful impacts of the dualistic approach and the need for a more inclusive, interconnected viewpoint. Building on this critique, Braidotti (2017a) puts forward the concept of species egalitarianism as an alternative framework for understanding the relationships between different species. Species egalitarianism refers to a framework wherein all beings, including humans, are embodied and embedded entities within the larger interconnected system often referred to as "nature." It acknowledges that human consciousness does not possess transcendental superiority over other forms of life and challenges the hierarchical and exploitative relationships between humans and nonhuman beings by advocating for equal consideration and respect for all species.

Further delving into the matter of ethical responsibility, Haraway (2016) believes that we have a responsibility to care for one another and the environment in order to promote the well-being of all species. She argues that telling stories about our

interactions with other species can help us understand our role in this complex web of relationships. Haraway contends that we all have a responsibility to create the conditions for multi-species flourishing, though our responsibilities may differ based on our particular contexts and relationships with other species.

Overall, this discussion on the ethical relationship between humans and nature refines posthuman knowledge by emphasising non-exploitative, reciprocal, and trans-species sustainability practices. It highlights that ethical responsibility extends beyond humans to encompass all species in planetary coexistence. Ultimately, it ensures that ethical environmental engagement is reflected in everyday practices.

Humans and technology

Building on diverse human and nonhuman relations, Haraway's concept of the cyborg (1987) symbolises the blurring of boundaries between humans and machines. Haraway describes a cyborg as a hybrid organism that obscures the traditional boundaries between humans (organic, natural beings) and machines (artificial, man-made entities). The cyborg symbolises the breakdown of clear distinctions between the organic and the mechanical, the human and nonhuman, representing a world where such dualities, as created in Western thought, are increasingly irrelevant. The cyborg also challenges the notion of the body as a fixed and natural entity. By integrating technology into the body, it becomes something that can be modified, enhanced, or even transcended. Haraway's cyborg also rejects essentialist ideas of what it means to be human, particularly those based on biological determinism. The cyborg perspective suggests that human identity is not fixed by our biological factors but can be reshaped by our interconnectedness with technology. The integration of technology into the human body, whether through medical devices, prosthetics, or even information technology, exemplifies this interconnectedness, which, in turn, opens up possibilities for fluid and dynamic forms of identity that transcend rigid categorisations.

The use of tools blurs the boundaries between the physical and technological (digital or non-digital) worlds of humans and challenges traditional notions of how people

interact with their environment. With technology, environmental experience can be extended or even transformed. For example, the choice of technology used for movement, such as canoeing, can have a significant impact on humans' outdoor experiences and engagement with the natural environment (Jukes et al., 2023). Similarly, the use of digital technology can shift people's sense of identity from being locally focused to being part of a global community (Sobré-Denton, 2016). These examples illustrate how technology does not merely serve as an external tool but actively co-constitutes human interactions with their surroundings.

By demonstrating how the boundaries between human and technology dissolves, this perspective refines posthuman knowledge by emphasising that environmental relations are always mediated technologically. Humans, technologies, and environments are deeply entangled rather than existing as separate entities, which allows for a deeper understanding of how technology co-constructs human experiences of the environment.

Nonhuman agency

Human–nonhuman relations further signify the distributed agency of all elements. Bennett (2010) argues for a concept of "vital materialism" that emphasises the influence of nonhuman forces within nature, the human body, and human-made objects. To counteract human narcissism—the belief that humans are in control of the world—Bennett suggests recognising the ways in which human agency resonates in the nonhuman realm. A key aspect of vital materialism is "thing-power," which highlights the vitality and agency present in nonhuman bodies and objects. Thing-power refers to the capacity of a nonhuman entity to act and influence its surroundings, as well as the way it interacts with human bodies and other things in the ecosystem. According to Bennett, thing-power is a means to rethink the traditional distinction between subjects and objects, or between living and non-living entities, acknowledging the political agency of nonhuman things. While thing-power focuses on the agency of an individual object, vital materialism takes a broader view, asserting that all matter—whether human or nonhuman, living or inert—possesses a liveliness and self-organising capability that qualifies it as an active agent. This

perspective also involves recognising that all matter is in a constant state of becoming and transformation. In a broader sense, vital materialism emphasises the importance of understanding the material aspects of life and their role in shaping political, social, and economic systems. In summary, thing-power foregrounds the political agency of nonhuman things, whereas vital materialism provides a broader lens through which to integrate the materiality of existence and the interdependence of human and nonhuman agents. Bennett asserts that agency is not confined to a human body or a collective solely produced by human actions; rather, it is distributed across an ontologically heterogeneous field. She references Deleuze and Guattari's assemblage theory, which consists of various living and active materials that can function despite internal conflicts. These materials are not controlled by any central authority; instead, their outcomes emerge from the interactions among their various elements. While each element within the assemblage has its own vital force, there exists an agency of the assemblage itself that is greater than the sum of its individual parts.

Bennett (2010) illustrates this by exploring the agency of food, presenting it as an active force capable of influencing our eating experiences and our ecological sustainability. The food we eat affects our metabolism, which subsequently impacts our energy levels, mood, and overall health. It also influences our cognitive processes—the ability to think, reason, and make decisions. By tracing the "life-history" of a food product, consumers can gain insight into its ingredients, the hardships faced by food workers, and the greed inherent in agricultural industries. This approach allows us to go beyond considering food merely as a resource or means to an end, recognising instead its role as a significant participant in the broader agentic assemblage that includes our metabolism, cognition, and moral sensibility.

By acknowledging the agency of nonhuman entities, this perspective enhances posthuman knowledge, promoting relational and assemblage-based environmental thinking. In this framework, nonhuman entities play crucial roles in co-constituting environmental reality.

Knowledge production and subjectivity

Human and nonhuman relations play a significant role in the process of knowledge production. As previously mentioned in this section, Braidotti (2019) emphasises the need to acknowledge that humans are merely one aspect of the natural world, with our lives deeply connected to those of other animals and nonhuman beings. This post-anthropocentric perspective challenges the belief in human superiority over other species and the entitlement to exploit, use, or dominate them. However, the rapid advancement of technology has introduced complexity to these relationships. As technology advances, it influences how humans interact with the natural world and with each other. Human interconnectedness and technological integration generate new circumstances for acquiring knowledge.

Additionally, our knowledge must incorporate post-humanist critiques against the humanist concept of 'Man' as the universal standard. Within the humanist paradigm, 'Man' often implicitly represents a specific archetype—generally Western, male, and belonging to a certain socio-economic class. Post-humanism questions the elevation of 'Man' as the universal benchmark, which marginalises women, people of colour, non-Western cultures, and others who are often excluded from being considered integral or fully representative of humanity.

Braidotti (2019) defines this convergence of post-humanism and post-anthropocentrism as the posthuman condition. She suggests that we should consider humans as being embedded in their material environments and embodiment, meaning that our physical forms shape our experiences. This embodiedness and embeddedness give rise to multiple perspectives. Therefore, recognising these multiplicities compels us to acknowledge that there exists a variety of human types, and we need to celebrate our differences rather than attempt to fit everyone into a single category.

In posthuman knowledge production, Braidotti (2019) stresses that ways of knowing emerge from the interweaving of the three layers—the "biological," the "geological," and the "technological"—to capture the complexity of existence on Earth (Buchanan,

2020). The "biological" layer relates to the formation and evolution of organic life, including its functions, behaviours, and ecosystem interactions. The "geological" layer encompasses tangible Earth components such as landforms, minerals, water bodies, and the processes shaping the surface. It represents the foundational layer of the Earth's structure, providing the conditions necessary for the development of life. The "technological" layer pertains to human-made aspects, including technology, infrastructure, systems, and culture. It involves the processes, changes, and developments that occur within human societies, including technological advancements, cultural shifts, and the evolution of communication and meaning. These three layers are distinct yet interconnected, meaning they must be understood in relation to one another rather than in isolation (Buchanan, 2020).

The engagement of Bellacasa (2017) with permaculture exemplifies posthuman knowledge in environmental relations. According to Bellacasa (2017), permaculture is both a set of agricultural techniques and an ethical approach to living that intertwines human activity with the natural world and the wider community, including nonhuman entities. In permaculture, human agency is important but not central or dominant. The ethical framework in permaculture arises from actual material conditions and relational dynamics between people, other living beings, and the Earth's resources. Permaculture promotes technologies that are adaptable to various contexts while remaining grounded in concrete, material ways of interacting with ecological cycles and physical forces. Training in permaculture principles, as Bellacasa (2017) explains, leads individuals to change their everyday behaviours, adopting practices such as composting food waste, growing food locally, and promoting ecological building. While these practices may vary among individuals, they collectively contribute to a broader environmental effort, shaped by the interplay of biological life, geological processes, and technological systems.

Biological, geological, and technological forces shape human subjectivity and experiences. This posthuman view of subjectivity introduces the concept of the non-unitary subject, which rejects the idea of a stable, fixed, and singular understanding of identity and instead recognises subjectivity as fragmented, fluid, and ever-

changing (Braidotti, 2006a). A non-unitary subject is characterised by the multiplicity of identities, viewpoints, and experiences that exist simultaneously within an individual. It involves an awareness that one's identity is not isolated but is embedded within a broader collective context, shaped by biological, geological, and technological forces—a framework described by Braidotti (2019) as the bio/geo/techno-framed subject.

To exemplify this notion of subjectivity, I will draw on Valentine's (2007) case study to demonstrate how individuals navigate multiple subject positions in their lives. Jeanette, who is deaf, a woman, a wife, a mother, and an employee, experiences her identity as fluid and evolving, changing across different contexts such as her school, marital home, workplace, and deaf club. Her story reveals how subjectivity is not static but emerges through interactions within specific spaces. These spaces, influenced by dominant groups, establish norms that define what is considered normal or acceptable, highlighting the challenges faced by those who do not conform.

By acknowledging that subjectivity is shaped through interactions with both human and nonhuman elements, this perspective strengthens the understanding of children's engagement with environmental issues. It emphasises that children's knowledge and agency emerge through these entanglements, shaping their lived experiences and highlighting the importance to recognise diverse environmental perspectives among children—including those shaped by sensory and emotional responses, situated experiences of inequality and access to resources, non-verbal or embodied forms of expression, and relational connections with nonhuman others.

Reality as a complex process

Reality is inherently complex and dynamic, shaped by ever-changing interactions between humans and nonhumans. The posthuman perspective sees reality as fluid and non-linear, emphasising continuous processes rather than fixed structures (Braidotti, 2016). In line with this thought, Fox and Alldred (2017) provide the example of a city's public health initiative aimed at improving child health by reducing

vehicular traffic, which demonstrates the interconnected nature of human and nonhuman elements. The initiative seeks to lower pollution and road accidents while promoting walking and cycling. It encompasses a wide range of components—such as vehicles, public transportation, bicycles, roads, fuel types (fossil and renewable), pollution levels, schools, workplaces, shops, housing, and the local community (including workers, environmental activists, council leaders, urban planners, and families). Each element in this network is interdependent, with their interactions influencing the effectiveness of the initiative. No single element is more important than others; for instance, the physical infrastructure (such as roads and cycle lanes) is just as crucial as the societal and cultural elements, like people's behaviours and choices (such as opting for bicycles or public transport over cars). Moreover, the initiative is not static but constantly evolving. Since its outcome cannot be predetermined, its success depends on adapting to changing conditions rather than assuming fixed solutions (Fox & Alldred, 2017).

This interconnected and ever-evolving nature of reality, as illustrated by Fox and Alldred's (2017) example, builds on the earlier discussion of nonhuman agency, emphasising the dynamic forces that shape posthuman knowledge production. By viewing knowledge production as an ongoing interplay of heterogeneous forces, this perspective refines children's transformative engagement with environmental issues. It moves children's engagement beyond static models, recognising that diverse entities—adults, children, and the environment—are entangled within children's assemblage of transformation. These entanglements are not fixed structures but are fluid, continuously negotiated, and shaped by tensions and realignments, influencing how children's engagement evolves over time. This concept will be further explored through assemblage thinking in Chapter 2.

In summary, building on Braidotti's (2019) concept of posthuman knowledge, this research examines children's participation in Indonesia as an entangled process involving nonhuman entities, technology, and ethical human-environment relations. Expanding on this perspective, the interchangeable use of the terms *participation, involvement,* and *engagement* reflects a posthuman thought that recognises the fluid

and relational nature of children's environmental participation. The approach aims to resist narrow definitions that reduce participation to merely decision-making processes or voice representation. Instead, it urges a reconsideration of children's voices as co-produced through their intricate entanglements with material reality. This research focuses on three key processes: children's transformation, the role of technology in shaping how children's voices are produced, and the power and tensions beyond children's immediate environments. By analysing these processes, this study lays the groundwork for a posthuman framework of children's participation—one that conceptualises it as a dynamic, relational, and contextual process of knowledge production, shaped by human and nonhuman interactions. This framework offers an ethical and affirmative way to engage children with environmental issues, strengthening human–nonhuman interconnectedness as a means to address global challenges and support sustainability. Finally, it also underscores that involving children in environmental issues is neither a straightforward process nor detached from broader societal structures. When children's involvement in environmental issues is treated as a straightforward process, participation risks becoming superficial, tokenistic, and ultimately ineffective. Such approaches often overlook how factors like institutional constraints, unequal access to resources, cultural norms, and power relations shape who can participate, in what ways, and with what impact, leading to initiatives that fail to meaningfully engage children or to support their sustained involvement in environmental action.

1.3 Research on children and the environment

Building on the posthuman lens outlined in the previous section, this section aims to provide an overview of various studies that focus on children and the environment. Specifically, it highlights those that offer critical insights into children's posthuman knowledge production. These include studies that explore the role of nonhuman, the use of technology, and posthuman approaches to pedagogy. It also looks at how knowledge production is observed—whether through children's learning activities, educational events, or the wider political and institutional context. In addition, it

considers research on children's everyday experiences in urban settings, as well as studies that explore environmental relations in Indonesia. By mapping existing studies and identifying research gaps, this section defines the study's research parameters.

A key insight from existing research is the recognition of nonhuman agency in children's learning processes. Studies have increasingly shown that learning is not solely a human-centred activity but is shaped by dynamic interactions between children and their material surroundings. For example, Elkin Postila (2019) examines how young children explore environmental issues related to water, positioning water as an active agent in the research process rather than a passive backdrop. Similarly, Kraftl (2022) discusses children's encounters with plastics, highlighting the various ways in which children come into contact with and are affected by plastics in their daily lives, from the toys they play with to the food packaging they consume. Stewart (2018) furthers this perspective by focusing on the Murray cod, a native fish, as a lens to explore the cultural, ecological, and historical dimensions of riverscapes. Urban elements, such as waste, also play a significant role in shaping children's understanding of environmental issues. For instance, Cutter-Mackenzie-Knowles and Siegel (2019), Goldman et al. (2021), and Jørgensen et al. (2018) highlight the interconnectedness of waste, human activity, and nature, advocating for a more-than-human ethical approach to waste education. They argue that this shift is necessary to promote critical thinking about consumerism, address the root causes of malconsumption, and move beyond the current focus on recycling. Jørgensen et al. (2018), in particular, critique traditional behavioural models of waste education, emphasising that exploring the material trajectories of waste can deepen students' understanding of its broader social, economic, and ecological implications. These studies collectively challenge human-centred models of participation by demonstrating how children's knowledge is shaped by interactions with nonhuman entities—water, plastics, animals, and waste materials.

An important strand of research highlights posthuman approaches to pedagogies that encourage a non-exploitative mindset. For instance, Lock (2019), explores how

posthuman pedagogies can decentre the human in environmental education, particularly in reimagining ethical human-animal relations. In Lock's study, children engaged with their school environment to observe wildlife, identifying ways to improve human-animal interactions within their community. This approach builds on Taylor's (2017) concept of common world pedagogies, which challenge human-centred models of education by shifting the focus from *about* the nonhuman others to learning *with* them. These pedagogies acknowledge the deep entanglement between human and nonhuman actors, fostering experimental educational practices that encourage co-learning and ethical engagement with the environment.

The role of technology in shaping children's interactions with their surroundings has been explored in several studies. For instance, Plowman (2016) highlights the complex relationships between children, digital technology, and the home environment, using the metaphor of "ecology" to illustrate how digital technologies are deeply interwoven with everyday experiences. Lameu (2020) focuses on how tablets, mobile learning, teachers, and students interact in school settings, highlighting the relational nature of technology in education. Similarly, Bond (2014) examines children's relationships with mobile internet technologies in their daily lives, showing how digital access influences their knowledge production. Extending the discussion beyond digital devices, Jukes et al. (2023) explore the role of canoes as non-digital technology in outdoor learning, demonstrating how technology and movement shape children's understanding of their environment. They argue that the mediating role of non-digital technology in learning cannot be taken for granted, offering valuable insights into how physical tools contribute to knowledge-making processes. Collectively, these studies provide a more nuanced understanding of technology's co-constitutive role in children's knowledge production.

Recent research has called for a shift towards process-oriented thinking in education, viewing knowledge production as a collective effort involving multiple human and nonhuman actors rather than an individual pursuit. This perspective frames knowledge production as a dynamic and evolving process rather than a set of predetermined outcomes. It encourages us to look closely at the children's activities,

the educational events, and the wider political and institutional settings that shape them. To begin with, several studies have examined how children develop knowledge through learning activities. A key contribution comes from Hodgins et al. (2022) who introduces the feminist ethic of care in educational research, demonstrating that observing, recording, and analysing children's learning experiences provides deeper insights into how knowledge is co-produced through relationships and embodied interactions. Complementing this perspective, Verlie (2020) emphasises climate intra-action as a framework for climate change education. In this approach, Verlie observes how children's sense of self and environment emerges through their engagement with climate phenomena. Verlie also records the disruptions, differences, and unexpected outcomes that shape children's evolving understanding of climate change. Together, these studies reframe children's critical thinking as an ongoing, relational, and responsive process, offering a new perspective on knowledge production that moves beyond traditional paradigms.

Other studies, for instance, Jukes et al. (2019) have explored outdoor environmental education by reframing learning as "events" rather than solely focusing on human-centred approach. They define an event as any occurrence that emerges through interactions between humans, animals, plants, and landscapes, illustrating how learning is shaped through multispecies and material entanglements. This perspective allows researchers to explore how environmental learning unfolds through dynamic and context-specific relationships. In contrast, viewing learning as a linear process oversimplifies these interactions, overlooking the unpredictable, affective, and situated ways in which children's knowledge is formed through encounters with both human and nonhuman actors.

In addition, recent studies highlight the importance of understanding the broader contexts and interconnected processes that influence how children engage with the environment. For instance, Lloro-Bidart's (2017) study highlights how institutional structures and political-economic imperatives influence human–nonhuman relations in educational settings. At the California's Aquarium of the Pacific, volunteers navigated institutional demands—such as generating revenue through commodified

human–animal interactions and complying with regulatory frameworks—while also fostering cultivating affective, ethical relationships with captive animals. Similarly, Everth, Gurney, and Eames (2022) illustrate how climate-activist teachers must negotiate rigid educational systems, institutional expectations, and their own existential concerns in the face of ecological crisis. Their work reveals that environmental engagement in education is shaped by complex social, political, and systemic forces that require constant negotiation and adaptation. Together, these studies call for a shift away from linear approaches to researching environmental education, and instead advocate for a relational perspective grounded in dynamic and contested assemblages.

Studies that focus on children's urban experiences provide useful ways to observe how they interact with and make sense of their surroundings. Hadfield-Hill and Zara (2019), for instance, examine the role of water in children's everyday lives, showing how it affects their routines, thoughts, living conditions, and even their well-being. By comparing children from different socio-economic backgrounds, they reveal how unequal access to urban resources produces starkly different environmental experiences—especially during the monsoon season. While wealthier children are relatively shielded and may even enjoy the rain, children from poorer households face heightened risks to mobility, health, and safety due to precarious housing, limited resources, and direct exposure to floodwaters, all of which reinforce existing inequalities. Similarly, Murnaghan and Shillington (2016) compiled a volume featuring studies that document how children respond to urban environmental issues, highlighting the diverse ways they interpret and engage with the cities they live in. These works offer valuable insights into children's lived experiences in urban contexts. However, they largely overlook how children themselves conceptualise and act upon environmental challenges—such as navigating water scarcity in daily routines or negotiating responsibilities within peer and family networks, leaving a gap in understanding how children produce and apply environmental knowledge in the urban settings they inhabit.

Several studies have begun to explore environmental relations in Indonesia, focusing on both educational and activism contexts. Parker and Prabawa-Sear (2019), for instance, critique the absence of adequate environmental education in Indonesia's formal schooling system. They highlight significant gaps in curriculum and policy implementation, which limit young people's engagement with environmental issues. In a different context, Nilan and Wibawanto (2015) examine how environmental activism in Indonesia involves complex interactions between human and nonhuman elements. Their work expands the focus beyond individual agency to consider how grassroots initiatives—such as community waste banks, urban gardening, faith-based conservation, and species advocacy—are embedded in relational, context-specific assemblages. These insights underscore the importance of approaches that are sensitive to local knowledge, social dynamics, and everyday practices in addressing Indonesia's ecological challenges. However, while both studies contribute to understanding environmental concerns in Indonesia, they do not directly examine how children participate in or produce environmental knowledge. What remains underexplored in these studies are the socio-political and cultural contexts that shape how children relate to the environment. Factors such as family expectations, religious beliefs, and community norms around practices like waste disposal and consumption significantly shape how children perceive and respond to environmental concerns. As both affected and affective actors, children actively engage with environmental issues through culturally mediated, situated, and embodied practices—yet their distinct ways of engaging with the world often remain overlooked in dominant environmental narratives. This leaves a significant gap in understanding how children in Indonesia conceptualise, navigate, and contribute to environmental transformation in their everyday lives. Children are not passive recipients of environmental messages transmitted by adults; rather, they interpret, negotiate, and transform these messages through embodied experiences, social relationships, and interactions with both human and nonhuman others. Recognising children as co-producers of knowledge is therefore essential—not only to acknowledge their agency, but also to understand how they shape responses to environmental issues within the socio-ecological assemblages they inhabit.

In summary, these studies collectively emphasise a more interconnected view of children, nature, and the environment, recognising the agency of both human and nonhuman actors. While some have touched on important components, they do not yet offer a comprehensive understanding of how children actively shape and transform their relationships with environmental issues, leaving key areas still unexplored.

First, there is a lack of discussion on the role of adults and institutional processes in children's environmental engagement. The current focus in the geographies and sociologies of childhood tends to be child-centric, failing to consider the broader networks that shape children's experiences. As a result, there is limited exploration of how adults' collective efforts, power dynamics, and resource availability influence children's transformations. Second, while many studies have recognised the agency of nonhuman elements in environmental learning, they rarely examine how children's knowledge of nonhuman entities is produced, negotiated, and transformed. These studies tend to overlook how children's experiences with nonhuman actors translate into environmental action. Consequently, they provide limited insight into children's lived experiences, emotions, and struggles in adopting a non-exploitative mindset and in navigating ethical dilemmas. Third, many studies of posthuman learning processes remain in the conceptual stage, with few empirical details. Few studies explore knowledge production as a transformative process, particularly addressing how children move from learning to action in their environmental involvement. Finally, existing studies fail to critically explore how technology—both digital and non-digital—influences children's environmental engagement. Technology is often viewed simply as a tool for delivering information through apps, websites, or educational media, with little attention to how it co-produces environmental knowledge and agency. This overlooks how technologies mediate interactions, enable new forms of participation, and entangle children within broader social networks. As a result, there is limited understanding of how technology reinforces or disrupts power relations within children's environmental interactions.

To conclude, I highlight the gaps surrounding children's environmental engagement towards transformations, particularly the interwoven influences of nonhuman entities—such as technologies and ecological materials—as well as the roles of adults. Addressing these gaps, I structure this research around key parameters that shape its focus, theoretical framework, methodology, and analytical approach to capture the situated and transformational nature of children's knowledge production. First, this research focuses on a dynamic human–nonhuman interaction approach that situates children's participation within relational networks, moving beyond child-centric models. Second, it integrates a posthuman theoretical framework into environmental education research, conceptualising children's participation as an ongoing learning process shaped by human and nonhuman forces rather than merely a cognitive experience. Third, it employs a qualitative methodology to capture real-world interactions between children, adults, and nonhuman entities. Lastly, it analyses human and nonhuman co-participation in environmental education, particularly how their relationships shape knowledge production. The next section outlines the study's aims and research objectives in relation to these parameters.

1.4 The thesis: Assembling environmental education in Bandung, Indonesia

This thesis aims to develop a posthuman framework for children's participation in the Indonesian context, wherein human and nonhuman interactions are integrated. To achieve this aim, the thesis is guided by three key objectives. First, it clarifies the key concepts that are central to this thesis. This includes defining "posthuman thinking," reinterpreting environmental participation through a more critical understanding of "environmental education," and exploring the dynamic interaction between human and nonhuman entities through the lens of "assemblage thinking." While the thesis focuses on children's participation in environmental issues, these processes are inseparable from educational contexts. Environmental education plays a crucial role in shaping how children encounter, interpret, and respond to ecological challenges, influencing their capacity to act. Yet, it is often framed in narrow terms—centred on awareness-raising or behavioural change—which risks overlooking its political

dimensions. By repositioning it as a space where children can question and navigate power relations, this thesis offers a more critical view of environmental education as a site of transformative knowledge production. In this framing, participation is an educational process through which critical environmental engagement can emerge. Second, the thesis examines a specific children's environmental initiative, analysing how interactions between human and nonhuman entities manifest and influence the participation process. Third, it will present a conceptual framework for posthuman environmental involvement within the Indonesian context.

The empirical research for this thesis consists of a case study of a children's participation project, Aksiku, in Bandung, Indonesia. Aksiku is co-created as a social enterprise with the purpose of enhancing children's involvement in environmental issues. It is selected as the case study due to its alignment with the research objectives. First, Bandung's rapid urbanisation provides an ideal setting to explore how children engage with environmental issues such as pollution, waste, and resource use. Second, Aksiku is grounded in cross-sectoral collaboration—involving schools, teachers, communities, and local governments—making it a valuable site for examining how adults and institutional contexts influence children's participation. Finally, as a co-creator and core member of Aksiku, my direct involvement in designing and implementing the project offers insights that external observers might lack. My positionality within this project will be further discussed in Chapter 3. These factors together provide a rich empirical foundation for understanding human–nonhuman interactions in children's participation projects.

The Aksiku project seeks to integrate environmental awareness into the educational experiences of high school students in Bandung. As Indonesia's third most populous city, Bandung has evolved from a resort city established by the Dutch colonial government in the 1800s into a bustling municipality facing rapid urbanisation. This rapid growth has led to increased population density, infrastructural issues, and ecological degradation (Tarigan et al., 2016; Putri & Zain, 2010). Given these challenges, Aksiku plays an important role in fostering ecological awareness among

students, empowering them to actively contribute to addressing environmental issues and promoting responsible practices.

Aksiku engages high school students aged 15–16. In Indonesia, nine years of education are compulsory (Law No. 20/2003 on the National Education System), but in West Java Province, including Bandung, this extends to twelve years. The system progresses from primary education (*Sekolah Dasar*, SD) through junior high (*Sekolah Menengah Pertama,* SMP) to high school (*Sekolah Menengah Atas*, SMA)—with options for accelerated learning—and vocational high schools (*Sekolah Menengah Kejuruan*, SMK). Bandung has 138 state and private high schools and 123 vocational high schools (Ministry of Education and Culture, 2019), serving nearly 60,000 students (Statistics of Jawa Barat, 2022). These numbers highlight the potential impact of the Aksiku project in fostering environmental awareness and action among young people.

The Aksiku project is supported by a collaborative team of researchers, facilitators, local stakeholders, and teachers who are part of the Adiwiyata National Environmental Initiative, which will be discussed further in Chapter 3. The project follows a child-led approach, encouraging children's active participation in knowledge production. Aksiku facilitates children's identification of environmental problems, gathering data, conducting interviews, and using their findings to inform real-world actions (Putri, 2017). During the pandemic, Aksiku adapted by developing an online module that enabled remote participation. Facilitators guided discussions digitally, while children accessed a wide range of information sources, including the internet, social media, and their social circles, thereby enriching their knowledge base. Through their involvement, children develop critical thinking skills, leading to a transformation in how they perceive their relationship with the environment. Digital media platforms have been instrumental in the project, enabling students to collect data, share experiences, and raise awareness through social media campaigns.

This thesis draws on qualitative research methods, using an ethnographic approach to explore children's environmental participation. Data were collected through

observations, interviews, and focus groups, while thematic analysis was employed to identify themes related to environmental education (a more detailed account is provided in Chapter 3). The findings reveal how human and nonhuman entities actively shape children's knowledge production across four key dimensions—socio-material, techno-spatial, socio-political, and organisational. The thesis also examines how power permeates through these dimensions, shaping the spaces and opportunities available for children to produce knowledge. Ultimately, this thesis presents a posthuman framework for environmental engagement in the Indonesian context, contributing to the broader discourse on children's environmental participation.

1.5 Thesis contributions

This section outlines how this thesis contributes to expanding the existing body of knowledge. By answering the question of how Indonesian children's involvement in environmental issues can be reimagined through a posthuman perspective, this thesis sheds light on the extensive networks of human and nonhuman actors that shape children's environmental participation. The findings on situated and transformational knowledge production—encompassing children's ethical relationships with the nonhuman, the role of technology, and the influence of adults and institutions—establish the foundation for a posthuman framework of children's participation. This framework is structured around four key dimensions: socio-material, techno-spatial, socio-political, and organisational.

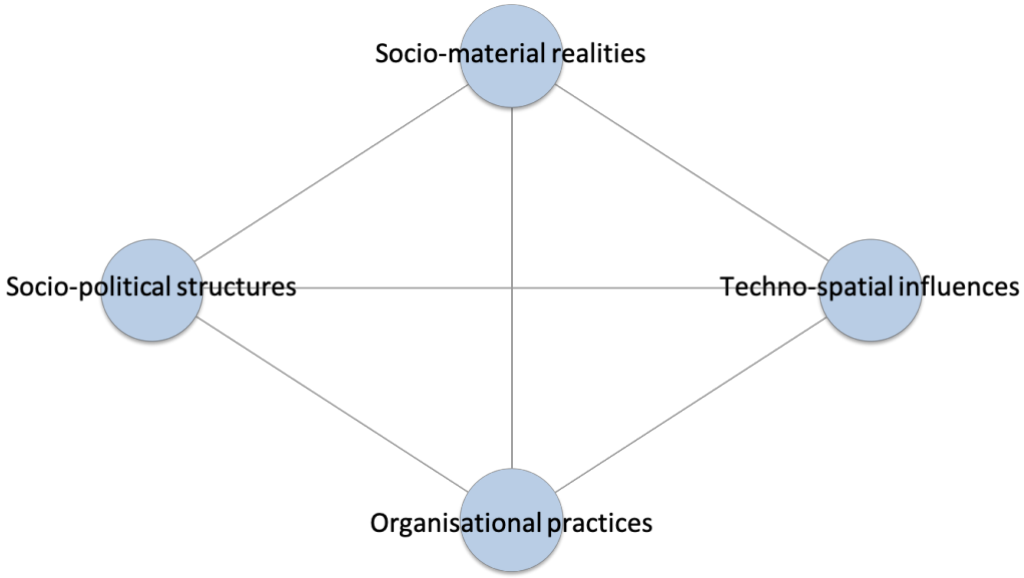

Figure 1-1 The posthuman framework of children's participation

The diagram represents a posthuman framework that illustrates the interconnections between different dimensions of children's participation using nodes and bidirectional lines. These interconnections are essential for shaping children's engagement. Each node within the framework acknowledges the entanglement of human and nonhuman elements at its core. The framework conceptualises participation as an emergent, fluid, and relational process influenced by material relations (e.g., interactions with ecological materials), spatial dynamics (e.g., physical and online learning environments), political structures (e.g., institutional constraints and policies), and organisational practices (e.g., multi-stakeholder collaborations). This framework informs both the research design and data analysis. By applying this approach, the study uncovers aspects often overlooked in traditional human-centred perspectives, revealing how participation emerges through the entanglement of human and nonhuman entities.

This thesis will have academic implications, particularly in advancing posthuman theories of knowledge production, children's participation discourse, and environmental education research, with a specific focus on the Indonesian context. First, the thesis advances posthuman theory and the concept of "knowledge

production" (Braidotti, 2019) through empirical studies that examine how children—positioned as the "missing people" who have been excluded from dominant knowledge and power structures (Murris, 2020)—actively produce knowledge. By mapping the power dynamics, the thesis highlights the structural forces that shape children's posthuman knowledge. Additionally, by providing evidence of various power relations and micro-resistance in everyday contexts, the thesis strengthens posthuman theories of power by emphasising its dual nature—both restrictive and generative—within the context of children's engagement with the environment.

Second, this thesis makes a significant contribution to the discourse on children's participation (e.g., Hart, 1997; Chawla, 2001; Driskell, 2002; Reid et al., 2008; Hörschelmann & van Blerk, 2011) by deconstructing humanist assumptions that often limit how children's participation is understood and practised. These assumptions tend to overlook the diversity of children's experiences, abilities, and contexts, leading to an oversimplified understanding of their engagement and failing to capture the complex ways in which they actually participate. The thesis expands humanist models by reframing children's participation as a relational process, deeply embedded in material, social, political, and nonhuman contexts. It demonstrates that participation is not an isolated individual act but rather an emergent outcome of assemblages encompassing interactions between human and nonhuman elements. In doing so, this thesis contributes to empirical research on children's transformative experiences in environmental education, particularly within the Indonesian context (e.g., Parker & Prabawa-Sear, 2019).

Third, this thesis critiques the humanist approach of Participatory Action Research (PAR) with young people and action research more broadly (e.g., Cammarota & Fine, 2008; Greenwood & Levin, 2007), highlighting its tendency to overlook power dynamics rooted in anthropocentrism. PAR often fails to account for how anthropocentrism and capitalism create complex systems of oppression, limiting its ability to address structural inequalities beyond human-to-human interactions. This thesis argues that children are not only affected by these systems but, in some contexts, also participate in the oppression of nonhuman entities. Within this

framework, children engage in critical discussions not only about human-to-human oppression but also about anthropocentrism and speciesism, and their intersection with modern lifestyles and educational systems. By moving beyond traditional power hierarchies (e.g., adults vs. children, insiders vs. outsiders), this thesis explores how power operates through material and nonhuman factors—including the design of participatory events and the ecological conditions of a given context.

Lastly, the thesis contributes to environmental education research, particularly through its focus on digital technology and the role of adults and institutions within a posthuman framework. Each substantive chapter will discuss these contributions in greater detail. Overall, the thesis advances discourse on children's environmental participation by embedding a posthuman perspective, offering a more relational and networked understanding of participation.

1.6 Overview of the thesis structure

The central research question of this thesis—"how can Indonesian children's engagement in environmental issues be reimagined to integrate a posthuman perspective, acknowledging the dynamic interactions between human and nonhuman actors in shaping environmental participation?"—is grounded in posthuman knowledge production. The answer to this research question lays the foundation for a posthuman framework for children's participation, offering a transformative approach to engaging children in environmental issues. This framework strengthens human–nonhuman interconnectedness, providing new ways to address global challenges and support environmental sustainability. The structure of the thesis reflects this inquiry by systematically unpacking how children's participation can be reconceptualised within a posthuman framework.

Chapter 2, "Assembling Environmental Education," lays the theoretical foundation for the study by examining environmental education as an assemblage that shapes children's knowledge production. It explores how humans (e.g., teachers, facilitators, policymakers) and nonhuman elements (e.g., technology and material environments)

influence the spaces and power dynamics of children's environmental engagement. This chapter explores different aspects of environmental education, including children's empowerment, transformative learning experiences, and participatory spaces. Using assemblage thinking, it situates environmental education within a posthuman context, offering insights into how various human and nonhuman actors interact to shape children's participation experiences. Chapter 3, "Research Methodology: Tracing How an Environmental Education Project has Evolved Before and During the COVID-19 Pandemic," outlines the research methodology, focusing on the Aksiku project as a case study to investigate human–nonhuman interactions in environmental education. It traces the evolution of Aksiku, from its inception to its adaptations during the COVID-19 pandemic, mapping the complex relationships between children, adults, and participatory environments. This chapter also details the ethnographic approach, highlighting how observations, interviews, and focus groups were used to capture the emergent and relational aspects of children's participation. Chapter 4, "From Home Confinement to Collective Awareness: The Journey of Children's Environmental Learning," explores the socio-material dimensions of environmental education by examining how children's interactions with materiality shape their knowledge. It argues that engagement with nonhuman elements is central to transformative learning, positioning material interactions as a foundation for posthuman knowledge production. This chapter contributes to the posthuman framework by illustrating how power, agency, and transformation emerge through children's everyday entanglements with their environments. Chapter 5, "Beyond Screens: Understanding Children's Remote Participation," shifts the focus to the techno-spatial dimensions of environmental education, investigating how digital technology co-produces participatory spaces and reshapes children's environmental learning. It goes beyond viewing technology as a functional tool, exploring its role in reconfiguring knowledge production and power dynamics. This chapter contributes to the posthuman framework by demonstrating how technological agency influences transformative environmental participation, which addresses global challenges and sustainability issues. Chapter 6, "The Struggle for Environmental Education in Schools," examines the socio-political dimensions of

environmental education, emphasising the power dynamics and tensions embedded within Indonesia's institutional landscape. It argues that adults navigate constraints while also creating spaces for children's participation, revealing how institutional power, adult mediation, and material conditions—including educational policies, school curricula, and administrative practices—shape knowledge production. This chapter expands the posthuman framework by illustrating how children's participation is shaped by socio-political structures and sustained by adult actors. Chapter 7, "Collaboration and Adaptation during Times of Crisis," focuses on the organisational dimensions of environmental education, highlighting the role of adults' reflexivity in knowledge production. It argues that their critical reflection on power structures, collaboration, and resource distribution is essential to sustaining participatory initiatives. By embedding reflexivity within human–nonhuman interactions, this chapter contributes to the posthuman framework by showing how organisational processes shape children's environmental engagement. Meanwhile, Chapter 8, "Conclusion," summarises the findings of the thesis and discusses its contributions, implications, and limitations, as well as areas for future research.

Together, these chapters develop a posthuman framework of children's participation that challenges anthropocentric assumptions in environmental education. By defining "the human" through adult-centric, Western ideals—rational, autonomous, and separate from nature—anthropocentrism marginalises children as not-yet-fully human, rendering their perspectives less legitimate in knowledge production and decision-making. A posthuman approach repositions environmental education as a dynamic, relational, and co-produced process that values children's ways of knowing beyond human-centred hierarchies.

Chapter 2 Assembling Environmental Education

2.1 Introduction

In the introduction, I argued that we need a paradigm shift that embraces the complexity and interconnectedness inherent in environmental challenges and initiatives. A posthuman perspective should serve as the foundational pillar of this shift, advocating for a nuanced understanding of reality and the interconnection of human and nonhuman beings, but also critically addressing the power dynamics that shape these relations.

To develop a posthuman participation framework, this chapter examines the role of environmental education in shaping children's knowledge production. It positions environmental education as a structure through which children engage with environmental issues and co-produce transformational knowledge. Addressing the research gaps identified in the previous chapter, this chapter explores how children's knowledge is produced, negotiated, and transformed through environmental education, alongside the co-constitutive roles of nonhuman elements, technology, and adults in these processes. This chapter introduces assemblage thinking as a key theoretical lens, offering insights into how human and nonhuman actors—including technology, material environments, teachers, facilitators, and policymakers—influence the spaces, conditions, and power dynamics of children's participation in environmental issues. To ground these concepts empirically, the following chapter (Chapter 3) presents a case study of an environmental education initiative in Bandung, Indonesia, illustrating how these dynamics unfold in practice.

The chapter is divided into two main sections, each addressing a distinct aspect of this thesis' theoretical foundation. The first section outlines the conceptual framework of environmental education. The second section introduces assemblage thinking as a lens through which environmental education, focusing on its dynamic interactions could be explored.

2.2 Understanding environmental education

Environmental education is a field of education that aims at motivating individuals to actively contribute to environmental and societal improvement. This field of education emphasises the development of a direct, experiential relationship with the environment and an understanding of the complex social and cultural ties between humans and nature (Dillon & Herman, 2023). The field adopts diverse pedagogical approaches, informed by theoretical frameworks and tailored to specific contextual needs (Sauvé, 2005). It has evolved globally, influenced by international agreements and the increasing urgency of environmental issues (Hart, 2007). I argue that environmental education is best understood through three interrelated themes: children's empowerment, transformative learning, and adults' roles in the participatory space. These themes collectively shape how children engage with environmental issues, navigate power dynamics, and contribute to knowledge production.

Empowerment

In this thesis, environmental education is fundamentally about empowering children to become active, informed, and engaged participants in environmental decision-making and advocacy. It seeks to position them as political actors capable of shaping and influencing environmental policies and practices. While traditional approaches to environmental education have focused on a human viewpoint, this thesis advocates for a shift towards a more inclusive posthuman perspective. It considers empowerment to be a process that recognises and nurtures children's capacities and roles within the interconnected environmental system.

This argument is supported by scholarly perspectives that highlight the essential role of environmental education in developing children's political capacity to engage with environmental issues. Barratt Hacking et al. (2007) emphasise that environmental education is instrumental in developing children's knowledge, attitudes, behaviours, skills, and environmental identities. It prepares them to become active stakeholders by equipping them with the tools needed for effective participation in environmental

decision-making and advocacy. Hayward (2021) further reinforces this viewpoint by advocating for children's empowerment to challenge established power, hold dominant actors accountable, and drive environmental change. She argues that environmental education should provide children with a sense of ownership over environmental issues, providing hands-on experiences that encourage problem-solving and collaboration. Hayward's approach recognises children as political entities with distinct capacities, positioning them as active agents who can influence and shape environmental policies and practices. Aligned with this political role, Hart (1997) highlights the potential for young people to create meaningful change by conducting research on environmental quality and communicating their findings to community leaders, planners, and policymakers. This approach not only educates children about environmental issues but also empowers them to take action and influence their communities. In this sense, environmental engagement is essentially a collective endeavour (Schindel Dimick, 2015).

In urban contexts, environmental engagement not only deepens children's understanding of their surroundings but also strengthens their social capacity for participation and change (Christensen & O'Brien, 2002). As pointed out by Christensen (2008), this engagement involves acquiring specific knowledge about the local environment through direct interaction with urban spaces, materials, and mobility. Scholars such as Maher (1988), Derby et al. (2015), Morgan (2017), Bellino and Adams (2017), and Ferreira (2019) advocate for a critical approach to urban environmental education. This approach challenges neoliberal practices and consumption logic, questions the romanticised human–nature relationship—in which nature is seen as a pure, harmonious, and passive backdrop awaiting human appreciation or protection, rather than as an agentic force entangled with social, political, and material relations—and, most importantly, critiques conventional models of behaviour change (Hursh et al., 2015; Kopnina, 2015; Jickling & Wals, 2008). By addressing the impacts of capitalism and power structures, this approach recognises the inherently political nature of environmental issues. Equipping children with these critical perspectives is crucial for cultivating their political thinking skills,

helping them understand and navigate the complexities of environmental challenges (Barratt Hacking et al., 2007; Chawla & Flanders Cushing, 2007; Schusler & Krasny, 2008; Marques et al., 2020). Developing political awareness not only enriches their educational experience but also serves as the foundation for transformative learning.

In summary, this discussion positions children as political agents, embedding environmental learning within a critical urban education framework. Building on the previous argument, it integrates posthuman knowledge into environmental education by redefining children's empowerment as a relational process—one that extends beyond human actors to include nonhuman elements such as urban materiality and spatiality. This perspective situates political thinking within a broader environmental network, recognising that children's empowerment is shaped by their interactions with both human and nonhuman forces. By linking theory to practice, this approach ensures that transformational knowledge is not merely conceptual but is directly embedded in environmental education practices, equipping children with the critical tools to navigate and influence their surroundings.

Transformative learning

Environmental education employs a pedagogical approach aimed at fostering transformative learning, reshaping children's understanding of themselves and their relationship with the world to cultivate a fairer and more sustainable future. This approach is both reflective and deeply personal, allowing children to engage with environmental issues in ways that align with their diverse experiences and values. It emphasises immersive, real-world learning, encouraging children to actively interact with their surroundings. By incorporating posthuman perspectives, this approach acknowledges the agency of nonhuman entities and promotes a non-exploitative mindset, reinforcing the interconnectedness between humans and nonhumans.

Scholarly literature strongly supports the transformative potential of environmental education, offering nuanced insights into how children learn and interact with their surroundings. Hopwood (2007) highlights that children's understanding of environmental issues is influenced by their emotions and personal interests. This

perspective recognises that environmental learning is a subjective and interpretative process. In line with Hopwood, Lundholm et al. (2013) further emphasise that environmental learning is highly personal, shaped by each child's unique experiences and reflections. Building on this perspective, Wals and Dillon (2012) argue that environmental education should be an emancipatory process, responsive to complex and uncertain conditions. Such an approach enables children to critically reflect on their beliefs, leading to shifts in their perspectives and actions. Peters and Wals (2013), Brandt (2014), Somerville and Green (2015), and Greenwood (2012) further reinforce the importance of place-based learning, which immerses children in real environmental issues—integrating physical, cultural, social, and political dimensions—to foster contextual engagement. This aligns with Hart's (1997) argument that direct and unmediated experiences with nature enhance children's connection to and understanding of their surroundings. Expanding on these insights, posthuman thoughts redefine learning as a dynamic process, shaped by the interactions of human and nonhuman agents. This perspective positions environmental learning as continuous, evolving alongside real-world challenges. In this way, environmental education is designed to adapt to the complexities and uncertainties of a risk society, where environmental issues are deeply intertwined with social, political, and ecological systems (Peters and Wals, 2013).

In addition, Morgan (2017) suggests that environmental education should adopt a 'more-than-human' pedagogical approach to challenge traditional education and emphasise coexistence with nonhuman entities. Rooted in post-anthropocentric pedagogy, this approach promotes non-hierarchical and non-exploitative relationships with the environment while recognising the agency and perspectives of both human and nonhuman entities (Tammi, 2020; Bazzul & Santavicca, 2017; McPhie & Clarke, 2015). By integrating digital technology and learning methods that extend beyond human-centred frameworks (Ringrose et al., 2019), environmental education serves as a means to enhance our understanding of the interconnections and interdependencies between human and nonhuman entities. These relationships encompass not only different species interactions (Malone, 2016) but also essential

ecological elements such as air and soil (Crinall & Somerville, 2020), which play a vital role in promoting sustainability.

Robertson (1994) and Dillon (2003) argue that understanding environmental learning requires a clear application of learning theories. These theories help explain how children conceptualise environmental issues and perceive knowledge itself. As Rickinson et al. (2009) highlight, environmental learning is complex, influenced by the diverse experiences, values, and perspectives of children. This complexity is further shaped by the social, cultural, economic, and physical environments in which children are situated. Learning theories provide a framework for unpacking these interconnected factors, offering deeper insights into how children engage with and make sense of environmental issues.

Overall, this discussion connects posthuman knowledge production with environmental education by exploring concrete pedagogical approaches, such as place-based learning and more-than-human pedagogy. These approaches move beyond traditional, human-centred education by actively integrating nonhuman agency and fostering a non-exploitative mindset.

Participatory spaces

Environmental education promotes a participatory approach that encourages children to be active contributors to knowledge production rather than passive recipients of information. Equally important is the role of adults and technology, which are essential in facilitating and sustaining participatory processes. As mentioned in the introduction, a posthuman perspective understands the environment as a complex and interconnected reality, where no single element is more important than another. Process-oriented thinking recognises that participation emerges through the interplay of multiple human and nonhuman actors, including adults, children, and technological tools. Therefore, acknowledging the significant contributions of adults and technology is crucial, as they navigate power dynamics, mediate relationships, and create spaces that support children's involvement in knowledge production.

Scholarly perspectives highlight the transformative potential of participatory approaches to environmental education while also shedding light on the challenges of implementing them effectively. Gaventa and Cornwall (2008) argue that participatory approaches empower participants by fostering critical reflection and self-awareness, enabling them to recognise both their challenges and their capacity for action. This perspective reinforces the idea that participatory learning transforms children from passive recipients into active knowledge creators, allowing them to develop a sense of agency in shaping environmental decision-making processes. Grove and Pugh (2015) emphasise the importance of creating spaces conducive to participatory processes, where affective encounters foster transformative interactions and enable participants to reflect on power dynamics. In these spaces, children can challenge existing power structures, leading to the emergence of new identities and possibilities. This perspective is further enriched by technology and methodological innovations that enhance children's ability to participate, as highlighted by Börner et al. (2023) and Mazzetti (2020). It also aligns with the posthuman perspective introduced earlier, which underscores the interconnectedness of humans and technology in shaping participation and knowledge production.

Cornwall (2004) and Kesby (2007) describe participatory spaces as dynamic fields of power, wherein social and institutional relationships shape individuals' ability to exercise their voice. Cahill et al. (2007) elaborate on this by highlighting how participatory spaces can often be sites of contestation, where conflicting interests and power dynamics intersect and sometimes clash. They also point out the tensions between institutional policies and the emergent and negotiated nature of participatory spaces, which can create obstacles to meaningful engagement. Furthermore, scholars such as Hart (1997), Thomas (2007), and Barrat Hacking et al. (2007) suggest that broader social, political, institutional, and organisational frameworks are indispensable in shaping the conditions for children's participation. Institutions and organisations are key facilitators of participatory spaces (Kudva & Driskell, 2009; Freeman et al., 2003), yet their structures and practices also impose

barriers, limiting children's ability to engage fully. These barriers often manifest in rigid institutional structures that prioritise standardised agendas, adult-led initiatives that centralise decision-making, and participation models that disregard children's embodied experiences and situated forms of engagement.

This discussion highlights the crucial role of adults in creating supportive environments for children's participation. Facilitators, teachers, stakeholders, and researchers each play a pivotal role in shaping children's engagement. They create a space that encourages children to explore and engage with the world beyond human-centric perspectives (Bozalek, 2020; Tammi, 2020). Beyond facilitating explorations, adults also extend their involvement to advocacy and action (Breitbart & Kepes, 2007). They use their expertise to navigate the complex socio-political landscape that shapes children's engagement (Wilks & Rudner, 2013; Hart, 2008), demonstrating that children's participation is not an isolated process but deeply intertwined with broader power dynamics and institutional structures. While adults help create opportunities for engagement, they also operate within institutional and organisational constraints, meaning power dynamics are often both reinforced and contested. This dual role positions adults as both enablers who create supportive environments for children's participation and actors who navigate the constraints and opportunities of their institutional and organisational contexts.

Finally, Kina (2012) and Bettencourt (2018) call for reflexivity among researchers working with young people, stressing the need to recognise biases and power dynamics. Bettencourt, in particular, examines how power imbalances between adults and young people can lead to adultism, where adults prioritise their own perspectives and interests over those of young people. She argues that adult researchers must ensure that they are acting ethically and not perpetuating injustice. This insight complements the emphasis on ethical engagement and collaboration in participatory processes. Together, these scholarly perspectives reinforce the necessity of reflective and ethically responsible participation in environmental education, highlighting the interdependence of children, adults, and institutional structures in this transformative learning journey.

In summary, this discussion integrates posthuman knowledge into environmental education by critically examining the role of technology, adults, and institutions in shaping children's environmental engagement. It explores how technology mediates children's agency, learning, and participation, while recognising that adults can act as both enablers and barriers in shaping participatory processes. Additionally, it examines institutions as structural forces that define the possibilities and limitations of participation. Finally, this discussion underscores power dynamics as an inherent feature of participatory spaces, emphasising the need for reflexivity and ethical awareness in environmental education.

Overall, this thesis emphasises the importance of environmental education in empowering children to engage with environmental issues and participate in decision-making processes. Whether within formal institutional settings or in their everyday lives (Horgan et al., 2017), environmental education equips children with the knowledge and skills to advocate for change. A key aspect of this approach is fostering transformative learning, which is a personal and reflective process—a personal and reflective process that encourages children to critically engage with real environmental challenges, deepening their understanding and involvement. Furthermore, environmental education incorporates a post-anthropocentric pedagogy that challenges human-centred thinking. This approach helps children develop ethical relationships with the nonhuman world, recognising the agency of nonhuman entities and the interconnectedness of all life forms. By acknowledging the complexity of both children's experiences and the environmental realities, this pedagogy provides a nuanced framework for understanding the intricate relationships between humans-nonhuman interactions. Crucially, adults play a significant role in creating and facilitating participatory spaces. They are not just mere facilitators; they are key actors in children's empowerment and transformation, providing the necessary structure, relationships, and institutional support. However, their involvement also adds another layer of complexity that influences children's participation and engagement in environmental education. By focusing on the participatory spaces created by adults, this thesis highlights the dynamic interplay

between structured educational efforts, pedagogical elements, technology, and the fluidity of environmental learning interactions. Ultimately, environmental education—with an emphasis on empowerment, transformative learning, and participatory spaces—serves as a foundation for involving children in environmental issues through the posthuman lens.

2.3 Conceptualising environmental education assemblage

The previous section explored how children, adults, technology, and the participation spaces interact to shape environmental education. This approach goes beyond children's learning and empowerment, considering how environmental education is embedded within the spatial dynamics of participation. Together, these interconnected processes form the basis for studying children's environmental participation.

The conventional approach to environmental education often relies on a static framework, which is characterised by singular, fixed causal relationships and an outcome-oriented perspective. However, this oversimplifies the complex and dynamic interactions among children, adults, and the environment, treating them as isolated processes and limiting the ability to fully capture the depth of environmental education. As emphasised in the introductory chapter, a shift towards a process-oriented and relational approach to understanding this issue is essential. This perspective views environmental education as a network of interconnected interactions and ongoing processes that provide a more comprehensive understanding of educational experiences. It looks at the multiple factors at play in these experiences and how they work together to cause certain events (Bennett, J. 2005), challenging traditional views by acknowledging the fluid and interwoven nature of educational encounters (Mol & Law, 2020; Thrift, 2000). Additionally, this approach takes into consideration the role of embodied practices and emotional dimensions (Anderson, 2009b; Thrift, 2000; Anderson & Harrison, 2011), further enriching our understanding of environmental education.

By building on the relational and process-oriented approach discussed in Chapter 1, assemblage thinking offers a powerful lens for examining environmental education. It facilitates a deeper understanding of how empowerment, transformation, and participatory environments emerge within environmental education. Rather than viewing children, adults, and spaces as separate entities, assemblage thinking sees them as simultaneous and contingent processes. This perspective captures the unpredictable and multifaceted interactions within the educational ecosystem, highlighting how each element influences and is influenced by the others. By shifting the focus from predefined outcomes to the ongoing processes that shape them (Li, 2007b; Colona & Jaffe, 2016; Huang, 2020), assemblage thinking enables a more fluid and comprehensive analysis of the synergies between children, adults, technology, and the environment. Through this framework, this thesis can better understand the complex networks that underpin environmental education practices and how they contribute to shaping knowledge production.

Assemblage thinking offers a framework for understanding knowledge production by emphasising the interconnected and fluid nature of its components. Rather than seeing an assemblage as a mere collection of parts, this theory recognises it as a dynamic and interrelated entity. In the context of environmental education, assemblage thinking breaks down its various elements and examines how they interact, affect each other, establish territories, and collectively contribute to the emergence of new capacities. The environmental education assemblage consists of interactions between humans, nonhumans, technology, post-anthropocentric pedagogical elements, and environmental contexts (Mannion, 2020). These interactions create affective relationships, leading to the development of new capacities in children. The following sections will further explore assemblage theory, focusing on five key concepts: elements, affective relationships, territories, emergent capacities, and micropolitics.

Assemblage thinking

An assemblage, or "agencement" in Deleuze and Guattari's philosophy (1987), refers to the way in which different entities come together to form functional units that

contribute to reality. These entities include both tangible elements—such as human bodies, living organisms, spaces, places, natural, and built environments—and intangible forces that produce material effects—such as social constructs, imagination, memory, and thought (Fox & Alldred, 2022). This perspective builds on the role of nonhuman elements introduced in Chapter 1. As Bennett (2010) describes, assemblages are “living, throbbing confederations” that persist despite internal tensions (pp. 23-24). These tensions arise when interacting elements do not perfectly align, leading to conflicts or disruptions. However, rather than destabilising the assemblage, these frictions enhance its adaptability and resilience. The constant negotiation between elements allows the assemblage to evolve and respond to change.

Deleuze and Guattari (1987: 71) differentiate between an "abstract machine" and a "machinic assemblage." The abstract machine is a conceptual, overarching structure that underlies various forms of reality, while a machinic assemblage is its concrete, specific manifestation in the world. In other words, the machinic assemblage is where the abstract machine takes a concrete form and becomes operational in the real world. Assemblages function through two primary types of interactions: one involving the physical components or bodies that interact, and the other involving how these interactions are expressed or communicated (Deleuze & Guattari, 1987; Buchanan, 2020). These physical and expressive aspects are not isolated; they converge and influence each other. Changes within an assemblage occur when its constituent elements come into contact. For example, in environmental education, children, pedagogy, technology, the environment, and adults come together to form a functional unit that actively engages with and responds to environmental challenges (Hecht & Nelson, 2022). In this way, the assemblage serves as a concrete form where the abstract principles of environmental education and advocacy takes shape and becomes operational in the real world.

Central to assemblage thinking is the concept of affective relationships. As Saldanha (2017) explains, affects emerge through encounters between bodies, where one body's interaction with another triggers a change or response. This phenomenon is

not limited to human beings; it extends to all entities capable of affecting and being affected. Affects manifest through encounters, sensations, and actions occurring at the surfaces of bodies where immediate interactions take place. While grasping these affects is crucial, it is even more important to consider how these encounters enable a body's capacity to act. This capacity is continually reshaped by interactions with other bodies and new circumstances. Affective relationships play a crucial role in shaping human identities, subjectivities, and perceptions through the exchange of emotions, feelings, and sensations (Alldred & Fox, 2019). Such interactions can result in significant changes in the state of the entities involved (Saldanha, 2017). To understand affect in this context means recognising its role in enabling new possibilities for action and the agency within an assemblage.

New capacities emerge through these relationships. Alldred and Fox (2019) illustrate this by showing how citizenship is not a static possession but rather a capacity that emerges through intricate interactions within material networks or assemblages. These networks encompass bodies, objects, norms, and ideas, all of which continually redefine what citizenship means. This perspective moves away from a hierarchical view of citizenship—traditionally defined and regulated by the state through legal and institutional frameworks—towards an emergent, affect-driven process shaped by interactions within networks. Assemblage thinking emphasises that agency, or the ability to act, does not stem from individual components but from the collective configuration of these components (Bennett, 2010). This approach redirects our attention from isolated entities to the interactions that form the assemblage. In environmental education, it means that children's ability to participate in an environmental initiative is not an individual trait but emerges from their interactions within the broader assemblage—including peers, educators, environmental challenges, community experts, and governmental bodies.

Assemblage thinking examines how elements are arranged and territorialised (Buchanan, 2020), viewing the world as fluid and shaped by continuous movements rather than by rigid hierarchies (Marston et al., 2017). Importantly, an assemblage is not simply a label for any socio-spatial organisation but underscores the dynamic

practices of composition (Anderson et al., 2012). It does not function to govern or control human behaviour, thoughts, and actions by enforcing stability and order (Legg, 2011). Instead, it explains how practices 'hold together elements' (Li, 2007a). In educational assemblages, territory extends beyond physical spaces—such as classrooms, homes, and outdoor environments—to include conceptual elements like ideas, curricula, and pedagogical approaches, as well as socio-political elements such as institutional structures, societal norms, and policies. These territories are continuously negotiated and reshaped by the interactions within the assemblage. Educational assemblages are neither singular nor fixed; they exist in a state of flux and change (Youdell, 2015).

Micropolitics is another key concept in assemblage thinking. As Krause and Rölli (2008) explain, it goes beyond formal political structures to examine the underlying desires and dynamics that drive political action. Unlike traditional politics, which is often framed as a dialectical struggle between rulers and the ruled, micropolitics focuses on the small-scale, localised, relational, and dispersed forms of power found within bodies. Assemblage thinking redefines resistance by highlighting subtle and often overlooked forms of opposition (Ringrose, 2011). Within assemblages, resistance does not occur through direct confrontation between fixed entities but emerges from interactions between various forces and affects (Alldred & Fox, 2019). It is an ongoing process rather than a fixed event, constantly shifting as different elements engage with one another. Power, in this context, is not top-down but fluid and ever-changing, shaped by the dynamic interplay of forces within assemblages. In environmental education, children's participation can be seen as a micropolitical act. Their engagement with environmental issues goes beyond mere involvement—it challenges and influences the established categories, norms, and practices (Blaise, 2013). Through their interaction with educational content and environmental contexts, children generate new ideas and solutions that have the potential to influence local environmental policies and practices. This micropolitical effect illustrates the fluid and dynamic nature of power and resistance within assemblages. Ultimately, assemblage thinking offers an approach that not only explains these

dynamics but also critiques and confronts inequalities (Rankin, 2011), particularly in human and ecological relations.

In summary, viewing environmental education as an assemblage highlights its dynamic and emergent nature, shaped by diverse elements, interactions, and affective relations. These relationships generate new capacities, while micropolitical processes reveal how environmental education can serve as a site of resistance beyond traditional power struggles. The approach underscores how environmental education territories are continually negotiated and reshaped across different dimensions—including physical, conceptual, and socio-political. Recognising environmental education as an assemblage has important methodological implications. Since it is shaped by interconnected factors—including children's learning experiences, adult collaborations, and broader techno-mediated processes—research methods must be designed to trace these dynamic relationships within a specific time and context. This requires an empirical exploration that maps the actors, events, and practices involved in creating and maintaining these relationships (McGuirk et al., 2016). It also demands a flexible and adventurous mindset, acknowledging that the entities within the assemblage are not static and that the research process itself constantly evolves alongside them (Batterham & Singleton, 2023). Therefore, a context-specific methodological approach is essential, enabling researchers to capture these complexities as they unfold in real time.

2.4 Conclusion

This chapter has demonstrated the need for a posthuman participation framework in environmental education, moving beyond traditional human-centred approaches to recognise the interconnected roles of nonhuman elements, technology, and adults in shaping children's learning experiences. By integrating assemblage thinking, this chapter has highlighted how environmental education is not a fixed structure but an evolving network of relationships, where empowerment, learning, and participation emerge through dynamic interactions. Rather than viewing children as isolated agents of change, this perspective positions their environmental engagement as

embedded within broader material, technological, and social assemblages that continuously shape their capacities and knowledge production.

This chapter's key contribution is its reframing of learning and empowerment activities as relational and political processes. Traditional models often position both learning and empowerment as individual capacities that children develop through knowledge acquisition and skill building. However, this chapter argues that learning and empowerment are co-constituted through interactions with urban spaces, technologies, and social infrastructures, making them inherently political. By engaging with critical environmental education, children not only expand their understanding of environmental issues but also develop political awareness, allowing them to navigate and challenge the power structures that shape their environmental realities. This is particularly important in the Indonesian context, where economic development is often prioritised at the expense of environmental sustainability. Here, critical environmental education becomes essential in helping children grasp how power operates—shaping who controls access to natural resources and who is left to bear the consequences of environmental degradation.

Furthermore, this chapter has demonstrated that participatory spaces in environmental education are complex and contested terrains. Rather than simply facilitating children's voices, participation is shaped by institutional frameworks, technological mediations, and adult interventions. Teachers, facilitators, and policymakers play a crucial role in enabling or constraining children's engagement, while digital and material infrastructures influence the ways knowledge is produced and shared. Recognising these dynamics allows for a more nuanced and process-oriented understanding of children's participation, where agency is not solely individual but distributed across human and nonhuman actors.

Finally, this chapter has underscored the methodological implications of viewing environmental education as an assemblage, highlighting its emergent and affective nature, shaped by the entanglements of children, adults, technology, and ecological systems. Since participation is continuously reshaped by interactions between

multiple actors and forces, research must adopt context-sensitive, relational approaches that capture these evolving dynamics. Rather than focusing on fixed outcomes, this perspective calls for methodologies that trace the emergence of environmental knowledge and agency across interconnected human and nonhuman networks. By advancing this theoretical framework, the chapter contributes to a deeper, more nuanced understanding of how children's environmental education unfolds as a situated, dynamic process within interconnected human and nonhuman networks.

In the following chapters, this thesis explores five interconnected aspects, each contributing to a posthuman reimagining of children's environmental participation. Chapter 3 establishes the methodological foundation, detailing the ethnographic approach used to examine the Aksiku project and tracing how human and nonhuman actors co-produce environmental education over time. Building on this, Chapter 4 explores the socio-material dimensions, demonstrating how children's interactions with materiality shape knowledge production. Shifting the focus to the digital realm, Chapter 5 examines the techno-spatial dimensions, arguing that technology is not merely a tool but an active agent that reconfigures participatory spaces and knowledge-making processes. Chapter 6 then turns to the socio-political landscape, highlighting how institutional power and adult mediation shape children's participation, while also exposing the tensions between policy structures, resource negotiations, and environmental engagement. Finally, Chapter 7 examines the organisational dimension, foregrounding adult reflexivity as a critical practice for navigating power dynamics and ensuring the integrity of environmental education assemblages. Together, these chapters advance a posthuman framework, moving beyond traditional participation models to show how material, technological, institutional, and political forces intersect in shaping children's transformation.

Chapter 3 Research Methodology: Tracing How an Environmental Education Project has Evolved Before and During the COVID-19 Pandemic

3.1 Introduction

Aksiku, which means 'my action' in Bahasa Indonesia, is a children's environmental educational initiative in Bandung, West Java, Indonesia. It aims to empower children to take an active role in environmental decision-making and advocacy. Through Aksiku, children collaborate with educators and adult stakeholders to address various aspects of environmental issues in their community.

This chapter outlines the research methodology used to answer the research question: "how can Indonesian children's involvement in environmental issues be reimagined through posthuman perspectives, acknowledging the dynamic interaction of human and nonhuman actors in shaping environmental participation?" It details the ethnographic approach applied to study the Aksiku project, capturing the ongoing and emergent nature of the environmental education assemblage. This chapter also discusses how observations, interviews, and focus groups were specifically utilised within the context of the study.

This chapter explores how the empirical investigation captures the evolution of the Aksiku project, from its pre-pandemic phase to its adaptations during the pandemic, in order to understand how these shifts shaped the environmental education assemblage. Although my doctoral research and ethics approval cover only data collected during the pandemic, this broader historical perspective illuminates the interconnections, power dynamics, and material reconfigurations that influence participation, learning, and institutional engagement during this period.

3.2 Data collection methods: Ethnographic tracing

In studying an educational assemblage, I adopt Fenwick et al.'s (2011) concept of ethnographic "tracing" to examine the specific details of daily interactions and practices within educational settings. This approach allows me to capture how events unfold in real-world contexts, providing deeper insights into educational phenomena. By meticulously following and mapping the complex network of relationships and interactions within the Aksiku project context, I trace the dynamics of learning and engagement. During the pandemic, I extended this tracing beyond the physical location, adopting a mobile method that traverses both physical and digital landscapes (Leander & McKim, 2003). By doing so, I bridge the gap between online and offline spaces, thereby challenging the binary notion of these spaces and recognising their interconnected nature.

Tracing examines how various human and nonhuman elements interact and come together to influence educational practices and experiences. This approach offers a dynamic and relational understanding of educational assemblages. As discussed by Fenwick et al. (2011), tracing involves capturing multiple perspectives and realities within educational settings without reducing them to a single fixed viewpoint. It recognises the diversity of experiences that exist in any educational environment. Tracing requires prolonged periods of observation and participation, allowing for the collection of rich, descriptive data that reflects the complexities and nuances of educational assemblages.

In this thesis, I immerse myself in environmental education settings, actively observing and participating in activities related to children's learning (Fenwick et al., 2011). My focus is on understanding how children interact with and are shaped by their environmental contexts and socio-political structures. I examine how they develop their capabilities to challenge established norms and how their agency emerges in environmental decision-making. This requires tracing the intricate web of relationships and interactions that support their learning journey. I also explore how different pedagogical components interact with children to facilitate transformative

learning. A key aspect of my approach is examining the interconnectedness of these elements and how they contribute to the creation of reflective and critical knowledge. Additionally, I pay close attention to how environmental education is territorialised in various settings, the role of nonhuman elements and technology, and the impact of materiality on the learning processes. My aim is to understand learning as an ongoing, nomadic experience influenced by a network of diverse elements. Through tracing, I also investigate the dynamics and power relations among the different actors involved in environmental education, including how adults and organisations collaborate to create spaces for transformative learning and empowerment—extending their involvement beyond traditional educational settings into advocacy and action. The tracing process reveals the simultaneous assemblages at play in environmental education, encompassing children's learning and empowerment processes, spatial processes, as well as the roles of adults and organisations.

As part of the ethnographic tracing approach, I employed a wide range of qualitative data collection methods, including observations, interviews, and focus group discussions. I adapted these methods in real time to accommodate changing circumstances (Cerwonka & Malkki, 2007), particularly during the transition to online participation. This flexibility allowed for a comprehensive understanding of the contexts both before and after the onset of the COVID-19 pandemic in early 2020.

Below is a summary of key methodological details, including the duration of observations, the number of interviews conducted, and the focus group discussions:

Table 3-1 Key methodological details

	Method	Details	Mode
1.	Participant Observation	Duration: June 2019 – December 2020 Pre-pandemic: 15 schools, 150 children During pandemic: 5 schools, 26 children Data collected: 278 journal entries, 251 children's digital assignments during pandemic	Online and offline
2.	Semi-structured Interviews	Number of interviews: 6 Teachers: 5 transcripts (ranging from 2 hours to 2 hours 30 minutes each) Aksiku staff: 1 transcript (1 hour 37 minutes)	Online
3.	Focus Groups Discussions	Number of discussions: 18 Children: 16 transcripts (ranging from 1 hour to 2 hours 30 minutes each) Facilitators and Aksiku staff: 1 transcript (2 hours 33 minutes) Teachers and community: 1 transcript (1 hour 45 minutes)	Online (children) Offline (adults)

3.2.1 Participant observation

As part of an ethnographic tracing approach, I observed the participants of the Aksiku project. This approach consisted of immersing myself in the project, observing and participating in its activities, and conducting interviews (Bryman, 2012). My dual role as both researcher and initiator of the Aksiku project positioned me as an insider within this ethnographic study. This insider perspective provided me with foundational knowledge that served as a starting point for conducting this ethnography (Wall, 2014), enabling me to capture the broad interactions that shaped the environmental education assemblage. Rather than observing from a distance, my positionality allowed me to trace these interconnections in real time, as I was entangled in the relationships that shaped the project. Additionally, being an insider granted me easier access to research participants and helped me establish rapport, facilitating more effective and focused data collection (Wall, 2014).

I documented all my observations in a research journal, which became a key methodological tool for tracing how the environmental education assemblage took shape (see Appendix D). Writing this journal became a way of mapping the interactions and relationships that created and sustained the Aksiku project. It also helped me to track how the research phases unfolded by documenting conversations, events, interactions, and emotional experiences that took place during the project (Simpson, 2013; Brown, 2021). Beyond serving as a record of the observed phenomena (Bryman, 2012), the journal also captured the complexities of the research process—offering an intimate account of the chaos, tensions, and emotional entanglements that emerged as my study intertwined with everyday life (Ustundag, 2016).

I opted for a digital journal to capture the multiple layers of engagement within the research. Since qualitative research does not impose strict rules on what constitutes a research journal (Brown, 2021), I found that the flexibility of electronic journal entries allowed me to embed various types of records, including field notes, WhatsApp messages, screenshots, photographs, online meeting transcripts, and links to web-based materials. For instance, I used this journal to document the strategies employed by Aksiku staff and how they ensured quality participation in a shifting digital landscape. By tracing the dynamics of digital communications, I gained deeper insights into how the Aksiku project team adapted their collaboration strategies and decision-making processes in an online environment. This documentation provided a real-time, in-depth understanding of their transition from traditional to digital educational practices. Additionally, leveraging my role within the project, I recorded not only the technical aspects of project execution but also the personal dynamics and emotional factors that influenced staff performance.

In researching an educational assemblage, I also observed the initial interactions with gatekeepers (Delamont, 2016). My observations revealed that gaining access to child participants was not a straightforward process but rather a negotiation of multiple relationships. It required navigating institutional structures and collaborating with gatekeepers to establish trust and legitimacy, including school authorities and

teachers who mediated access, municipal officials who aligned the project with policy agendas, parents who supported participation at home, and Aksiku staff whose coordination ensured the project's coherence. By capturing the complexities of these adult interactions, I aimed to understand how these processes shape and influence children's participatory spaces.

In summary, my approach to participant observation recognises that environmental education is not a stable or bounded phenomenon but an evolving set of relationships, encounters, and negotiations. This approach allowed me to stay attuned to the fluid and emergent nature of assemblages. In the following section, I will further detail how these dynamics unfolded in practice.

The origins of the Aksiku project

Observations of the Aksiku project revealed its evolving trajectory, from its inception as a grassroots initiative to formal collaborations with educational institutions and local government bodies. Its integration into broader environmental initiatives in Bandung highlights the intersection between urban governance, environmental education, and participatory engagement. Through these observations, I gained a deeper understanding of how the project's objectives and significance take shape within the local educational and urban environmental landscape. Additionally, my embedded role as an insider provided me with intimate insights into how the project navigates institutional structures and dynamics.

The Aksiku project is a collaborative initiative under the larger Aksiku Lab initiative, which focuses on environmental education, creativity, and children's participation in urban settings across Indonesia. Building on its work in Bandung, Aksiku has expanded to Surabaya and fostered collaborations with networks such as the Bandung Creative City Forum (BCCF), Institute of Technology Bandung (ITB), Surabaya Creative City Network (SCCN), and CityNet South Korea. In addition to strengthening local and regional collaborations, Aksiku has introduced its participatory approach in international platforms—such as the 2018 Suwon Forum on Asian Human City in South Korea—and integrated its programme into municipal policy through the

Adiwiyata scheme. Initially, I set up this initiative as part of an exploration of how to involve young people in urban processes, particularly decision-making, in the context of Bandung. This initiative has been evolving since 2013. Driven by my background as an architect and urban designer, I have tried to facilitate children in becoming active participants in environmental decision-making, along with other urban stakeholders. Prior to this endeavour, I mostly worked with commercial developers and governmental bodies. I decided to delve into urban grassroots initiatives in 2012, spurred by personal exploration after my fellowship year at a university in the United States. In 2013, I began my journey towards community development by starting a project that aimed to involve children in local decision-making processes. I initially tested this project at a high school, engaging with flood issues while working closely with members of the local community and aligning with the city's public engagement agenda for urban infrastructure. Furthermore, I modified a module designed for school–community collaboration in the US to fit the context and needs of this local project. By 2015, I was immersed in children's participation literature, emphasising practise-based research and crafting a specialised participation module tailored for schools. This endeavour gained momentum through partnerships. Initially, it joined forces with the BCCF and ITB. Later, its reach extended to encompass the Office of Environmental Services (OES) in Bandung, a regional government agency responsible for environmental management in the city.

In 2019, Aksiku participated in the Bandung municipal programme for Adiwiyata Schools. The Adiwiyata programme, launched by the State Minister of Environment, began in 2006 and has since expanded to include thousands of schools in Indonesia. Schools that follow Adiwiyata guidelines are designated as Adiwiyata Schools. The programme implements a ranking system for participating schools to assess their performance and adherence to the programme's guidelines. The ranking levels include the district/city (*kabupaten/kota*) level, the province (*provinsi*) level, the national (*nasional*) level, and an independent (*mandiri*) category. While participation in Adiwiyata is voluntary, this ranking system serves as a motivation for schools to strive for higher levels of environmental engagement and recognition. The

programme is quite structured and offers schools an opportunity to establish a reputable and respected institution (Prabawa-Sears, 2018; Parker & Prabawa-Sears, 2019). Schools are expected to meet specific standards, implement various stages of the programme, and achieve certain milestones in areas such as policy, curriculum, participation in activities, and environmental management. In Bandung, the Adiwiyata programme falls under the jurisdiction of the OES, which has implemented it through regular promotions and workshops for schools. In the collaborative framework between Aksiku and OES, Adiwiyata is also connected with an initiative called 'Kang Pisman'. The name 'Kang Pisman' is an acronym that stands for Indonesia's directive to reduce, sort, and reuse waste. This initiative stems from the political agenda of elected city leaders and represents a collective endeavour to tackle Bandung's escalating waste issue (Regional Regulation of Bandung City Number 3 of 2019). This connection demonstrates how children's environmental participation is shaped by broader political agendas that set priorities, define problems, and allocate resources. While programmes like these offer opportunities for engagement, they also impose institutional boundaries that mediate the terms of children's involvement. For instance, even when children's ideas are positively received, their implementation is often constrained by regulatory frameworks, sectoral jurisdictions (e.g., transportation or environmental agencies), and adult-defined standards of feasibility, limiting their ability to meaningfully influence outcomes (Research Journal, 2019).

My positionality in the Aksiku project was also shaped by my background as an architect and urban designer, which influenced both its pedagogical approach and its integration into urban environmental initiatives. By incorporating a design thinking approach, I aimed to enhance children's environmental problem-solving skills, including that of waste management, water pollution, energy conservation, the regulation of public space (such as pavement use by street vendors), and the transformation of neglected land into more productive community spaces. Through Aksiku's involvement in city-level programmes like Adiwiyata and Kang Pisman, my role evolved into a mediator of multi-stakeholder collaborations between Aksiku,

institutional stakeholders (such as OES), and the local community. Positioned at the intersection of children's participation initiatives and municipal environmental governance, I was responsible for both supporting children's environmental engagement and navigating the structural and political dimensions of their participation. In this way, Aksiku served as a mediating platform that connected environmental education with broader urban policies. My involvement in designing and directing activities gave me an in-depth understanding of the project's evolution, from its inception to its adaptations during the pandemic.

At this stage, my observations focused on how the Aksiku project gained access to child participants and how it was shaped by institutional structures, bureaucratic negotiations, and collaboration with key stakeholders. These observations provided valuable insights into the complex social and political landscapes that shape children's participation in environmental decision-making processes. Additionally, my dual role as both a researcher and the initiator of Aksiku gave me a unique perspective on institutional dynamics. This position allowed me to observe and document the intricate negotiations involved in engaging children in environmental education programmes. It also deepened my understanding of the challenges related to building partnerships and fostering collaborative work.

The following subsection outlines my observations of the formative phases of the Aksiku project, capturing the detailed planning and foundational activities that shaped its trajectory. The early phases of the project, which began in 2019, revealed the participatory methodology that structured collaborations among children, educators, and local stakeholders. These observations illustrate how the environment, material elements, and technology interact to create a participatory setting. As the project developed, its envisioned trajectory became apparent. However, as the later subsection reveals, the emergence of the COVID-19 pandemic brought significant disruptions, necessitating adaptations to sustain the project. My observations document these shifts, highlighting the evolving strategies used to navigate the challenges of a rapidly changing global landscape.

Pre-pandemic project phases

My observations of the Aksiku project prior to the pandemic reveal a series of participatory activities designed to immerse children in environmental problem-solving. Through workshops, field surveys, and interactive sessions, children actively engaged with their urban environments, identifying challenges and collaboratively brainstorming solutions. These observations highlight the hands-on and dynamic nature of participation, where interactions between Aksiku staff, municipal agents, facilitators, teachers, local stakeholders, and children shaped the environmental education experiences. The project fostered a collaborative learning environment, encouraging children to navigate environmental issues through direct engagement with both human and nonhuman elements on issues such as waste management, traffic congestion, water and sanitation shortages, as well as collective environmental behaviour. Children observed and interviewed local actors—such as local residents, street vendors, motorbike taxi drivers, sanitation workers, and local officials—to better understand community dynamics around these issues. At the same time, they encountered nonhuman elements including rubbish on pavements and rivers, broken sidewalks, wastewater, dry leaves, as well as various technologies—such as mobile phones, cameras, and apps—all of which shaped how they identified problems and proposed contextual responses. Additionally, my observations indicate that access to child participants and schools was shaped by institutional policies and bureaucratic structures, influencing how environmental education initiatives were implemented.

Project initiation and planning

At this phase, my observations focused on how different actors shaped the children's participatory process, highlighting the role of municipal agents and the Aksiku staff. I documented the institutional negotiations involved in integrating the Aksiku programme into the city-wide initiative, providing insight into the bureaucratic challenges and administrative procedures required for implementing environmental educational projects.

In late 2018, the Office of Environmental Service (OES) was searching for innovative ideas to differentiate Adiwiyata Bandung from other cities through a unique

environmental programme. My colleague and I, representing Aksiku staff, approached the OES to explore opportunities for collaboration. Our discussions focused on involving children in environmental decision-making using the Design Thinking approach. Design Thinking is a problem-solving process that involves five stages: empathising with the needs of users, defining the problem, ideating creative solutions, prototyping ideas to assess feasibility, and testing the solution with users to refine and finalise it. This methodology, following IDEO's model of the Design Thinking process (consisting of stages such as 'empathise, define, ideate, prototype'), aligned well with the OES's objectives, as it had the potential to develop problem-solving skills and empower children to take an active role in addressing local waste issues. The shared goals resulted in a productive collaboration between Aksiku Lab and the OES, leading to the OES allocating resources in 2019 to support children's participation projects.

Prior to my doctoral studies, I participated in several alignment and planning meetings at the OES office. These discussions aimed at ensuring that all Aksiku staff members have the same understanding regarding the project. During the discussions, the staff also came up with a strategy regarding the project's timeline and financial aspects. Among the financial aspects discussed included adapting the project into smaller, budget-compliant activities. This collaboration resulted in ten distinct projects to support Aksiku, including designing a mobile-optimised website, designing the learning module, conducting Design Thinking workshops in fifteen different schools, and setting up a committee to evaluate these design prototypes. Each project required adherence to specific administrative procedures. For example, the mobile website design project required a consultant work contract, while others involved hiring experts on a short-term, project basis. These specialists—such as those in participatory facilitation—provided targeted expertise to support different aspects of the project's design and implementation. Our subsequent meetings with OES staff focused on negotiating budget allocations for each project. The OES staff ensured that the Aksiku staff understood the administrative requirements of the

consultant work contract and requested their assistance in coordinating the administrative documentation for hiring experts.

In June 2019, as we were about to start implementing of the Aksiku project, the OES held three meetings to present its budget disbursement plan for the project. In these meetings the OES and Aksiku staff jointly analysed the workshop expenses and planned the budgetary execution of 75 workshops across fifteen schools. Each school was expected to host five workshops, each representing a stage in the Design Thinking process. Additionally, two workshops for local stakeholders and facilitator training were scheduled. The cost breakdown included facilitators' fees, speakers' honoraria, workshop tools and materials, as well as provisions of food and refreshments. The OES decided to use a downtown Bandung hotel function hall for the full-day school-stakeholder workshop, accommodating 230 participants, while the facilitator workshop was held in the OES's meeting room without rental costs.

The children's Design Thinking workshops were scheduled for five weeks, starting in early October and ending in mid-November 2019. Each week was dedicated to a specific stage of the process, which culminated with stakeholder presentations. All the workshops for children were set to take place in their respective schools or nearby public spaces. Afterward, a second cycle of the project was planned for 2020.

In summary, my observations at this phase reveal that the inception of the Aksiku project was shaped by collaborative efforts between the Aksiku staff and the OES, with administrative and logistical considerations playing a crucial role in its implementation. The evolving dynamics of participation became evident through the interactions between children and adults in this project, illustrating the interconnected nature of environmental education. These observations highlight how institutional coordination, resource allocation, and participatory structures influenced the experiences of both children and adults within the project. My observations also indicate that access to child participants and schools is heavily influenced by institutional policies and bureaucratic structures. They demonstrate the crucial role of understanding how programmes such as Adiwiyata operate and

how the relationship between schools and the municipal government affects the possibilities for children's participation. I will elaborate these findings in more depth in Chapter 6.

The school stakeholders' workshop

In early October 2019, the children's project began with a full-day workshop at the function hall of a downtown Bandung hotel, organised by the Office of Environmental Service (OES). The OES carefully selected and invited participants, ensuring a fair representation from fifteen Adiwiyata high schools and vocational high schools across twelve Bandung sub-districts (*Kelurahan* in Indonesian). Adult stakeholders, including sub-district chiefs (referred to as *Lurah* in Indonesian) and youth organisation representatives (*Karang Taruna* in Indonesian), were also invited to contribute to discussions about neighbourhood surveys of the areas surrounding the schools.

The workshop focused on a pivotal assessment of environmental issues and stakeholder alignment. All the groups were given the task of brainstorming environmental problems and selecting a survey area. Facilitators helped this process by providing illustrative examples. Each group marked their chosen survey area on an A2-sized map, on the condition that it should be within walking distance from their school. All the groups identified solid waste problems as a pressing issue, along with additional missions covering wastewater and clean water sources, electricity use, sidewalks and traffic, green open spaces, and school canteens. They also finalised the schedule for surveys, workshops, and presentations to stakeholders. Discussions varied across tables, with some groups being led by teachers, others by sub-district or youth leaders, and in some cases, the children themselves—especially those from school environmental clubs who were familiar with these issues.

In summary, my observations during this phase documented how children were introduced to participatory environmental education. They were encouraged to identify and articulate environmental problems through brainstorming sessions, peer discussions, stakeholder dialogues, and mapping exercises. Additionally, these

children also engaged with a diverse group of adult stakeholders in collaborative activities, working together to assess various environmental challenges. Issues discussed included polluted rivers, limited public awareness of waste separation, a lack of basic services in the informal settlements near schools, and the misuse of pavements by vendors and vehicles, which obstruct pedestrian access. This phase laid the foundation for further exploration and problem-solving activities using the Design Thinking principles.

Three main project gatekeepers were identified. First, the Office of Environmental Services (OES) served as a formal gatekeeper. The OES facilitated access to schools through the Adiwiyata Programme, which was already recognised within the school system. Second, the schools themselves played a crucial gatekeeping role, as their participation in the Aksiku project was voluntary. However, the structured nature of the Adiwiyata Programme incentivised schools to engage with environmental initiatives by ranking the schools based on their level of participation in the programme. This reward system motivated these schools to actively participate in the programme. By ranking highly in this programme, these schools gained institutional recognition and validation for their active participation in environmental issues. Lastly, at the school level, teachers acted as direct gatekeepers, facilitating access to children. Their role was essential in integrating the programme into the students' existing schedules.

Environmental survey and gameplay

The Aksiku staff's proposal to develop a mobile website for the 'empathise' stage of Design Thinking was accepted by the OES. The website was designed for small smartphone screens, incorporating a gaming approach. They worked with the OES to identify environmental issues that could be turned into missions and quests for the game. They decided to incorporate six missions into the game, namely: solid waste, wastewater, clean water sources, electricity usage, sidewalks and vehicles, green open spaces, and school canteens. These topics were chosen for their direct relevance to children's everyday experiences at school and in their neighbourhoods, making them both relatable and actionable. Except for school canteens, the selected

themes also correspond to categories listed in the Environmental Behaviour Indicators Book (*Buku Indikator Perilaku Peduli Lingkungan Hidup*, 2014), published by the Indonesian Central Bureau of Statistics (BPS), ensuring their alignment with national environmental priorities. This dual focus on contextual relevance and policy alignment aimed at fostering meaningful, situated learning while connecting children's actions to broader frameworks. Each mission included several quests that involved specific actions or questions. For example, one quest required players to find and take photos of garbage piles they encountered. Another quest asked how much organic waste was in a pile. Players were also prompted to ask someone why the garbage was left unattended. Each school was required to participate in at least two missions, with solid waste being mandatory and the other mission chosen in collaboration with local stakeholders. The game's output included geotagged photos (utilising the underlying map provided by Google Maps), scaled assessments, and brief interview summaries. Additional scoring could be obtained by repeating missions in different locations. After these missions have been identified, the Aksiku staff enlisted web developers and designers to create the mobile website platform.

The following week, the Aksiku project started involving children to conduct field surveys on the environmental issues affecting their local community through interviewing local residents and observing their surroundings using the guide provided by the mobile web platform. Most of the participating children came from middle-income backgrounds and lived outside the low-income settlements they were assigned to observe. This socio-spatial distance made the fieldwork especially valuable, as it exposed them to unfamiliar environmental and social conditions, encouraging critical reflection on urban inequality and the everyday challenges faced by marginalised communities. This hands-on approach allowed children to engage with the community and gain a better understanding of actual environmental issues in their local community. Adult participants—facilitators, representatives from youth organisations, and teachers—assisted the children in conducting the surveys.

These surveys were carried out at different times, with some conducted in the morning and others in the afternoon. At the beginning of each survey, facilitators

always provided thorough briefings to child participants. These briefings emphasised the importance of ethical interaction with neighbourhood residents, which included self-introduction, clarification of survey objectives, and obtaining permission before taking any photographs. During the surveys, facilitators played a crucial role in fostering observational skills and critical thinking among the children by asking thought-provoking questions such as, "Can you see any differences in the sidewalks between those near the school and those in the neighbourhood?" They also assisted with initial interactions with informants, particularly when the children felt shy or nervous. It is worth noting that, in some schools, representatives from the local youth organisation actively participated as co-facilitators, providing support to the survey process. The facilitators assigned these children a diverse range of well-thought-out tasks such as map handling, photography, interviewing, note-taking, and uploading data onto the mobile web platform—a crucial step in this activity. After spending around three to four hours conducting the survey, the groups returned to their respective schools for a short break, during which they enjoyed refreshments and filled out attendance documentation, as required by the OES. Once the survey was finished, the group gathered to discuss their findings, while the teachers often chose to leave and go home.

The children's exposure to the environmental realities of low-income settlements was profound. Their involvement in the surveys was not merely about documenting environmental issues, but also about encountering and learning from unfamiliar conditions. The children observed practices such as using river water for washing and directly disposing of waste into rivers. These moments elicited strong emotional responses—shock, confusion, disbelief, and critical questioning. Similar reactions occurred during discussions about slum areas and the conditions of short-term waste storage sites (Indonesian: *Tempat Penampungan Sementara*, abbreviated as TPS). The children were also amazed by the densely populated settlements and semi-permanent riverbank houses, as they had never seen them before. The youth representatives provided valuable insights during the surveys, offering contextual information about various environmental challenges faced by the neighbourhood.

Their guidance led the group to explore significant sites, such as floodgates, which enhanced the children's understanding of how local communities manage their environment.

The use of gadgets and the mobile web platform played a crucial role in the survey process, allowing for the documentation of environmental conditions. The influence of the mobile technologies on the surveys was significant, with some groups preferring guided activities while others embraced more spontaneous methods. The gamification aspect of the surveys motivated some groups to request additional survey days to improve their scores. However, technical challenges such as unstable internet connections, platform glitches, and difficulties uploading photos in real time disrupted data collection. In response, facilitators adapted by instructing children to take photographs first and upload them later. While this workaround was practical, it compromised the immediacy and situational accuracy of some survey data.

At this phase, my observations captured how children engaged with their environment through hands-on environmental surveys in urban areas. I documented how digital technology influenced their participation in environmental exploration and affected their interactions with their surroundings. Additionally, I observed children's emotional responses to urban inequalities, particularly their reactions to waste disposal practices, slum conditions, and informal settlements. While some appeared to come from more privileged backgrounds, these distinctions were not always clear-cut. Nevertheless, many children were confronted with unfamiliar realities—such as overcrowded housing, waste being dumped into rivers, and inadequate access to basic services. These encounters often elicited strong emotional reactions, ranging from shock and discomfort to empathy—which challenged their prior assumptions and broadened their understanding of environmental issues to include dimensions of inequality, infrastructure, and environmental justice.

Problem-defining, ideating, and prototyping workshops

In the following weeks, children participated in Aksiku workshops at their respective schools. This subsection outlines the three key workshop sessions: problem-defining,

ideation, and prototyping. The first session focused on identifying and analysing environmental issues based on survey findings. The second session, ideation, involved brainstorming possible solutions to these issues. Finally, in the prototyping session, children translated their ideas into practical environmental initiatives. Each session was conducted on a separate day over a two-week period.

In the problem-defining workshop, children focused on identifying and articulating environmental challenges observed in their surroundings. This process involved analysing survey findings and collaboratively discussing the various environmental issues present in different settings. Facilitators employed diverse techniques to guide discussions. In one instance, children were challenged to articulate survey observations on sticky notes using only ten words. Another approach involved facilitators from different schools collaborating, with one managing time and the other guiding discussions. Each child had a five-minute window to share their survey experiences, using prompts such as 'I hear,' 'I see,' or 'I read' to begin their narratives. This storytelling process led to the categorisation of sticky notes based on thematic relationships, which some children found challenging due to the volume of notes. The facilitators then helped them come up with a short title for each group's theme, followed by discussions to craft accurate theme descriptions.

To aid understanding, facilitators provided visual aids by sketching examples on the board, and highlighting important keywords. They encouraged an empathetic approach, using phrases like 'don't judge whose fault it is,' 'if I were in that position,' and 'how would I feel if I were there.' A unique technique involved having children role-play as different community members, such as garbage workers, mothers with small children, temporary residents, or local inhabitants. This immersive exercise allowed children to contemplate the complexity of the issues, setting the foundation for the next phase: ideating potential solutions.

After the problem-defining session, the workshop moved into the ideation phase, where children brainstormed possible solutions to the environmental issues they had identified. This session encouraged creative thinking and active participation, offering

a structured yet open-ended approach to generating ideas. To start, the facilitator set clear guidelines: "Each child must write one idea on a sticky note. Write as many ideas as possible." However, it was not only about quantity; the facilitator emphasised that "all ideas are valuable, so children should not limit themselves." With minimal conversation, the children began filling the large sheets of brown paper with their colourful sticky notes, each one representing a unique idea.

This workshop also included a prioritisation exercise, in which each child was handed small round stickers in three colours—red, white, and blue—each representing different levels of importance. These stickers were then affixed to the chosen sticky notes, initiating a voting process that allowed the children to collectively select the top three ideas. This engaged them in collaborative decision-making. This collaborative decision-making process encouraged them to reflect on the feasibility and impact of their proposed solutions, preparing them for the next stage of prototyping.

After brainstorming ideas in the ideation session, the workshop moved into the prototyping phase, where children transformed their concepts into tangible solutions. This session focused on hands-on problem-solving and the development of practical interventions that could be implemented in their communities. Children were provided with various materials and tools—cardboard, sticky notes, threads, glue, scissors, cutters, and markers—as they worked on creating prototypes and developing community outreach strategies. This process encouraged them to think critically about how to turn abstract ideas into actionable solutions.

As children worked on their prototypes, group discussions and debates emerged, highlighting the collaborative nature of the process. One group, focusing on littering, designed a 'bag-like trash holder with a separator.' As they worked on their prototype, a child questioned the appropriate price point of the bag. The group debated its cost and purpose—whether it should emphasise affordability or quality. Another child acted as a mediator and redirected the discussion, emphasising the importance of aligning the bag with the community's needs. They proposed that the

bag should facilitate the separation of common waste types for school children, such as bottles, paper, and plastics. This shifted the focus of the discussion from price to practical design considerations. They also suggested enhancing the bag's appeal by making it simple, compact, and with multiple pockets for disaggregating different types of waste. The group agreed to this approach.

Meanwhile, another group was addressing the issue of unauthorised curbside parking near the school, which was causing traffic jams. Their innovative approach involved setting up an online motorcycle taxi stand. However, they faced difficulties in finding a suitable vacant lot nearby. The discussion reached a standstill until a group member opened Google Maps on their laptop to find a suitable location. This action reignited the conversation and propelled their project forward.

Throughout the prototyping session, children demonstrated creativity, adaptability, and teamwork, guided by facilitators and teachers. They engaged in real-world problem-solving by designing solutions that were both practical and responsive to community needs, reinforcing the role of environmental education in fostering meaningful change.

My observations during this phase documented how children developed environmental solutions, progressing from problem identification to tangible prototype development. I also observed peer collaboration dynamics, noting how children debated, refined, and restructured their ideas with facilitator support. Additionally, I captured their emotional and cognitive processes—such as frustration, excitement, and decision-making struggles—as they worked through the prototyping phase. The prototyping phase was not only about generating solutions, but also about revealing the relational and affective dimensions of collaborative learning. Children's experiences underscored how environmental learning is shaped by dialogue, compromise, and peer interaction. Once their prototypes were created, the next phase of the Aksiku project focused on presenting and refining these ideas. This phase provided children with the opportunity to share their solutions with adult stakeholders, receiving feedback and making further improvements. It also marked

an important step in demonstrating how their environmental initiatives could be extended beyond the workshop setting. The following subsection briefly explores how children engaged with stakeholders, navigated the iterative process of idea development, and adapted their prototypes based on real-world constraints and community feedback.

Presenting to adult stakeholders

In this phase of the Aksiku project, my observations focused on how children engaged with institutional stakeholders, presenting their environmental solutions to community leaders. I documented their experiences—ranging from initial nervousness to growing confidence—as they navigated the challenges of interacting with adult decision-makers. Additionally, my observations suggest that access to participation is not only about being given a platform but also about how children are prepared to engage with existing power structures.

Five weeks after the initial workshop with stakeholders, in the last days of October 2019, the children had an opportunity to showcase their work. They gathered at their respective subdistrict offices to present their prototypes to adult stakeholders. The audience included the subdistrict chief, youth leaders, neighbourhood chiefs, the leader of the subdistrict's Family Welfare Empowerment (Indonesian: *Pemberdayaan Kesejahteraan Keluarga*, abbreviated PKK), and the Community Empowerment Board for Neighbourhoods (Indonesian: *Lembaga Pemberdayaan Masyarakat*, abbreviated LPM). The presentations followed a prearranged schedule, with formal invitations sent to the children, their schools, and the subdistrict authorities by the OES.

In this session, the children shared their survey findings, highlighting three key problem insights, as well as proposing their solutions, and demonstrating their prototypes. It was their first time presenting in front of adult stakeholders, and thus some of them felt nervous and scared. One child mentioned being happy with their presentation but felt that not everyone understood their idea well. Other children were confused when adult stakeholders asked them questions during the presentation, such as, "How long does it take for environmental problems to

improve?" The session revealed challenges in communication between children and adults. Children often struggled to express their ideas in ways that aligned with adult expectations or familiar conceptual frameworks. These moments of confusion—particularly when adults asked complex or abstract questions—illustrated how participation is shaped by the ability to navigate adult-dominated discursive spaces.

During the following week, the children entered an intensive phase of refining their ideas. They incorporated feedback from the adult stakeholders to enhance their prototypes. They also submitted their prototypes to the OES office for evaluation. The outcome of their efforts was revealed at an OES event where three groups were honoured as winners and received monetary rewards for their innovative contributions. The winning groups and their teachers were present at the event to celebrate their achievements and receive their prizes.

In this concluding phase, my observations focused on how children presented and refined their prototypes, highlighting their engagement with stakeholders and the iterative process of developing solutions. Throughout this phase, I documented the range of emotions and challenges children experienced, demonstrating their dynamic engagement in environmental education.

Overall, my pre-pandemic observation revealed that gaining access to child participants and schools was not merely an administrative process but required navigating institutional structures, managing stakeholder relationships, and understanding the complexities of collaborations. The partnership with OES involved strategic negotiations to align Aksiku's goals with government agendas. Additionally, I observed how schools positioned themselves within the Adiwiyata ranking system, which influenced their willingness to engage in environmental education initiatives. Furthermore, my observations showed that environmental education is not solely influenced by learning methodologies but also by social dynamics, technology, and interactions with various actors within the urban setting. By documenting all phases of Aksiku, I gained valuable insights into how children develop a critical understanding of environmental issues through active engagement in urban spaces.

The project emphasised hands-on engagement through workshops and surveys, fostering collaboration among children and adults and deepening my understanding of knowledge co-production in physical learning environments.

The following section explores how my doctoral research evolved in response to the disruptions caused by the COVID-19 pandemic. Initially, the research was designed to examine environmental education in traditional, in-person settings, where hands-on activities and direct collaboration among children, teachers, and stakeholders formed the foundation of participatory learning. However, the onset of the pandemic in early 2020 necessitated a reassessment of this approach. As in-person interactions became limited, observations shifted to digital engagements, requiring a reconfiguration of research methods. Online meetings and digital tools became central to the research, reshaping both the dynamics of project organisations and the ways in which environmental education was experienced.

Project adaptations during the pandemic

At this stage of the Aksiku project, I observed the adjustments and innovations made to sustain the initiative amid the disruptions caused by the pandemic. My observations were conducted primarily online. During this period, my data collection was included in the ethics application for my doctoral research. The shift to remote learning posed significant challenges in maintaining participatory engagement, requiring adaptations in both content and methodologies to suit a digital environment. Through interviews and focus groups, as elaborated in the next subsection, I documented participants' reflections on their experiences, revealing the complexities of online environmental education. My observations highlighted the resilience and adaptability of key actors—including Aksiku staff and teachers—who navigated institutional constraints and technological barriers to ensure the continuity of environmental education during a time of global uncertainty. Additionally, my observations during the pandemic revealed that accessing child participants necessitated continuous adaptation to evolving regulations.

As a core team member, I actively contributed to key project decisions, from designing learning content to managing funding and implementation. This hands-on involvement immersed me in the challenges of navigating the project's emotional demands, particularly during the pandemic—such as exhaustion, confusion, and frustration. I participated in reflective discussions, contributed to evaluations, provided feedback, and adapted the project in real time based on input from teachers, facilitators, and child participants. Additionally, my role as a doctoral researcher allowed me to engage in critical reflexivity regarding these experiences, which I will elaborate on further in Chapter 7.

Navigating the effects of the pandemic

The official recognition of the COVID-19 pandemic in Indonesia in March 2020 had a significant impact on the Aksiku project. Four governmental regulations specifically affected the project's direction and financial framework: the prohibition of public events and gatherings, the closure of schools and workplaces, the stay-at-home orders, and the requirement to wear face coverings. As a result, remote schooling became the nationwide directive.

The reallocation of local government funds to respond to COVID-19 led to the withdrawal of funding from the Adiwiyata programme. This prompted the Aksiku staff to adjust their collaboration plans with the Office of Environmental Service (OES). Despite budget cuts, the Aksiku project moved forward with 26 student participants and five teachers from five schools. Although formal collaboration was limited due to fund redirection, the OES demonstrated a willingness to support the children's surveys by assigning staff in subdistricts. However, during several online meetings, they cautioned about the unpredictable field conditions and the prioritisation of COVID-19-related resources, which meant that the project's implementation could not be guaranteed as initially planned. The staff kept the OES updated on their progress and received positive and supportive feedback. OES staff also expressed concerns about the feasibility of applying the Design Thinking approach online. They were sceptical about replicating the dynamics of in-person workshops and group-based prototype development and suggested shifting the

learning orientation towards individual-focused activities, taking into consideration children's varying access to technology during the school-from-home period.

The staff engaged in two online discussions with teachers, first focusing on challenges in the school-from-home setting and then on their ideas and needs. Continuous text communications were also used to supplement these discussions. Subsequently, three offline meetings were held in Indonesia to delve into workshop technicalities.

During the discussions, the teachers expressed concern that an online approach might disconnect children from real environmental issues. To address this, they proposed an interactive module to support students' independent environmental learning. They shared their strategy of limiting video calls in favour of text-based consultations for assignment guidance. Some teachers suggested shifting the focus of environmental education to pandemic-related issues at home, an idea that was well-received by all participants.

There were requests for training on new modules to facilitate classroom application. Additionally, teachers noted that the Ministry of Education's implementation of an emergency curriculum during the SFH period allowed for the relaxation of normal targets, thereby creating an opportunity to explore new educational approaches.

The Aksiku staff held discussions with a group of children who participated in the previous year's Aksiku project to gather their experiences and ideas for a pandemic-adapted project. To facilitate these discussions, two simple worksheets were created using Google Slides. This approach resulted in more dynamic and in-depth conversations compared to traditional question and answer sessions. The insights gained from these discussions were invaluable for the Aksiku staff in enhancing online interaction and module design. Although the Aksiku staff acknowledged the limitations of the online format, the children expressed a keen interest in continuing to explore and prototype solutions for real-world problems. However, parents raised concerns about their children attending school for extracurricular activities during the pandemic. As a solution, a suggestion emerged for peers living nearby to

collaborate on neighbourhood environmental investigations. One participant recommended focusing on the broader issues affecting Bandung, such as river health, and proposed producing a campaign video for social media to raise awareness and stimulate broader discussions on environmental change. The project design went through iterative stages, shaped by dialogues with the OES, teachers, and the children. In May 2020, the Aksiku staff had a strong inclination to continue conducting environmental surveys in neighbourhoods. However, the feasibility of this idea was questioned, particularly if these surveys were not conducted near schools. Several concerns arose, such as the logistics of supervising children during surveys, the appropriateness of fieldwork during the pandemic, and determining eligible stakeholders. Nevertheless, the idea was still being considered as the Aksiku staff worked through the suggestions and limitations put forth.

By June, the Aksiku staff were forced to shift into a new awareness and mindset. They reframed their difficulties and asked, "With scarce resources, limited internet access for children, and reduced stakeholder involvement, what alternative strategies can we employ to design a simpler yet impactful project?" The staff discussed intensively to reimagine a new approach. One staff member emphasised the essence of the project: the children's creativity and ideas. She was keen to adapt the Design Thinking methodology to allow children to use their homes as laboratories for individual creation. The debate deepened when another team member suggested stepping away from the Design Thinking framework to embrace a more adaptable model, one that encourages children to observe and reflect on their environments amidst the pandemic. She proposed integrating a documentary-style approach, enabling children to listen, observe, and chronicle their experiences. The staff contemplated whether the project could invite children to exercise critical thinking by reframing everyday problems so that they could identify mundane things that are usually not noticeable. The consensus was to develop a project that fosters reflective and critical thinking about environmental issues during the COVID-19 pandemic. The goal was to enable children to share their stories in a format that offers alternative perspectives on the pandemic to the wider public.

While the staff settled on the overarching concept, translating it into a tangible module framework remained a challenge. The Aksiku staff revisited the idea of environmental activism for children, contemplating a project that would prompt them to reflect on their privileges and their relationships with their environment. This reflection could act as a precursor to recognising their position of advantage and their potential to drive change. A key moment occurred when a staff member introduced a video that connected with the project's objectives. The video explored human and nonhuman relations, personal reflection, and cohabitation on Earth. The Aksiku staff found the video's narrative clear and accessible, agreeing that it would be an excellent resource for module development.

Inspired by the video, the Aksiku staff created worksheets to encourage children to contemplate their relationships with other beings and objects within a planetary context. The video provided a visual representation of the individual's connection to both the planetary scale and singular objects within the lifeworld system, making it easier to simplify complex concepts for the module. As a result of the discussions centred on the video, the staff refined the project's approach to encourage children to "reflect on greater wisdom by starting from the small things in their everyday lives." This shift marked a move away from the Design Thinking framework towards a more reflective method.

To enrich the module, the Aksiku staff curated additional educational media, formulated missions, and created worksheets. They incorporated an Indonesian documentary available on YouTube that addresses local issues such as mental health, plastic pollution, water conservation, and biodiversity during the pandemic. This documentary became part of a mission brief within the module. The Aksiku staff also invited child participants from the previous year to watch the films and gathered their responses. The feedback was positive, with participants expressing a desire to advocate for environmental justice for animals, plants, and indigenous people. However, they felt hindered by a lack of information. This feedback led to the creation of a 'self-capacity enhancement' mission, designed to help children transform their 'anxiety' into an 'affirmative condition.' The mission aimed to assist

children in assessing their current capabilities and envisioning their potential for growth, thereby empowering them to become confident advocates for their environment.

In summary, the Indonesian government's COVID-19 regulations—including school closures, restrictions on public gatherings, and budget reallocations—directly impacted Aksiku's access to children. With conventional channels disrupted, the project had to adapt to the changing context, shifting from direct engagement to digitally mediated forms of participation. Furthermore, by observing digital communications—such as WhatsApp messages and online meetings—I gained insight into how Aksiku staff adapted their decision-making, strategies, and teamwork in a digital environment. I captured both the technical details and the emotional dynamics shaping the collaboration.

Facilitating a remote participatory environmental education

Observing the initial approach to remote participatory environmental education provided insights into how interactions among human and nonhuman actors have changed in a digital environment. Furthermore, my observations highlighted how access to children now relies more on digital tools and adaptations in facilitation methods. The following observations demonstrated how the Aksiku project co-produced environmental education, shifting children's engagement from physical exploration to digital storytelling and personal reflection.

The Aksiku project continued with a focus on remote learning and digital engagement. It adapted the pedagogical and facilitation methods to support digital learning. The pedagogical elements consisted of a digital module, which was organised into five main missions, comprising a total of eleven diverse environmental tasks. To ensure accessibility and user-friendliness, the module was created using Google Slides, allowing children to directly interact with, copy, or complete their tasks within the platform. Throughout the five-week project, the children engaged with one to three tasks each week, providing a steady yet flexible learning pace. Participants were given a comprehensive set of digital tools, including detailed

explanations of the project, clear mission briefings, educational video content, additional reading materials, and interactive worksheets, all designed to enhance their learning experiences.

The pedagogical approach of the Aksiku project focuses on its post-anthropocentric and transformative nature. In the project, children are encouraged to observe and interact with their immediate environments, reflecting on their relationships with nonhuman entities. The emphasis on critical thinking and individual reflection about environmental issues encourages children to reevaluate their perspectives and roles in the environment, highlighting the non-exploitative relations with nature. The project also emphasises participatory action research methods, allowing children to identify, investigate, and address environmental issues in their communities.

The Aksiku project commenced with a comprehensive onboarding process that covered consent and group formation, setting the stage for participants' involvement. To initiate the onboarding process, the Aksiku staff distributed an introductory video to teachers, enabling them to engage potential participants. The video outlined the project's objectives, duration, tasks for each participant, and the non-monetary rewards for successful completion. After signing up, the children were swiftly added to specific WhatsApp groups, where they met their facilitators. Group assignments were made according to school affiliations to promote a sense of familiarity and ease among the participants.

Once the participants were organised into their respective WhatsApp groups, the facilitators promptly scheduled an introductory video call for each group, typically on the same day. During this session, the facilitators shared their screens and displayed the consent document, which they read aloud. I introduced myself as the initiator of the Aksiku project and as a doctoral researcher. We specifically sought consent for the participants' involvement in the Aksiku project and the use of their participation documentation for my doctoral research. We also provided explanations and illustrative examples to clarify the content. Participants were actively encouraged to ask questions and express any concerns, ensuring their full understanding and

comfort. A key point reiterated throughout was the voluntary nature of participation, emphasising that participants could withdraw at any time without any consequences.

After completing the consent process, facilitators made the consent document available in the WhatsApp group, giving children the opportunity to reconsider their decision if needed. Once consent was established and necessary arrangements were in place, facilitators invited the children to meet online at least once a week. These meetings had flexible scheduling, with the possibility of additional weekly meetings based on mutual agreement between the groups and facilitators. The groups worked together to set the schedule for video call sessions, as well as for discussing mission procedures and deadlines. One participant made a notable suggestion to occasionally integrate face-to-face meetings with the online sessions. While the Aksiku project primarily operated online, facilitators acknowledged that, with group consensus and teacher permission, in-person meetings could be arranged with strict adherence to COVID-19 safety protocols. This flexible and adaptive onboarding approach ensured that the process was accommodating and engaging, fostering an environment supportive of the project's goals and aligned with participants' needs and preferences to maximise successful outcomes.

Each week began with facilitators introducing new missions to the children, which they were required to complete by the end of the week. This process started with a group video call, wherein the facilitator presented the mission for the week. During this meeting, facilitators guided the children through various ways to complete the worksheets, offering options tailored to individual preferences and creativity. This included using software tools for digital creation, making photo collages, or creating hand-drawn artworks. After completing the worksheets, the children were instructed to upload their work to a specific Google Drive link provided by the facilitators for easy collection and review. Importantly, one of the facilitators took the opportunity to emphasise the importance of approaching the missions earnestly. They encouraged the children to invest genuine effort in their tasks, reminding them of the value of creating meaningful personal narratives that reflect their understanding and experiences related to the environmental missions. This emphasis on seriousness and

depth of engagement aimed to enhance the educational impact of the tasks and foster a stronger personal connection to the environmental topics being explored. Throughout the Aksiku project, facilitators also opened individual text chats to make it easier for children to seek clarification and support, ensuring continuous engagement.

The Aksiku project started with a nostalgic activity in the first week, where the children identified the objects they missed the most about their city during the stay-at-home period. This activity then led to the creation of personalised house plans, which outlined the children's daily movements at home during the pandemic. The purpose of this exercise was to help the children develop awareness and understand the connection between their individuality and their environment. Ultimately, the goal was for them to be more mindful of their surroundings.

In the second week, the focus shifted to examining daily routines. The children created timelines that detailed their daily activities and the resources they consumed, such as electricity for charging devices and the sources of their meals. This exercise not only documented their consumption but also encouraged the children to identify environmental issues associated with their activities. This step was crucial in reframing environmental problems and establishing actionable goals, prompting the children to consider the broader impacts of their personal choices on the environment.

The third week of the Aksiku project focused on addressing environmental issues and fostering self-empowerment among participants. Building on the understanding gained in previous weeks about the environmental impact of their daily activities, participants delved into their concerns regarding the environment. The week included capacity-building activities using a Participatory Action Research (PAR) approach. This approach allowed children to investigate specific environmental problems, such as electricity generation and resource depletion. By conducting interviews and gathering information from online sources, they collected data to understand the causes and effects of these issues. This process helped them see the

connection between their individual behaviours, personal consumption patterns, and larger environmental issues. With this understanding, the children synthesised their findings and brainstormed potential solutions, thereby improving their critical thinking and problem-solving skills in promoting environmentally responsible behaviour.

In the fourth week, rapid ideation sessions were introduced to inspire the creation of actionable ideas. These sessions were conducted through video calls, with children working on Google Slides. The slides provided spaces for children to jot down as many ideas as possible and included a quadrant system to help prioritise their ideas. The quadrant was formed through intersecting axes, with the X-axis representing potential impact and the Y-axis representing required resources or effort. This resulted in four quadrants, each representing a different combination of impact and resource requirements (e.g., low impact-low resource, high impact-high resource, etc.). Children used virtual sticky notes to brainstorm and occasionally sought guidance from facilitators. At the end of the session, each child presented their thought processes and the most feasible ideas they had developed to their group and facilitator. This exercise aimed to enhance their creativity and understanding of practical implementation considerations.

During the final week, participants shared their journeys on Instagram, showcasing how they transformed their environmental concerns into practical actions. This stage involved sharing their campaign efforts with their social media followers, disseminating their learning outcomes. Through engaging captions, visual content, and interactive posts, the children communicated their environmental initiatives to a wider audience, inviting others to join their cause. Additionally, they evaluated the impact of their efforts with facilitators, discussing both achievements and challenges in driving change. This exercise provided an opportunity for participants to reflect on the effectiveness of their actions, identify lessons learned, and suggest potential improvements for future initiatives.

In the context of remote participation, the weekly digital meetings with children faced various obstacles. The meetings, conducted via Google Meet or Zoom, often relied on the children's access to either cellular data or home Wi-Fi connections, both of which were frequently unstable. This instability manifested in several ways, such as sudden disconnections due to power outages in participants' homes or fluctuating internet connections. As a result, these technical difficulties occasionally led to participants being involuntarily removed from meetings or experiencing poor audio quality. To address these challenges and maintain connection stability, facilitators limited video usage to essential times, such as during the presentation of module slides or when children were sharing their work.

Regarding engagement strategies in digital learning, facilitators utilised diverse and creative techniques to encourage interaction and participation. In the initial sessions, they encouraged self-expression through digital tools such as Google Jamboard. This allowed participants to create drawings or collages that best represented their individual identities. This approach not only fostered engagement but also provided valuable insights into the participants' personal interests and lifestyles. For instance, facilitators initiated personal introductions, enabling participants to share aspects of their lives, ranging from hobbies to achievements. This created more relatable and humanised interactions among children. Additionally, light-hearted and imaginative activities were integrated to enhance engagement. Facilitators posed unique questions, such as asking participants to describe themselves as a type of food, which elicited humorous and creative responses. This fostered a friendly and open atmosphere among the children. Moreover, the use of distinctive acronyms for labelling sessions—such as *'Sabar'* (meaning 'patience'), which stood for *sharing-bareng* (an Indonesian expression for sharing in a spirit of togetherness)—added a unique and memorable touch to the digital meetings.

Discussions during the online sessions often evolved naturally, revealing the depth of the children's thoughts on various topics. For example, a discussion on the environmental impact of soap led to broader conversations about sustainable living practices. This included topics such as choosing personal care products without

sodium lauryl sulphate (SLS) and considering environmentally friendly transportation options. These dialogues showcased the diverse perspectives of the participants and highlighted how daily choices can influence environmental outcomes.

During these sessions, I observed the Aksiku project's pedagogical approach, focusing on its post-anthropocentric elements. I documented how Aksiku's approach shaped children's experiences and the use of digital tools in the project. The material aspects of these tools were utilised to deeply engage children with the project, highlighting the significance of affective methods in fostering deeper participation. Further discussion of this topic will be provided in Chapter 5.

Building environmental knowledge in a home setting

Biweekly sharing sessions were created as a space for children to take the lead and share their progress in their missions, developing environmental knowledge. During these sessions, children engaged in a dialogue where facilitators and their peers listened attentively, asked questions, and provided feedback. The main goal was to empower children to voice their experiences and thoughts on each mission, creating a supportive environment for personal expression and collective learning.

To co-facilitate these discussions, I developed a series of questions designed to encourage a deeper reflection and engagement. These questions were shared with the group facilitators in advance to ensure a structured yet open-ended discussion, allowing for a fluid exchange of ideas during the sessions. As each participant presented their visual narrative, they were encouraged to explain the reasoning behind their choices. For example, in the first sharing session about home and daily activities, the session started with a simple prompt: "Please share your picture story." This was followed by a series of probing questions from both the facilitator and me, such as: "Why did you choose this particular object?", "Which of your home activities brings you the most joy and why?", "Describe your favourite spot in the house and what makes it special?", and "Where do you spend most of your time at home, and what attracts you to that area?" These questions aimed to uncover the deeper meanings and attachments participants had to their personal environments. The

session concluded with a reflection, during which participants were asked to share their thoughts and feelings about the sharing activity. One participant remarked, "I've never shared my home activities like this before." Another shared, "This session made me think about things that I never thought of before, and it became a self-reflection. I like it." A third participant noted the value of integrating evaluation into storytelling, saying, "I appreciate how we conducted an evaluation through our stories" (Online Focus Group 1, 22 October 2020). In child-focused research, it is crucial to create a safe space where children can freely express themselves without feeling pressured or judged (Spyrou, 2018). The positive feedback from the participants indicates that the session was conducted in a way that made them feel comfortable and appreciated. Furthermore, the participants' responses suggest that they found value in the activity, thus highlighting the beneficial aspect of the research.

These sharing sessions provided a platform for children to engage with environmental knowledge and reflect on their interactions with the pedagogical framework. The activities revealed how their learning was shaped by daily observations and reflections on nonhuman entities at home. These insights highlighted the connections they made between personal consumption, lifestyle choices, and broader environmental issues, offering a deeper understanding of how their environmental awareness and critical thinking emerged. This underscores the role of environmental materials and activities in shaping children's understanding of the relationship between individual actions and larger societal and ecological dynamics.

However, I observed that the shift to home-based environmental education in the Aksiku project led to varied experiences as children adapted to remote learning and collaborated with peers they had never met in person. One participant, who started high school during the pandemic, shared how quarantine disrupted her routine and motivation, making it harder to engage in the project (Online focus group 3, 24 October 2020). My observations provided valuable insights into how the home environment influenced children's emotions and the pressures they faced in participating.

In summary, my observations during this phase highlighted how environmental education became more introspective, shifting from group-based participation to individual reflection, self-directed learning, and digital environmental advocacy. Children focused more on their personal habits and relationships with nonhuman entities rather than engaging in direct field activities. By reviewing children's digital assignments—such as sketches, collages, and essays on Google Drive—I gained insights into their learning processes, engagement with environmental issues, and reflections on household materials. These observations informed my focus group questions, ensuring they were relevant and insightful. Moreover, my observations noted both the opportunities and challenges of conducting online research, particularly technical issues such as low internet bandwidth, which impacted the quality of interactions.

Concluding the project

My observations of the final remote participatory session revealed the tension between children's aspirations for meaningful environmental education and the constraints of remote participation. It documented how technology mediated human interactions, functioning both as barriers and as conduits for engagement.

The final sessions of the Aksiku project combined both offline and online formats based on children's requests, with approval from parents and teachers. After sharing their stories on Instagram, the children worked with facilitators to schedule these concluding sessions. Three groups chose to meet in person at local cafés and the school mosque, while two groups preferred to continue online. For one group, a planned offline meeting had to be adapted into a hybrid format due to an increase in COVID-19 cases in their neighbourhoods and concerns from parents.

During these final gatherings, participants were recognised for their involvement in the Aksiku project with certificates and memorabilia, such as tote bags, printed modules, and stationery. Attendance was notably high, with only three out of the twenty-six participants absent. Interestingly, two children who had withdrawn from the project halfway through made an unexpected appearance and shared their

insights and reflections. These children expressed a lack of enthusiasm, partly due to the unique challenges they faced in this year's project. They mentioned difficulties with the independent nature of the project and the lack of collaborative opportunities compared to the previous year. A significant factor contributing to their decreased motivation was the perception that their school did not fully appreciate the water recycling facility prototype they developed in 2019. Despite winning second place and a cash prize, they felt that the school did not fully recognise the extent of their progress or the potential impact of their prototype. The absence of open forums for discussion and knowledge-sharing within the school deepened their disappointment, leaving them with the feeling that their innovative ideas and aspirations were not given the consideration or support they deserved.

In this phase, my observations indicated that the pandemic not only altered how environmental education was conducted but also shaped how children experienced, understood, and engaged with environmental education within digital spaces. Final discussions with the children provided deeper insights into their reflections, particularly regarding how the transition to online participation influenced their involvement in the Aksiku project. To guide these reflections, I used a focus group protocol (see Appendix B).

Engaging with adult collaborators

The Office of Environmental Service (OES) was actively involved in the initial discussions and made significant contributions to the Aksiku project. However, the pandemic forced major adjustments, including budget reallocations that disrupted collaboration plans. Teachers played a crucial role in facilitating access to children, recruiting participants, and contributing to the development of educational modules. Meanwhile, Aksiku staff played a vital role in curating resources for remote environmental education, providing technological support, and maintaining smooth project coordination. Facilitators worked closely with children in online sessions, ensuring meaningful participation and engaging learning experiences.

The Aksiku project's collaboration with teachers from five schools was key to its successful implementation. It is worth noting that these schools had participated in previous iterations of the project. They sent a total of twenty-six students to participate in the children's workshop, with some students returning from 2019. Teachers played a crucial role in recruiting their colleagues and facilitating access to training spaces. In addition to the children's project, a teacher programme was implemented simultaneously. Prior to the children's programme, an offline workshop was conducted in a high school classroom to introduce the Aksiku module to teachers. A total of fourteen teachers attended the module training, and communication was facilitated through a WhatsApp group. This was followed by weekly online discussions held every Friday afternoon via Google Meet. Invitations for these sessions were sent on Thursday afternoons through the WhatsApp group. The focus of these sessions was to integrate the module into the teachers' lesson plans. At the end of each session, the Aksiku staff made notes and provided updates to the teachers' WhatsApp group so that absent teachers could stay well-informed with its progress. Teachers, who typically managed classes of 35 to 50 students, planned to incorporate the module into their subject lesson plans, which ranged from Biology to Environmental Education and Counselling classes. At their respective schools, they utilised e-learning platforms and chat applications to deliver the module and interact with students. However, only three teachers reported fully implementing the module, highlighting the challenges of achieving students' understanding through purely online methods. Teachers expressed feeling disconnected during video calls and acknowledged the problems with limited student–teacher interaction, especially for new high school students starting during the school-from-home period, when COVID-19 infection rates were fluctuating.

The weekly debrief meetings served as a key platform for facilitators to discuss challenges and refine their strategies for delivering the project in a digital format. These meetings provided insights into how facilitators adapted to online facilitation, engaged with participants, and navigated problem-solving in a remote learning environment. They also played a crucial role in shaping the project's implementation

by allowing facilitators to share feedback, exchange ideas, and ensure the continuity of meaningful engagement despite the constraints of the pandemic. Furthermore, the post-project offline meeting provided facilitators with an opportunity to reflect on their experiences and evaluate their transition to online facilitation. This meeting allowed them to share insights on the use of digital technology and their observations on children's engagement and learning outcomes. It served as a space for collective reflection, helping to assess the project's impact and identify lessons for future initiatives.

The role of adults became more apparent during the pandemic as teachers, Aksiku staff, and facilitators emerged as key actors in maintaining access to children. By engaging with adult collaborators, this study contextualised children's participation as a collaborative effort shaped by multiple actors—including schools, local governments, and policy frameworks—that either supported or constrained participatory environmental education. Through this lens, the research examines how environmental education is co-produced across various scales, from individual educators and children to broader institutional and governmental networks.

To conclude, my observations documented the evolving dynamics of environmental education across phases of the Aksiku project—before and during the pandemic. Using field journals, I recorded collaboration dynamics, interactions, and personal reflections throughout the implementation of the project. Before the pandemic, I conducted direct observations in physical environments such as schools, local communities, and urban areas. When the pandemic necessitated remote learning, I adapted my research to online methods to ensure its continuity. This transition was not just a necessity but also an opportunity to explore new dimensions of children's environmental participation, particularly how technology mediated their learning. Additionally, observations during the pandemic revealed that access to child participants was influenced not only by institutional policies but also by evolving interactions among human–nonhuman actors in a crisis context. By capturing these interactions, the observations highlighted the challenges of sustaining environmental education when social, technological, and institutional barriers intersect.

3.2.2 Semi-structured interviews

To gain a critical understanding of the environmental education project, I conducted interviews with project participants, using a semi-structured approach. This method balanced structure and flexibility, allowing for considerable freedom in responses while following an interview guide (Bryman, 2012). It was particularly effective in gaining insight into the individual experiences of teachers and the Aksiku staff, as well as their perspectives regarding the environmental education initiative. Most importantly, I used this method to elicit how the emotional experiences of adult collaborators (Bondi, 2005; Knudsen & Stage, 2015) shaped their engagement with environmental education. Overall, this method provided valuable insights into the complexity and messiness of the work of assembling (Durose et al., 2022), particularly in the environmental education project.

I conducted interviews with the Aksiku staff and teachers to gain an understanding of how different actors shaped and experienced environmental education. Each group had distinct areas of focus. In my interviews with the Aksiku staff, I concentrated on their personal reflections, the challenges they encountered, the pressures of managing their time, and their contributions to the project's success. When interviewing teachers, I explored how they integrated environmental education modules into the curriculum, reflecting on the difficulties they faced and the institutional constraints they had to navigate. I also examined the support they received and how they incorporated environmental education into their teaching practices.

3.2.3 Focus groups discussions

To obtain a deeper understanding of collaborative experiences in an environmental education project, I conducted focus groups with facilitators, teachers, a community member, and children. Unlike traditional interviews, focus groups encourage collective interaction (Bryman, 2012), making them particularly useful for studying collaborations. In this thesis, focus groups were used to study three distinct groups: children, adult stakeholders, and Aksiku staff, including facilitators. While interviews

typically involve a one-on-one conversation between the researcher and a participant, focus groups allowed multiple participants to engage in discussions moderated around a specific topic. This group setting was instrumental in generating richer, multi-perspective insights, as it enabled the interaction and integration of diverse individuals—an important aspect of studying collaborative environments. Through these sessions, I uncovered how participants construct and negotiate shared meanings while navigating the complexities of working in teams. Focus groups were particularly valuable for understanding group dynamics and how collective meanings emerged (Bryman, 2012). By bringing together individuals with different roles and perspectives, focus groups provided me with valuable insights into the collaborative process and its challenges.

Through focus groups, I gathered participants' collective experiences and perspectives on an environmental education project, particularly in the context of the pandemic. In the sessions with facilitators and Aksiku staff, I delved into group dynamics, shared experiences, and the adjustments they made to online facilitation. My observations of the weekly debrief meetings throughout the project further enriched my understanding of these dynamics. Furthermore, during the session with teachers and a community member, I focused on the impact of policies, such as the Adiwiyata programme, on environmental education, as well as their experiences in promoting and implementing these initiatives (see Appendix C). These sessions provided me with significant insights into institutional challenges, collaborative efforts, and strategies for advancing environmental education. In the focus groups with children, I captured their unique perspectives, shedding light on their engagement, challenges, and reflections on the project. Together, these discussions allowed me to develop a rich understanding of the interactions and adaptations within the Aksiku project.

3.2.4 Research adaptation

Conducting research digitally during the pandemic presented challenges such as low internet bandwidth, dropped calls, and poor video or audio quality, which sometimes

resulted in incomplete or lower-quality data (Archibald et al., 2019; Lobe et al., 2020; Rivera et al., 2022). Engaging with children remotely was also difficult, especially when they switched off their cameras to save bandwidth or felt uncomfortable with digital communication, preventing me from observing subtle gestures (Keen et al., 2022). Rather than focusing on these limitations, I approached this new context as a site of exploration. This involved redefining the research field, developing new documentation protocols, and recognising the potential of digital technology as an enabler of new forms of expression.

As my research shifted to online fieldwork, I expanded my understanding of the research "field" beyond physical spaces to include digital environments (Howlett, 2021). I identified three interwoven spaces in mediated fieldwork: my own setting as a researcher, the participants' settings, and the digital platforms facilitating our interactions. To trace the movement of human–nonhuman entities across different spaces—including homes, schools, public offices, and digital environments—I combined online and offline observations, providing rich insights into how these spaces intersect (Hine, 2017). I examined how children engaged with environmental education at home and how digital platforms such as Google Slides, WhatsApp, and Zoom mediated their engagements. At home, I traced how children utilised their everyday surroundings as small laboratories, reflected on their routines, and built environmental awareness through interactions with household objects. Even in a digital setting, I found that observation remained suitable for capturing the subtle nuances of social, spatial, and material interactions that drive change (Gunnarsson, 2021).

To overcome digital constraints, I developed new protocols to adequately document participants' experiences in ways that enriched the research. I asked children to record their experiences through images and writing (Watson & Lupton, 2022; Mazzetti, 2020). Later, I used these records as prompts during discussions to elicit various narratives about environmental matters. These creative outputs revealed how nonhuman entities—such as household objects, ecological elements, and pollution sources—contributed to children's understanding of environmental issues.

They also allowed me to trace how children engaged with environmental knowledge production and articulated their perspectives.

Finally, rather than treating online communication as merely a substitute for offline interaction, I recognised that digital technology enabled different forms of expression (Börner et al., 2023). This understanding informed my approach to data collection, which influenced both my analysis and interpretation. I paid close attention to the role of technology in the Aksiku project and its impact on children's learning experiences. Digital technologies—such as computers, smartphones, tablets, and the internet—mediated children's engagement in remote environmental education, both facilitating and constraining their participation. By focusing on the material aspects of these technologies—such as the emotional impact of certain apps and the fatigue caused by prolonged screen time—I observed how digital tools shaped children's interactions and learning experiences. Moreover, I directed my methods to capture the emotional and sensory dimensions of children's interactions with technologies. Drawing on Duff (2016), I paid attention to affective traces—subtle emotional, embodied, and sensory responses—that emerged from these interactions. Rather than documenting participation as a predetermined process, I attuned myself to its felt, embodied, and sometimes unpredictable aspects. A more detailed discussion of this topic is presented in Chapter 5.

In conclusion, I acknowledge that an environmental education assemblage does not have fixed or rigid boundaries. Instead, it is fluid and constantly shifting, shaped by resources, relationships, and the vulnerabilities of both human and nonhuman actors (Walker et al., 2011). In this way, I examined how the assemblage was territorialised in different ways. First, I studied children within their pandemic assemblage, exploring how their learning experiences unfolded through unexpected events (Kullman, 2015). I investigated how the domestic environment shaped their emotional engagement in online learning, as material conditions—such as access to technology and household distractions—significantly influenced their ability to participate in the Aksiku project. Observing children's assemblages provided deeper insights into their activities, behaviours, and interactions within remote

environmental education. Second, I explored how the Aksiku module design elicited emotional engagement with the project. The project emphasised affective methods, highlighting the deep interconnection between emotions, material conditions, and learning experiences. Lastly, I examined adult collaborative dynamics, which were essential to the project's adaptation and success during the pandemic. I focused on institutional and organisational aspects, highlighting the contributions and challenges faced by different adult groups.

3.3 Ethical principles

Ethical principles were central to this PhD research, particularly in its engagement with children. I adhered to key ethical guidelines, including avoiding harm to participants, obtaining informed consent, respecting privacy, as well as maintaining confidentiality and anonymity (Bryman, 2012; Brydon-Miller, 2008). To ensure that my research met ethical standards, I sought ethical approval from the UCL Research Ethics Committee Office, which was especially crucial given both the involvement of children and the challenges posed by the pandemic. To protect the participants' identities, I replaced all personal information, such as names and schools, with pseudonyms. Furthermore, I prioritised children's well-being and rights (Bradbury-Jones & Taylor, 2015), especially when exploring their personal and emotional experiences.

To address the issue of dominant adult decision-making and power imbalances, I ensured that both my PhD research and the Aksiku project were directly shaped by children's ideas and feedback. This was achieved by actively involving children in reviewing and suggesting changes to the project design during the pandemic. By including them in the decision-making process, I aimed to respect their autonomy and ensure their meaningful participation (Bradbury-Jones & Taylor, 2015).

I carefully navigated the process of obtaining children's consent by implementing a dual consent approach for participation in both the Aksiku project and my doctoral research. Before joining the project, children—and their guardians, for those aged

fifteen or younger—received detailed information about its goals and activities. I provided an introductory video and conducted an initial session to thoroughly discuss consent. I explicitly asked children to provide consent, with clear explanations that their involvement would be recorded for research purposes. Additionally, I requested their separate consent for my doctoral research. The process included providing an information sheet that outlined the research objectives, data collection methods (such as observations and interviews), data usage, and measures to maintain confidentiality (see Appendix A). Following Hopwood's (2007) approach, I sought children's consent continuously throughout the research phases, allowing them to choose whether to participate or withdraw at any stage. This ensured that their involvement remained fully informed and voluntary (Bradbury-Jones & Taylor, 2015). Some children decided to pause their participation temporarily and later rejoined, demonstrating that they felt in control of their engagement in the project and research.

The shift to online learning during the pandemic introduced unique ethical and emotional challenges. I observed my role extending beyond research to providing care and support to child participants in response to the disruptions caused by COVID-19. As both a researcher and facilitator, I developed and observed the impact of support mechanisms that enabled children to discuss sensitive topics in a safe space. The transition to remote learning and the increased focus on individual activities affected children's emotional well-being. In response, I needed to develop a suitable and dynamic 'care' strategy for participants to build their capabilities (Bozalek, 2020; Ergler, 2017). This included creating dedicated sessions where children could freely share their personal struggles without pressure from peers. This approach addressed the ethical complexities of conducting research with children during a crisis, balancing their right to participate with the need for protection (Cuevas-Parra, 2020; Bradbury-Jones & Taylor, 2015). Ultimately, my research process aimed to benefit both the children and myself as the researcher, allowing us to build each other's capabilities and work together towards the goal of making changes (Bozalek, 2020; McLaughlin, 2020).

3.4 Thematic analysis

This section outlines the thematic analysis process used in this research, detailing the steps taken to code and interpret data collected from various sources. It also presents key themes that emerged, offering insights into the complexities of environmental education and participation.

The analysis drew on all data collected during the pandemic. The data set included 18 focus group transcripts of children, teachers, Aksiku staff, and facilitators, as well as six interview transcripts with teachers and an Aksiku staff. Each transcript ranged from 60 to 180 minutes of conversation. Additionally, it included 251 children's digital assignments and 278 entries from my journal, providing a detailed account of the research setting (Bryman, 2012).

After data collection, I applied a structured process of thematic coding to identify key patterns. First, using NVivo software, I annotated the transcripts to make sense of the data and explore the variety of concepts that emerged in conversations and discussions. I translated all annotated quotes into English for analysis. Familiarising myself with the data was an essential step in thematic analysis (Braun & Clark, 2006). Second, I built an initial list of codes deductively, by identifying theoretical lenses that matched the concepts found in the transcripts. I used a mind map to visually organise and group these codes (Wheeldon & Åhlberg, 2018). Third, I continued refining the codes inductively as new insights emerged from the data.

The analysis revealed several overarching themes across different data sources—my journal, Aksiku staff, child participants, and teacher collaborators. These themes provided a deeper insight into the evolving nature of environmental education. I focused on the themes that were relevant to answering my research questions and meeting my research aims, exploring the impact of the pandemic on participatory methodologies, the delivery of the Aksiku project, and the experiences of participants. This analysis highlighted the challenges and adaptations required in these unprecedented times, with technology emerging as a crucial factor—serving

both as a facilitator and a barrier to education as learning shifted to a remote context. Additionally, my data underscored how environmental education intersects with broader socio-political dynamics, including urban environments and gender roles, suggesting a multifaceted approach to understanding and implementing educational initiatives.

Drawing insights from my journal, interviews, and focus groups with Aksiku staff and facilitators, I aimed to understand how human and nonhuman factors shaped the project's dynamics. The themes that emerged from my journal reflected both the practical and reflective aspects of running the Aksiku project before and during the pandemic. These insights shed light on the evolving nature of collaboration among different adults to create strategies for involving children in environmental issues. I identified key themes related to the influence of nonhuman factors—such as pandemic conditions and digital tools—as well as broader elements like human–nonhuman interactions, affective relations, and micropolitics. These themes demonstrated how the shift to online teamwork and facilitation altered the relational dynamics within the project. They also highlighted the adaptive strategies employed by staff and facilitators to address the challenges, emphasising the flexibility of the project organisation. Overall, the themes revealed insights into how individuals experienced the project, adapted to changing circumstances, and embraced new practices, roles, and identities. Analysed together, they illustrated the emergent territory and capacities of Aksiku as an organisation.

In examining children's experiences in online environmental education, I discovered new dimensions of knowledge production. Several key themes emerged from the data (see Appendix E), including the significant role of technology in shaping their involvement with the Aksiku project. These themes provided valuable insights into how pedagogical approaches could foster children's understanding of their position within a broader environmental network, highlighting the interconnectedness between human and nonhuman elements in their thinking. I also identified how children produced environmental knowledge, experienced emotions, and faced the pressure of participation. Additionally, my analysis showed how children navigated

and negotiated their physical and digital spaces—such as their homes and digital platforms—and how these spaces influenced their engagement with environmental education. Lastly, I identified how the materials and objects within children's homes shaped their learning and engagement during the school-from-home period, contributing to an understanding of how social, material, technological, and spatial factors intersect in educational practices.

I gained valuable insights from teacher collaborators about the evolving experience of teaching environmental education. My analysis revealed themes that reflected both their personal experiences with the teaching process and the broader institutional dynamics at play. These themes shed light on the daily interactions between teachers, students, physical facilities, and non-teaching staff, emphasising the challenges and strategies involved in incorporating environmental education into the school structure. Additionally, I identified the critical role that curricular and extracurricular programmes played in shaping and sustaining environmental education within schools. My analysis also explored the systemic changes and varying levels of institutional support that impacted teachers' abilities to implement environmental education. Moreover, I recognised how teachers' diverse identities influenced their approaches to environmental education, contributing to a richer understanding of how social and political dimensions intersect in educational practices.

The themes I identified provided a deeper understanding of environmental education as an assemblage. The next step in my analysis involved interpreting these themes and constructing a narrative that situates them within the broader research context. My interpretation process went beyond merely summarising data; it involved ascribing meaning to the data and translating it into valuable insights (Trent & Cho, 2014; Mills, 2018). This approach was particularly important for portraying the complexities of environmental education and describing how various human and nonhuman entities contribute to its emergence. I articulated key findings that illuminated the three main topics explored in this study: children's transformative experiences, the role of nonhuman factors and technology in their participation, as

well as the influence of policy and organisational structures on adults' roles in environmental education. To substantiate these insights, I incorporated direct quotes from journal entries, focus groups, and interviews (Rickson, 1986; Trent & Cho, 2014), connecting specific instances to broader theoretical frameworks and concepts (Rickson, 1986). This approach helped me delve deeper into the meanings of certain patterns within the context of environmental education. Before conducting this thematic analysis, I had already completed a literature review, as outlined in Chapters 1 and 2, to identify relevant theoretical frameworks. I used these frameworks as analytical tools to guide my data interpretation (Trent & Cho, 2014), which allowed me to move from concrete empirical examples to broader theoretical insights. By achieving higher levels of abstraction (Mills, 2018), I was able to narrate how environmental education functions as an assemblage. Through this analytical process, I situated children, teachers, the Aksiku staff, and myself as a researcher within the broader environmental education discourse.

I recognise that interpretation plays a critical role in shaping educational research, and it can directly impact participants' lives (Mills, 2018). According to Mills, analysing and interpreting findings allow researchers to provide insights that may influence and enhance educational practices. Building on this perspective, I approached my interpretation as a process of questioning and potentially altering preconceived notions and beliefs about environmental education and children's involvement in environmental issues. I remained mindful that interpretation is inherently subjective and selective (Trent & Cho, 2014), shaped by my perspective and understanding of how theories, concepts, and practices intersect in environmental education.

3.5 Conclusion

This chapter has outlined a methodological approach that reimagines environmental education as a fluid and emergent assemblage, shaped by the dynamic interplay of human and nonhuman actors. By adopting ethnographic tracing, this research moves beyond static representations of children's participation, instead capturing how learning is shaped by material environments, technology, and institutional structures.

Through a qualitative approach, combining participant observation, semi-structured interviews, and focus groups, this study traces how an environmental education case—the Aksiku project—unfolds across both physical and digital landscapes, particularly in response to the disruptions caused by the COVID-19 pandemic.

A key contribution of this methodology is its ability to trace the transformation of participatory environmental education across different phases—before and during the pandemic. By shifting from in-person ethnography to online methods and digital engagement, the research highlights how children's participation evolved in response to changing material and social conditions. This adaptation also brought ethical and logistical challenges, requiring careful navigation of power dynamics and gatekeeping. The study's insider positionality further enabled deeper engagement with participants, necessitating a reflexive stance on the complexities of co-producing environmental knowledge. It captures how environmental education is continually negotiated, adapted, and co-produced across different scales.

Finally, this study contributes to discussions on ethics and power in participatory research with children, particularly in the context of crisis-driven adaptations. Through continuous consent, affective research practices, and participatory decision-making, it ensures that children's voices and experiences remain central to knowledge production. The thematic analysis provides deeper insights into how children develop environmental awareness through both material engagements and digital storytelling.

By adopting a posthuman, process-oriented approach, this chapter presents a flexible and context-sensitive methodological framework for studying environmental education. It advances ethnographic research on assemblages (e.g., Youdell, 2015; Baker & McGuirk, 2017) by providing a detailed account of the case study, methodology, and data collection techniques used in this research. Extending Fenwick et al.'s (2011) work on studying educational initiatives, it offers an empirical examination of human–nonhuman interactions across both physical and digital learning environments. By tracing how environmental education unfolds through

institutional, technological, and material entanglements, this chapter moves beyond conventional human-centred frameworks, contributing to a more relational and process-oriented understanding of learning.

After displaying the methodological approach, the following chapter will delve into children's transformative learning journey, highlighting the role of human and nonhuman actors—such as material conditions and social learning networks—in shaping their evolving understanding and commitment to environmental care.

Chapter 4 From Home Confinement to Collective Awareness: The Journey of Children's Environmental Learning

4.1 Introduction

The previous chapter showed how the Aksiku project adapted to remote participation during the COVID-19 pandemic. In this new context, children were encouraged to explore environmental issues from home, using digital tools to investigate and reflect on their interconnectedness with broader ecological contexts. The shift to online learning led to the creation of 'missions' that prompted children to think critically about their everyday interactions with both human and nonhuman entities. Adopting a posthuman perspective, the project approached environmental education by positioning humans and nonhumans as equal actors in environmental processes. To bring this perspective into practice, the project's learning activities were designed to immerse children in the materials and spaces of their everyday lives during the pandemic. Activities included creating personalised house plans, analysing daily routines and resource consumption, as well as identifying environmental issues that resonated with them. The project encouraged children to map their relationships with nonhuman and material entities—such as energy use, waste, and ecological elements—through direct observation and reflection. As the following section illustrates, assignments like creating flow diagrams of consumption and evaluating the environmental impact of everyday household products (e.g., soap and clothing) helped children understand how nonhuman entities actively shape their environmental practices.

To explore how Indonesian children's involvement in environmental issues can be reimagined through a posthuman perspective, this chapter focuses on the socio-material dimension of environmental education. Drawing on the concept of posthuman knowledge production, it investigates how children's interactions with materiality shape their knowledge and participation in environmental issues. This chapter argues that engaging with nonhuman material is a crucial foundation for transformative environmental education, emphasising that these interactions are

integral to the empowerment process. It contributes to a posthuman framework of children's participation by demonstrating how children's everyday interactions with materiality shape knowledge production, revealing how power, agency, and transformation emerge through the dynamic entanglements between children and their environments.

This chapter engages with and extends key debates on children's environmental learning, political agency, and material interactions in learning. By integrating a posthuman lens, it demonstrates how children's web of research—encompassing human–nonhuman interactions—shapes their environmental knowledge, thereby expanding the discussion on environmental learning (e.g., Lundholm et al., 2013). Furthermore, this chapter enriches the body of work on urban environmental education (e.g., Russ & Krasny, 2017) by advocating the importance of recognising children's assemblages in learning and decision-making processes. It also advances existing debates on children's political agency (e.g., Pyyry & Tani, 2019) by illustrating how children's interactions with material realities drive meaningful social and environmental change. Building on discussions of children's political participation (e.g., Barratt Hacking et al.; Hayward, 2021), the chapter highlights how empowerment emerges through children's engagement with environmental education assemblages. Ultimately, it broadens the current understanding of how nonhuman interactions contribute to significant educational outcomes (e.g., Taylor, 2017) by providing empirical evidence of children's transformative engagement within the pandemic assemblage.

The following sections outline a pathway for reimagining the involvement of Indonesian children in environmental issues by examining the socio-material dimension of environmental education. The findings demonstrate how interactions between human and nonhuman entities within children's daily settings shape their environmental knowledge and actions. Ultimately, this chapter shows that children's critical engagement with their immediate surroundings fosters reflections on power dynamics.

4.2 Pathways to children's transformations and empowerment

4.2.1 Immersing in material contexts

This section explores how nonhuman entities within children's daily environments shape their perception of their environmental impact. It shows how hands-on experiences with their immediate surroundings help children grasp the consequences of their actions on the environment. By engaging with physical resources and ecological materials, children develop a deeper awareness of their environmental footprint and their connection to broader ecological systems.

As part of the initial mission, children were encouraged to reflect on their daily routines and draw a diagram to map the products they consumed, where they come from, and where they are disposed of. Zed, for instance, considered activities such as showering, online schooling, eating, exercising, and doing household chores as he reflected on the environmental impact of these actions. During a group discussion, Zed shared his observations.

> First is food consumption. It must be acknowledged that my family and I still consume foods containing animal protein. Meat is still a dominant choice, even though we also eat vegetables every day. But we also eat meat daily, like chicken, beef, or eggs, and so on. And this definitely has its own impact on our Earth, affecting the carbon cycle, which if we investigate further, impacts global warming. Then, of course, studying from home means online learning, and we need the internet. The internet itself uses electricity. So, the more we use the internet, the more electricity we consume. So, during the pandemic, since we are often at home and my mother, who is a teacher, teaches from home, there's definitely an increase in electricity use. But most of the electricity still uses coal resources, which are obtained through mining activities that, regrettably, are not beneficial for the environment. How people pay attention to the safety of the surrounding environment is still minimal. Therefore, the more electricity used, the more coal resources are needed, which encourages mining activities to continue. And coal is not a renewable resource. Next, about taking a shower… this is what I realised the most after doing this mission. Because, when you think about it, soaps, shampoos, and other cleaners contain chemicals, and these chemicals have an unfavourable impact on the environment (Zed, Online Focus Group 3, 24 October 2020).

Zed connected higher electricity usage to increased coal demand, leading to intensified mining activities and environmental degradation. He understood that as electricity consumption rises, so does the demand for coal, which perpetuates a cycle that harms the ecology. His observation of the chemicals in hygiene products reflected a nuanced understanding of how everyday activities contribute to environmental problems. As he reflected on his family's daily habits and their environmental implications, Zed developed a strong awareness of how lifestyle choices are interconnected with environmental health.

The children's observations and reflections on their lifestyle choices led to a heightened awareness regarding the broader ecological impacts of their material practices. These insights fostered a critical understanding of how everyday actions contribute to environmental issues. Marina, Qira, and Nadia, for example, reflected on the interconnectedness of personal choices and their environmental consequences. Marina shared her concerns about the water consumption involved in clothing production, stating, "The first thing that really concerns me is the praying clothes (*mukena*) [and] every piece of clothing in my closet. In its production process, it consumes several thousand litres of water. Then just imagine, [if] one piece of clothing takes up 2,700 litres of water, how many litres of water were used [to produce the whole closet]. I just realised it could consume that much clean water. Next, the use of plastic in every product, like makeup [and] skincare as well. So, that's what really concerns me" (Marina, Online Focus Group 1, 22 October 2020). Marina's reflection revealed her newfound understanding of the significant environmental footprint of the fashion industry. Building on this discussion, Qira and Nadia highlighted the environmental impact of menstrual products. They acknowledged the consumption of water, plastic, and sanitary pads associated with their menstrual cycles (Online Focus Group 1, 22 October 2020). Their discussion brought attention to a topic that is often overlooked in environmental conversations, highlighting how personal health and hygiene practices also play a role in sustainability. Overall, these reflections demonstrated the children's growing awareness of how their personal

choices—from clothing and personal care to health and hygiene—are interconnected with broader environmental impacts.

The findings provide specific examples of how the entanglements between Zed, Marina, Qira, and Nadia, along with nonhuman actors and material conditions, co-produce an evolving understanding of environmental issues. Children's insights emerge from relational processes that connect their daily practices with the nonhuman world. Their interactions with food, electricity, personal hygiene, and clothing production are not isolated choices but are always enmeshed within broader assemblages of carbon emissions, resource depletion, and pollution. Through these interconnected experiences, children develop a deeper understanding of how their actions contribute to the broader context of environmental health.

Two studies provide valuable insights into how children's entanglements with materials shape their knowledge: Tammi's (2020) study on mould and Kraftl et al.'s (2022) study on plastic objects. Tammi explores how mould in Finnish schools acts as a nonhuman agent that disrupts daily routines and reconfigures children's relationships with their surroundings. As children experienced discomfort from mould exposure, they began to identify symptoms, avoid certain areas, and share these embodied experiences with peers—developing ecological awareness grounded in lived, sensory encounters. Mould, as an adaptive organic entity, responds to human-made conditions like temperature and ventilation, reflecting broader human-centric decisions and their ecological consequences. Its persistent presence reveals how policy choices—such as funding and standardised school design—overlook local environmental conditions, making schools more susceptible to dampness and contamination. Tammi's approach emphasises how human assemblages are intricately intertwined with larger ecological systems, often going unnoticed but exerting significant influence. Therefore, applying a post-anthropocentric lens to environmental education, as suggested by Tammi's study, enables children to critically reflect on their relationship with organic entities within the larger environmental system. By examining the forces that shape the presence and behaviour of these entities, children can develop a deeper understanding of their

planetary interconnectedness. My observations reveal this dynamic. For example, Zed's reflections on food consumption led him to recognise the ecological impacts of dietary choices. His engagement with these organic entities, such as meat and its role in the carbon cycle and global warming, serves as a practical example of how organic entities are instrumental in shaping children's environmental consciousness. By tracing how living organisms interact with and influence ecosystems, Zed exemplifies the intricate network of interactions that shape environmental knowledge.

Kraftl et al.'s (2022) study, meanwhile, highlights how everyday interactions with mundane materials, such as plastic objects, can be pivotal for children's ability to grasp broader environmental issues, such as pollution. Unlike living entities, plastics are inert and inanimate; yet, their agency lies in their durability, widespread presence, and resistance to decay. Building on this, my observations highlight how children's interactions with everyday inanimate objects—such as the makeup and skincare products mentioned by Marina and the menstrual products discussed by Qira and Nadia—offer valuable insights into how a broader array of daily practices connects to the environmental impact of human lifestyles. These encounters, therefore, act as conduits for environmental education, in which embodied interactions with material assemblages are key to developing a nuanced understanding of environmental knowledge (Kraftl et al., 2022). Moreover, Marina's raised awareness of the environmental footprint of her wardrobe highlights how sensory encounters with personal belongings—another form of inanimate everyday objects—can spark critical thinking about environmental relations. Her realisation regarding the water-intensive processes in the fashion industry underscores the educational potential of everyday encounters with inanimate objects in nurturing a critical and informed environmental mindset among children. These non-living entities shape children's perceptions by integrating into their daily routines and consumer cultures, prompting reflections on waste, sustainability, and the broader implications of consumption.

Children's subjectivity emerges through their interactions with the environmental assemblage, where their identities are shaped by engagements with material,

ecological, and technological elements. Zarabadi (2022) illustrates how a child's co-produced reflection with the watery assemblage—encompassing the entanglements of water with bodies, spaces, and experiences—shapes their understanding of personal identity. This concept is particularly resonant in my thesis, where children's daily environmental assemblages—comprising interactions with materials, ecology, technology, and routine practices—form a fabric of experiences that influence their understanding of and relationship with the world. For example, in the case of Zed, daily observations and reflections on electricity consumption, online learning, and the use of hygiene products embody a nuanced understanding of environmental impact, serving as a channel for him to articulate his environmental identity. These assemblages offer a lens through which children like Zed perceive and articulate their positions and roles within the broader environmental process. This finding underscores the importance of environmental education in embracing children's diverse, everyday experiences and recognising the contributions of nonhuman entities to children's environmental identity formation (Bazzul & Santavicca, 2017).

Rather than treating nonhuman materials—such as water, soil, air, food, and waste—as passive background elements, learning should encourage children to recognise them as active participants in shaping their environmental awareness. This perspective shifts the focus from isolated individual actions to broader assemblages of practice, where both human and nonhuman elements interact to shape environmental engagement. The concept of "distributed agency" proposed by Bennett, J. (2005) and expanded by Strengers et al. (2016) emphasises the idea that agency—or the capacity to act—does not reside solely with humans but is distributed across a network of human and nonhuman actors, particularly in environmental practices. This perspective shifts the focus of learning from individual behaviour toward a deeper understanding of how human actions are entangled with material and broader systemic forces. For instance, when Zed examined his routine activities and their environmental implications, the concept of distributed agency suggested that the environmental impact was not just a result of his actions alone. Instead, it was the product of the collective interactions between Zed (human) and the various

nonhuman actors, such as electricity-consuming devices and online schooling policies. This perspective allowed Zed to see his online schooling as part of an "assemblage of practice" (Strengers et al., 2016), involving human actors (Zed, his family), nonhuman actors (technology, electricity, internet infrastructure), as well as broader societal norms and policies. This assemblage influenced and shaped the environmental impact of his daily routine. Similarly, when Marina discussed her reflections on the water consumption aspect of clothing production, she realised that her environmental impact extended beyond her role as a consumer. The distributed agency perspective allowed her to consider the broader network of actors involved in her clothing choices—from the manufacturing processes to the marketing strategies that shape consumer behaviour. Marina began critically observing advertisements and fashion trends, identifying how these messages maintain unsustainable consumption cycles and the pressure to constantly buy new items. This critical awareness helped shift her understanding of environmental responsibility—from isolated consumer acts to entanglement within a larger socio-economic system driven by corporate interests. By recognising the distributed nature of agency, children like Zed and Marina developed a more nuanced view of environmental responsibility, one that integrates personal reflection with an understanding of structural conditions. This perspective is crucial for children because it moves them beyond the idea that environmental responsibility lies solely in individual behaviour, such as recycling or conserving water. By recognising how their choices are shaped by broader systems—like mass production, advertising, and consumer culture—they begin to understand the need for collective action and systemic change.

In some interviews and discussions, children also referenced certain aspects of religious knowledge regarding ethical environmental practices. For instance, during a podcast created as part of an Aksiku assignment—where children were encouraged to express their reflections through creative media—Qira connected her environmental concerns with her sense of piety. She said, "We literally live in this world on loan from God Almighty. God has given us everything; has given us one Earth, one planet for us to live on, but we are destroying it. We are ill-mannered. I

am so embarrassed" (Qira, Online Focus Group 13, 25 November 2020). Her perspective framed the environment as a 'loan from God.' Similarly, Nabil described an exploitative and damaging relationship with the environment as sinful (Nabil, Online Focus Group 13, 25 November 2020). These reflections reveal an interesting dimension to my thesis: the intersection between children's environmental awareness and their religious beliefs. Children like Qira and Nabil voiced how religious and ethical considerations informed and motivated their non-exploitative relationship with the environment. These findings highlight the role of religious values in shaping children's post-anthropocentric perspectives, an area that remains underexplored in existing scholarship.

In light of Hasse's (2020) concept of "preceding learning," this thesis underscores the crucial role of pre-existing religious beliefs in shaping children's environmental consciousness. Prior knowledge and cultural backgrounds—particularly within religious contexts, as illustrated by Qira and Nabil's reflections—serve as foundational influences on how children perceive and engage with environmental issues. This aligns with studies of Indonesian Muslim environmentalists by Nilan (2021) and Koehrsen (2021). However, a notable tension emerges when contrasting this with new materialism theories that prioritise the tangible and material aspects of existence over metaphysical or religious frameworks (Braidotti, 2016). In Bandung, children's material relations with the environment often intersect with, and are sometimes guided by, metaphysical realms. My findings reveal that children's religious beliefs not only coexist alongside their material engagements but also actively inform them. Chapter 6 will delve deeper into how religious beliefs and practices influence environmental advocacy, suggesting a more complex, multidimensional approach to understanding environmental education.

In summary, nonhuman elements play a critical role in shaping children's environmental perceptions. Everyday materials—both organic and inanimate—alongside daily assemblages, provide tangible entry points for children to connect with broader ecological processes, deepening their understanding of environmental interdependence. A post-anthropocentric lens offers a critical perspective to examine

power relations between humans and nonhumans, revealing hidden forms of environmental oppression. These insights add layers to children's personal identities, which are both shaped by and actively shape their subject positions within environmental processes. Furthermore, children's relationships with nonhuman elements are often mediated by religious and spiritual beliefs. These perspectives influence how they perceive and engage with ecology, reinforcing an interdependent view of environmental participation that extends beyond secular frameworks.

Overall, this section contributes to a broader discussion on material interactions in learning by illustrating how they can lead to significant educational outcomes. Empirically, it builds on Taylor's (2017) common world pedagogies and extends Lock's (2019) work by demonstrating how children's direct, embodied interactions with material—including built infrastructures, ecological materials, waste, digital technologies, and objects—actively shape their ethical understanding and learning experiences. By advocating an integrated material approach to environmental education, this section challenges human-centred pedagogical models and argues that knowledge emerges through relational engagements with nonhuman materials. This section further extends research on children's agency within heterogeneous assemblages (e.g., Gallagher, 2019; Holloway et al., 2019) by incorporating religious and spiritual dimensions. It highlights that children's assemblages are not only material and discursive but also spiritually mediated, introducing a new layer of complexity to discussions on posthuman childhoods.

4.2.2 The social aspect of research and information-gathering

This section investigates how children's social contexts shape their environmental knowledge. It focuses on the roles of social media, the internet, peers, and adults in supporting research and information-gathering. By highlighting the interplay between these human and nonhuman influences, this section demonstrates how children's environmental knowledge is constructed and enriched, emphasising the interconnected nature of environmental education from a posthuman perspective.

Social media and the internet

Children explore a wide range of digital sources, including the internet and social media, to gather information. Rafi, for example, shared how he used online resources to research his topic on reducing consumption.

> Initially, the source I mainly used was my parents. But sometimes I was not really satisfied with their answers. Then, I turned to other sources like the internet. I looked up what experts say on the internet... Like during a certain mission [when] we were asked to interview experts [about] the topic we chose. I was looking [on the internet] for topics about reducing usage patterns but couldn't find any [satisfying finding]. So, I searched for anything related to usage patterns. Then I found articles saying that human needs are basically divided into primary, secondary, and tertiary [needs]. That's where I got my thoughts out. So, it means that among [our] primary, secondary, and tertiary [needs], we have to prioritise the most important ones. That's one way to reduce usage patterns (Rafi, Online Focus Group 14, 14 December 2020).

Rafi began his research with a mix of curiosity and frustration, as indicated by his inability to find immediate and direct information on his topic. However, the internet eventually led him to discover the concept of categorising human needs, which provided him with a sense of clarity.

Faris described his experience of finding interview contacts for his research on paper waste. He eventually turned to Twitter to find individuals who could provide the information he needed. He referred to a 'base'—a community or platform where people with similar interests gathered. He explained, "It was complicated for me to find people, make contacts [online]. And finally, I found them on Twitter... I asked the base [if] anyone was willing to be interviewed about this topic that I raised, how to increase awareness on the importance of conserving paper. There were many comments, I only took two that were related and I did interviews" (Faris, Online Focus Group 14, 14 December 2020). Although Faris was aware of this Twitter base before joining the Aksiku project, he only recently started engaging with it for his research. His research assemblage included an interview mission, the use of Twitter, the online community, and the interviewing processes. His experience highlighted the affective movement of conducting research—navigating digital spaces, building connections,

seeking information, and solving problems. The mission prompted him to engage with others, while the online platform provided him with the resources to pursue his mission, and the interviewing processes facilitated the exchange of ideas and information.

Other examples of similar processes include Nuri's investigation into the environmental impact of everyday detergents. Her research led her to discover natural alternatives to harsh chemical components, sparking excitement about making soap using organic materials. Marina delved into the significant environmental footprint of the fashion industry, focusing on wastewater and the fast fashion phenomenon. Her reflection culminated in the need to combat human greed and promote mindful consumption. Nabil researched alternative energy sources, such as wind, water, and nuclear power, critically analysing their potential and limitations. His findings emphasised Indonesia's heavy reliance on traditional energy sources, such as coal and petroleum, while advocating for energy conservation. Meanwhile, Nadia's investigation into plastic waste in Indonesia led her to conversations about the power of individual awareness and how small actions can collectively make a significant impact in tackling plastic pollution.

The findings illuminate how children's interactions with digital technologies contribute to their environmental knowledge, showing that a deeper understanding develops through relational processes. These insights reveal a range of digital practices, from conducting internet searches to engaging on social media, demonstrating how digital platforms act as vital resources for gathering information and building connections. Additionally, the findings show the mutual influence between digital tools and human users in shaping children's understanding of environmental issues.

Peers, family, and experts

Children often sought out peers for different perspectives and insights, especially friends who share the same interests. Zed, for example, reached out to Ibrahim, a

friend with experience in digital media, to learn how to use electricity more efficiently —especially given the high energy demands of digital activities.

> One of my resource persons is this friend from a different school. He is very active in digital media, likes editing, making videos, and of course, it will consume a lot of electricity. From the discussion, it turns out that he thinks that using electricity efficiently does not mean that we reduce [use electricity below] our needs. Because we have work to do with digital media that requires electrical energy. If we limit our activities, will it be efficient? He chose the definition that electrical energy efficiency is not reducing, but using electricity according to our needs (Zed, Online Focus Group 10, 11 November 2020).

Zed also sought advice from Sarah, a senior student studying at the Faculty of Mathematics and Natural Sciences.

> I can draw a conclusion that reducing the impacts of [utilising] electrical power can be done in simple ways, like using it according to our needs [and proportional to] our activities. For example, if we leave a room, we turn off the light, that's according to our needs. Also, it can also be through ways that involve researchers, the government, and the community, which is the creation of alternative resources obtained from innovative technology created by expert researchers (Zed, Online Focus Group 10, 11 November 2020).

Through this research assemblage, Zed expanded his understanding of using electricity based on personal needs and began exploring alternative energy sources.

When selecting an interviewee for her research on reducing plastic waste, Nadia shared her thought process. She chose a peer whom she considered both intellectually capable and a strong communicator. She described her friend, saying, "[She is] really smart. I thought her answers would be correct, appropriate. Because she's really good at speaking, smart overall" (Online Focus Group 10, 11 November 2020). Nadia believed this choice would lead to insightful responses, as the interviewee could understand her questions and engage meaningfully in the online interview (Online Focus Group 10, 11 November 2020). She also considered how some people might be more articulate and engaged in offline settings compared to

online interactions. Her approach suggested a thoughtful consideration of the interviewee's potential to contribute effectively to her research. However, Nadia and the other children also acknowledged the limitations of relying solely on peer discussions, highlighting the need to consult reliable sources and remain aware of the strengths and weaknesses of different information-gathering methods.

> Qira: From the research that you [did], starting from the internet, asking experts and relevant people, which was the most useful for you [to execute environmental action]?

> Nabil: What satisfies me the most is asking friends. But it can be difficult to [ask them] concrete questions because it's not within their capacity. [That is when I turned to] the internet and my uncle, who is an expert, for gaining satisfying information (Online Focus Group 10, 11 November 2020).

Nabil began his research on electricity usage by combining online research with discussions with peers and knowledgeable individuals. While he found peer discussions helpful, he noted their limitations in providing in-depth and technically accurate information, reflecting his critical approach to gathering knowledge. Similarly, Kara acknowledged that, as a high school student, her understanding of complex topics was understandably limited.

> But the dissatisfaction comes from the limitations of [my] knowledge. If I ask peers, who are of the same age, their knowledge [about alternative energy sources] usually leads to answers like hydroelectric power (PLTA). And if I ask how to save electricity, their answers are still too superficial. For example, turning off the lights during the day and at night unplugging the socket. I think that's still too basic (Kara, Online Focus Group 10, 11 November 2020).

Although peer interactions offered some value, they did not fully satisfy her quest for in-depth knowledge, reflecting a gap between her expectations and the information received. To bridge this gap, Kara reached out to an electrician for a more thorough understanding of good electricity usage practices. Her conversation with the

electrician provided her with detailed information on the practical considerations for managing electricity efficiently.

> I spoke to an electrician. I asked him what good electricity usage looks like from an expert's perspective. He said that the voltage used should match the electrical appliances being used. The electrical equipment should not exceed the available electrical power, and the use of electrical devices should also adhere to national standards (SNI). Electricity utilisation should also consider safety in terms of usage. I also asked about common electrical problems, which are usually fires caused by electrical short circuits. Incorrect cable connections or electrical installations can lead to such issues. So, from there, I learned that using electricity properly isn't just about turning off lights during the day. I learned that electrical issues are not just about lights going off during rain; there's more to it than that (Kara, Online Focus Group 8, 4 November 2020).

Kara combined online research, practical evaluations of electricity-saving devices, and expert consultations to obtain a well-rounded understanding of energy efficiency and its practical implications.

The findings delve into how peers, family, and experts influence children's environmental education assemblage. It highlights the critical role of social settings in shaping their comprehension of environmental issues and guiding their actions. The experiences of Zed, Nadia, Nabil, and Kara illustrate how their environmental knowledge and practices evolve through these interactions.

Various related networks

When discussing environmentally friendly cleaning products, Dira shared how her Google search led her to discover local stores selling environmentally friendly soap. She chose to promote one particular store because of its affordability. Arif, who had experience in making natural soap, contributed a practical perspective to the conversation.

> Actually, at a chemical analyst practicum once, we tried to make soap. It's less foamy. The colour is also not as attractive [compared to other commercial soaps on the market]. Is this really soap? Maybe people's

> perception is that soap is something that creates a lot of foam (Arif, Online Focus Group 12, 4 November 2020).

His hands-on experience in producing and selling eco-friendly soap provided valuable insights into the characteristics and feasibility of such products, enriching the group's discussion with his embodied knowledge.

These findings collectively highlight how children's research assemblages emerge through the dynamic entanglement of peer interactions, digital mediation, expert consultations, and past experiences. First, their engagement with digital platforms illustrates how environmental knowledge is co-constituted through fluid exchanges between children and digital sources, where both actively influence and reshape one another. Second, their interactions with peers, family, and experts emphasise the relational nature of knowledge production, as children negotiate perspectives and refine their understanding through these exchanges. Finally, Dira and Arif's discussion underscores how past experiences become entangled with present information-gathering, demonstrating how knowledge is continually reconfigured through lived interactions.

Spyrou (2018) argues that children's participation in research is not just about involvement but a transformative practice that generates unique and profound knowledge. This transformation is not solely driven by children's cognitive processes but emerges through their entanglements with material and nonhuman entities throughout their research journey. The cases of Rafi, Faris, Nuri, and Marina illustrate how their interactions with digital platforms, social media interfaces, peers, and experts actively shape the way environmental knowledge is produced and reconfigured. These entanglements influence their information-seeking, interpretation, questioning, and recontextualisation, which leads to the creation of situated knowledge that is both distinct and rich in depth and perspective. As outlined by Genat (2009), Participatory Action Research (PAR) emphasises knowledge production grounded in the participants' lived experiences and perspectives. However, by recognising research as an assemblage, this study extends PAR beyond

human-centred approaches, illustrating how children's knowledge production is materially grounded. From Rafi's deep exploration of digital resources to understand consumption patterns to Faris' use of social media to connect with interviewees, these cases exemplify how children actively co-produce knowledge through their entanglements with various actors and technologies.

Furthermore, studies by Douglas (2016), Rees et al. (2016), and Aitken et al. (2016) highlight how children's participatory research fosters a unique understanding of environmental issues. Rather than passively receiving knowledge, children actively engage in inquiry, formulating questions that emerge from real-world contexts and personal curiosities. This process is facilitated by diverse qualitative methodologies such as internet research, peer discussions, and expert consultations, demonstrating the efficacy of children's research methods (Barrat Hacking et al., 2012). However, this active inquiry is not solely human-driven. For example, Nuri's investigation into organic soap production is shaped by her interactions with material elements—such as ingredients, chemical reactions, and production techniques—which influence her knowledge pathways. Similarly, Nabil's exploration of alternative energy sources unfolds through his digitally mediated entanglement with the material properties of energy systems, where wind and hydro turbines, as well as nuclear reactors, actively affect his understanding of renewable energy. These examples illustrate how nonhuman entities—ranging from chemical compounds and digital platforms to energy infrastructures—play an active role in shaping what knowledge is produced and how it circulates. This reinforces how children's research assemblages co-produce situated environmental insights, leading to a diverse environmental perspective among children.

In summary, this section emphasises the relational and entangled nature of children's Participatory Action Research (PAR), where knowledge is co-created through diverse human and nonhuman interactions. Children's participation in research does not simply democratise knowledge production in a human-centric sense. As active agents in knowledge co-production, children are influenced both by personal curiosity and by their ongoing, situated encounters with the world around them.

This section contributes to the broader argument by articulating how a network of research interactions shapes children's environmental knowledge. Drawing on Hopwood (2007), it illustrates how children's lived experiences within their material and social contexts influence their understanding of environmental issues, emphasising the significance of everyday encounters in research activities. Additionally, it extends Lundholm et al. (2013) by shifting the focus from individual student-teacher interactions to a more expansive research assemblage, where environmental knowledge emerges through distributed, relational entanglements rather than hierarchical learning relationships. By applying a posthuman lens, this study reveals that children's interpretations of environmental problems are not purely cognitive but are dynamically shaped by their interactions with both human and nonhuman elements, positioning research methods as active mediators in knowledge production.

4.2.3 Transformative learning experiences: Children's interconnected process of change

This section examines how learning emerges within children's environmental education assemblages, demonstrating how their learning processes evolve from basic environmental awareness to a deeper understanding of complex ecological interconnections.

Shifting personal understanding

Nabil, for example, realised through his engagement with environmental assemblages that environmental discussions extend beyond what he learns at school. He acknowledged that environmental practices are not limited to separating waste and maintaining cleanliness (Online Focus Group 14, 14 December 2020). Similarly, Kara reflected on how her learning experience equipped her with the analytical tools to grasp the complexity of environmental issues. She noted that her previous understanding was limited to simple concepts, but her learning journey expanded her perspective to include not only physical environmental actions but also the interconnectedness of different aspects.

> Kara: …previously my [environmental knowledge] was based on school textbooks, like planting trees, and the [learning] material was too superficial. After [participating in this programme] I know [that environmental issues are] definitely broader. I can explore much more than before.
>
> Shinta: What is an example?
>
> Kara: I can, for example, explore the roles of the internet. The main point is the environment, but its reach is far beyond that, more than merely the environment (Offline Focus Group 16, 27 November 2020).

Kara's reflection points to the crucial role of internet in shaping how young people engage with environmental issues. Through online discussions, digital contents, and blogging practices, her understanding evolved beyond everyday habits to encompass broader questions about social, technological, and political entanglements. Her insights that "it goes beyond just the environment" signals an important shift in learning process—one that connects the environmental concerns to broader interconnected issues. Similarly, Zed reflected on how his perspective evolved through learning. He realised that everyday actions can also have significant environmental impacts. His reflection showed that learning extends beyond moral shifts; it also encompasses the ways in which materials, chemicals, and everyday consumption practices shape his awareness.

> I initially felt negligent, seeing that the environment is limited to common things, for example, throwing garbage in the river can cause flooding. I never thought that, for example, the soap we use to clean our bodies could have a less beneficial impact on the environment (Zed, Online Focus Group 10, 11 November 2020).

These examples illustrate how learning emerges through entangled relationships between children, materials, technologies, and broader environmental assemblages. Rather than acquiring knowledge in isolation, Nabil, Kara, and Zed's learning experiences unfold through their engagements with nonhuman entities, infrastructures, and discourses. Their experiences demonstrate how environmental knowledge is co-produced within these assemblages. These assemblages co-

constitute children's transformation, shifting their understanding from a simplistic and isolated view of environmental issues to a more integrated perspective.

Other transformative learning experiences related to environmental responsibility were shared by Haris, Arif, and Faris. Haris described a significant change in his perspective, transitioning from a self-centred viewpoint to considering the needs of future generations (Online Focus Group 14, 14 December 2020). This shift highlights a shift towards a collective understanding of environmental responsibility. He contrasted this with his regular school experience, emphasising the value he now placed on developing critical thinking and informed perspectives, which he found lacking in his previous experience (Online Focus Group 14, 14 December 2020). Arif reflected on his personal contribution to waste problems, acknowledging a contradiction between his role in the school's environmental ambassador programme and his own consumption habits (Offline Focus Group 20, 28 November 2020). This realisation points to a deeper understanding of the broader implications of waste and his personal accountability. Faris, initially believing that environmental concerns were beyond his responsibility as a high school student, recognised through his learning that age should not be a barrier to taking action (Offline Focus Group 17, 28 November 2020). His insight challenged age-related stereotypes and promoted a more inclusive view of participation in environmental efforts.

This finding illustrates how children's understanding, beliefs, and values regarding environmental issues have transformed. Through interactions with both human and nonhuman entities, reflective practices, and active discussions, they have moved beyond basic awareness to a more nuanced understanding of the interconnected factors shaping environmental issues and their own capacity to make a difference, which will be elaborated further in the next section.

Changing the self and inviting others

One way children responded to their growing environmental awareness was by translating it into everyday actions—starting with small, personal behavioural changes and gradually influencing those around them. These actions were often

driven by emotional and ethical reflections, shaped by their deepened understanding of human–nonhuman relationships. The following account illustrates how such reflections can prompt meaningful personal transformation.

> For a bigger environmental [initiative], I'm not ready. [So, I started from the] daily habit of saving paper. [I began to develop the feeling] that I didn't have the heart [to waste paper]. It's because the trees and I, we're both living creatures. I don't think I can bear [to take them for granted] (Faris, Offline Focus Group 17, 28 November 2020).

Faris's learning process emerged from his entanglement with paper and trees, where his emotional connection to trees developed through direct engagement with the materiality of paper. His emotional response was a mental construct that materially affected his behaviour, leading him to adopt a personal environmental initiative—to conserve paper by using it thoughtfully and minimising waste. Importantly, trees and paper were not passive objects in this process but active agents in shaping his environmental ethics.

Raina's change in electricity usage reflected a shift in her awareness and behaviour.

> I feel now my electricity usage has become more efficient. Before, I hardly thought about electricity usage. For instance, the light in my room was rarely turned off, even during the day, it could be on for two full days. But now it's not like that anymore. Even if it's night and I'm not in the room, I turn off the lights because it's wasteful otherwise. And about chargers, now when I'm done charging and it's full, I unplug the charger along with the charger head from the socket. Also, regarding the bathroom, now I feel like I'm often nagging. I just like to remind everyone. For example, if my sister comes out of the bathroom and doesn't turn off the light, I don't turn it off for her. Instead, I call her to do it herself. Even though I can do it for her, I prefer for her to do it so it becomes a habit (Raina, Online Focus Group 6, 5 November 2020).

Raina became more mindful of her electricity use, resulting in tangible changes in her daily habits, such as turning off lights and unplugging chargers. She expressed feeling wasteful, indicating an emotional response to unnecessary electricity consumption. Her emotional response materially affected her behaviour, leading to more conscious

actions regarding energy usage. Raina's awareness extended beyond her personal actions, gradually influencing her family's habits and contributing to a larger pattern of energy conservation within the household.

Some children took their environmental advocacy beyond their homes. For example, Dira created and shared a post on Instagram promoting environmental care while also endorsing a small local business that produces environmentally-friendly soaps (Online Focus Group 18, 27 November 2020). She specifically chose this seller for its affordability compared to similar businesses. Meanwhile, Zed designed a campaign poster encouraging the conservation of electricity.

> Zed: Behind the house of Neighbourhood Head (the lowest administrative division of Indonesia, in Indonesian: *Rukun Tetangga*/RT) is a stall, a lot of people [come] to shop or to buy food. [The house is strategically located] near the entrance [of the housing complex]. So, it is on the main road and is often passed by people [to access] the other complexes. I think that's one of the ideal spots for me to put the poster.
>
> Shinta: What outcomes do you expect?
>
> Zed: I hope that they will read it. Because, when a hundred people read [it], probably not all of them will be immediately aware, but maybe there are five people [who will be aware], then there will be twenty more people, and so on. Thus, I also hope that the people who become aware of it [would] remind the people around them. Then the impact will grow (Online Focus Group 10, 11 November 2020).

Both Dira and Zed's actions, whether through social media or physical posters, demonstrated a desire to influence others on environmental issues. Dira's decision to support and promote a small eco-friendly business based on affordability indicated an intersection of economic and environmental considerations. Her use of Instagram positioned her within a digital-material assemblage that mediated her environmental advocacy. Additionally, Zed's strategic placement of his electricity-saving poster demonstrated his understanding of the local environment and social dynamics that materially affect his chosen action. By selecting a location with high visibility, he believed he would maximise the reach of his message. These actions emerged from

distinct assemblages, each extending beyond personal action to contribute to broader community change.

Qira's perspective provides insight into how she engages with and is influenced by other elements in her assemblage. In her podcast, she reflected on her environmental concerns through the lens of everyday consumption, focusing on the issue of ecologically-friendly products. Qira defined eco-friendly products as those made from materials that are not harmful to the environment. She also considered the longevity and reusability of products as criteria for being eco-friendly (Online Focus Group 13, 25 November 2020). By highlighting the importance of products that last longer and can be reused, she emphasises reducing waste and consumption. Qira used the example of menstrual cups to illustrate her point, comparing them with sanitary pads to demonstrate how a reusable product (menstrual cup) can be more eco-friendly than a single-use product (sanitary pad). Qira emphasised the importance of education in raising environmental awareness.

> [To effect change], the most important thing is education. So, I was thinking about creating some kind of social organisation for [environmental] education because I think people out there really lack education. And about eco-friendliness, people won't know [its urgency] if there is no education. […] So, when people are informed, and then consumer demand also increases, maybe factories and entrepreneurs will also try to find out how to make eco-friendly products more in demand by consumers (Qira, Online Focus Group 13, 25 November 2020).

By prioritising education, Qira sought to address a lack of awareness and understanding as the root cause of environmental issues. Her perspective on consumer demand and production practices demonstrated her understanding of how economic systems intersect with environmental concerns. She believed that informed consumers could drive market demand for eco-friendly products, which, in turn, would encourage manufacturers to adopt more sustainable practices. She also identified accessibility as a major barrier, stating, "Many eco-friendly products are expensive or hard to get. I want [products] that are already eco-friendly to be easy [to get], even in *warung*" (Qira, Online Focus Group 13, 25 November 2020).

*Warung*s*,* a type of small family-owned retail business, are an essential part of daily life in Indonesia. By advocating for eco-friendly products to be available at *warung*s, Qira envisioned a society where sustainability is embedded in everyday consumption. She further discussed this idea through her podcast, using digital platforms as a tool for environmental advocacy.

> I immediately thought of making a podcast because I often listen to podcasts, which can be about anything—politics, current issues, history, stories, etc. I noticed that there are not many podcasts about the environment. I think it would be interesting to discuss. I feel moved when I listen to podcasts, like 'Oh my God', you know. I feel that people nowadays think they are cool when they listen to podcasts. So, if they are moved by it, they might act on it (Qira, Online Focus Group 13, 25 November 2020).

Through her podcast, Qira sought to leverage the accessibility and popularity of digital media to educate a wider audience about environmental issues. Her learning emerged from an assemblage of interconnected elements, including her environmental concerns, a digital platform, public education, consumer behaviour, production practices, and the role of local businesses in Indonesia. This assemblage shaped her approach to environmental action.

Expanding towards wider action, several children expressed the idea that environmental movements are not isolated but interconnected with the internet and information technology (Online Focus Group 13, 25 November 2020). Given that environmental issues are global, some children considered English-language skills to be crucially important to support their engagement. Kara expressed this view, stating, "Environmental issues are not just in Indonesia or Asia. So, I should be able to know about problems in other countries compared to ours, for example, waste. So, English is indeed one of the ways for me to gain insight from outside" (Kara, Online Focus Group 13, 25 November 2020). Their expanding understanding of environmental issues influenced their thinking and actions. Increased global awareness motivated them to seek broader knowledge and participate in global discussions, further enriching their learning process.

These findings underscore the relational nature of environmental decision-making among children, illustrating how their engagements with environmental issues emerge through dynamic assemblages of human and nonhuman forces. Rather than being driven by isolated personal values, their transformation materialises through continuous social interactions and an increasing sense of global interconnectedness.

Navigating cultural contexts

Children's environmental decisions and actions are shaped by their broader societal and cultural contexts, reflecting the intricate micropolitical dynamics of their learning. This is evident in how they navigate ethical considerations within their sociocultural settings. For example, Nadia, Qira, and Safira discussed the use of menstrual cups as an environmentally friendly alternative to sanitary pads. In Indonesia, where formal education on sexual and reproductive health is often lacking, peer discussions provide a safe space for young women to explore these topics (Parker, 2016). Their conversation around Qira's interview findings highlighted the process of self-negotiation in adopting more environmentally ethical practices, such as transitioning to menstrual cups.

> Nadia: So, have you started thinking about wanting to use them?
>
> Qira: Yes, I've really been thinking about it. I've been considering it for a while, but I kept putting it off. After talking to [the interviewee], I really want to learn how to use it. I also feel that it's wrong to keep using pads, contributing to waste and plastic.
>
> Nadia: Yes, right. Like, you have to change them several times a day.
>
> Qira: Yes, exactly. Especially on heavy days, you have to keep changing them, and it feels like a lot of waste. Oh my gosh [my guilt] goes a long way.
>
> Sabrina: Some people say that the menstrual cup should be used later, like when you're older. But I found out that [the interviewee] is only one year older than me. [She is] not married yet [but] she has looked for information and started using a menstrual cup. It's interesting how she researched and finally decided to confidently use a menstrual cup.

> Qira: Yes. She also said that it took her a year to learn (Online Focus Group 8, 4 November 2020).

Within the cultural context of Indonesia, their discussion on menstrual cups challenges prevailing stereotypes about who can use them. This discussion is significant, underlining the deep connectedness between children's environmental actions and broader ideas, values, and norms. Qira, Nadia, and Safira—the facilitator—are all young, unmarried Muslim women under the age of 25. For Qira, considering the use of menstrual cups was part of her learning process. Her knowledge of the environmental impact of traditional sanitary products sparked her desire to switch to a more sustainable alternative. This decision was informed not only by knowledge but also shaped by an emotional response to her contribution to plastic waste. Additionally, her interviewee's experience with menstrual cups provided a crucial reference point and inspiration, showing how peer experiences influence children's decision-making and environmental choices.

The conversation reveals the intricate micropolitical dynamics within the environmental learning process, showing how actions and choices are influenced by and, in turn, influence broader sociocultural contexts. In Indonesia, cultural and religious norms around purity and femininity represent a form of stabilising force that dictates acceptable behaviour and choices for girls. Qira's initial hesitancy towards menstrual cups can be seen as her internalisation of these norms. As highlighted by Nilan and Mansfield (2013) as well as Saraswati and Beta (2021), Indonesian youth culture blends global influences—such as technology and consumerism—with traditional moral values and gender roles. This interplay affects how children, particularly girls, navigate their choices and behaviours. For Indonesian girls, empowerment is intricately linked to societal expectations of moral conduct. Qira's contemplation of using a menstrual cup is not just a matter of personal choice but a negotiation between new possibilities and established traditions. This negotiation is a common theme in the lives of Indonesian Muslim girls, who must balance their individual preferences with cultural and religious expectations (Saraswati & Beta, 2021). Her consideration of menstrual cups exemplifies her active agency—both

resisting and navigating dominant norms while recognising the complexities involved (Mahmood, 2011). Furthermore, the menstrual cup itself, as a nonhuman actor, disrupts entrenched norms and invites new negotiations, demonstrating how environmental learning is co-produced through material, cultural, and discursive elements.

Qira's potential adoption of menstrual cups and her discussions with her peers signified an act of breaking away from stabilising social norms to create new ways of being or thinking. Her decision is not just a personal choice but a political act that challenges dominant narratives about femininity and environmental responsibility. By exploring menstrual cups as an alternative, she engages in what Mannion (2020) describes as a "line of flight"—a break from existing human-environment relationships that opens possibilities for more sustainable ways of living. In Indonesian society, the dominant discourse places a strong emphasis on purity, virginity, and modesty for girls (Bennett, L. R., 2005). Menstrual cups, as an inserted product, are sometimes perceived as a threat to the hymen and, consequently, to the cultural expectation that women should preserve their virginity until marriage (Shaw, 2023). This perception can lead to resistance against menstrual cups despite their environmental benefits. Qira's engagement with this topic signals a shift in thinking—one that reflects both growing environmental awareness and a willingness to navigate complex cultural expectations. Her assemblage integrates menstrual technologies (Shaw, 2023), her personal values, waste, eco-friendly living, and sustainability. Through this assemblage, she negotiates both environmental ethics and gendered expectations, illustrating how environmental learning is deeply entangled with cultural and material realities.

In summary, Qira's exploration of using menstrual cups brought about new norms and practises as she developed a deeper understanding of her identity. Her experience illustrates how subjectivity and environmental engagement emerge through a dynamic assemblage of cultural, religious, and ethical environmental practices.

Creating change on a larger scale

On a larger scale, children's environmental actions are further influenced by their social positions and contexts, portraying their struggles and aspirations to find their place in the environmental movement. For example, Kara considered aligning her academic and organisational activities with her growing interest in environmental issues. She aspired to explore alternative energy innovations and organise educational events. Her involvement in the Aksiku project exposed her to a wider range of environmental issues and encouraged her to think beyond immediate behavioural changes toward larger systemic solutions. Through discussions, assignments, and peer collaborations, she was able to gain the confidence to articulate her views on these issues. Her article, 'Save Your Lights', which she published on her blog, reflects on increased electricity use during the pandemic and explores everyday strategies—such as energy-saving tools, scheduled usage, and alternative energy sources—to promote more sustainable habits. She also considered taking further action—such as initiating workshops to broaden her peers' perspectives on these issues—while also reflecting on whether her engagement would remain temporary or develop into a long-term commitment. These experiences marked a shift in Kara's engagement, moving from a previously limited interest to a more thoughtful and ambitious involvement.

> My initial interest [before participating in the Aksiku project] was far from environmental issues. But after [finishing the project], I realised how interesting it is. It's just that, right now, I still don't know how I can proceed. I will see in the future if I can finally form a new relationship. If I can open [other colleagues' way of thinking to be] open-minded. If I can bring them to create a workshop [and then initiate] a movement. I'm still thinking about it. [I also ask myself,] is this project just a one-time experience or will it go further? (Offline Focus Group 16, 27 November 2020).

Marina's concern with fast fashion and her desire to campaign against consumptive behaviour highlight her struggle to navigate the complexities of environmental activism. She expressed uncertainty about how to frame her campaign, recognising

fast fashion is also intertwined with global trends and employment opportunities. She did not know how to position herself regarding such complex issues.

> I like shopping for clothes, or [other fashion] items. Then [there are] people who work as fashion bloggers. They also buy clothes and give [style] advice. If I [campaign], please stop [shopping], while [the bloggers] are not only [trending] in Indonesia, they are trending in America, in Europe, [it is] just a lot. So, it's hard to raise awareness [about fashion]. [It is easier for me to campaign about bringing] tote bags [to reduce plastic waste], the government has already [started the initiative]. [Fast] fashion is just a difficult [issue] because there are people who make a living [from it] (Online Focus Group 6, 5 November 2020).

Marina also recognised the media's dual role in both promoting consumerism and serving as a platform for environmental advocacy. While the media can empower individuals to raise awareness and drive change, it also entraps individuals within a cycle of consumerism by constantly promoting new trends and products. Her reflections illustrate the challenges of advocating for sustainability within systems that simultaneously encourage and undermine such efforts. Ultimately, Marina's concern highlights the entangled nature of environmental activism, where ethical considerations, economic structures, and cultural influences intersect. This entanglement makes navigating and advocating for sustainable practices a complex task.

Most children expressed concern about public involvement in environmental issues. They felt that the personal dimensions of environmental problems were difficult to address. Arif, for example, struggled with raising awareness about the dangers of plastic waste, as its harmful effects are not immediately visible to everyone (Offline Focus Group 20, 28 November 2020). Similarly, Zed was unsure how to encourage people to seek information from multiple perspectives on environmental issues. He believed that new perspectives could help to raise people's awareness on various daily environmental issues (Offline Focus Group 17, 28 November 2020). Expanding on the topic of public engagement, Gavin stated the importance of organisational and communication skills in addressing the social dimensions of environmental issues (Online Focus Group 19, 21 December 2020). In line with Gavin, Kara said that

leadership skills are essential for driving change (Online Focus Group 14, 14 December 2020). Meanwhile, Haris argued that changes in environmental behaviour must be reinforced by social pressure (Online Focus Group 14, 14 December 2020).

Several children attempted to start conversations with their family members, including siblings, parents, and household assistants. They tried to provide input about the harmful effects of using plastics and certain soaps. However, they found that initiating change was not always easy (Online Focus Group 14, 14 December 2020; Offline Focus Group 20, 28 November 2020). Many felt unheard, their opinions belittled, or they struggled to influence long-standing household habits. As a result, they believed that change needed to begin with their own actions, hoping that their families would take notice and follow their example. These experiences illustrate the complexities of shifting everyday environmental practices within their immediate circles.

These findings illustrate how children's environmental decisions are shaped by their cultural contexts. It specifically focuses on ethical considerations and personal negotiations within these contexts. Through the conversation between Nadia, Qira, and Safira about menstrual cups, it demonstrates how societal norms and individual learning processes influence the adoption of environmentally friendly practices. Their conversation also demonstrates how subject formation in environmental education emerges through entanglements with environmental ethics, educational practices, and material-discursive forces.

Children's environmental learning is a complex process, deeply influenced by multiple interconnected factors. Illeris's (2007) concept of "situatedness in learning" emphasises that all learning is embedded within a specific context—both the immediate physical setting and broader societal structures. This is evident in Faris's shift towards conserving paper and Raina's increased awareness of electricity consumption, illustrating how direct interactions with their surroundings influence their learning. Moreover, the conversation between Nadia, Qira, and Safira regarding menstrual cups reveals how societal norms influence their learning towards ethical

decision-making. Similarly, Marina's reflections on fast fashion highlight the challenges of learning at the intersection of social, economic, and political forces. Social barriers further complicate the children's learning process, as some children expressed frustration about feeling unheard when discussing environmental concerns with their families. Their struggles reflect broader societal attitudes that often normalise environmental problems, as observed by Schlehe and Yulianto (2020). Ultimately, these examples demonstrate that children's transformation is influenced by an intricate interplay of material conditions, internal motivations, community norms, and the broader social landscape. Through learning assemblages, they actively navigate these influences as they transition towards meaningful change.

Children's transformation involves reflecting on their roles within their communities. Lave and Wenger's (1991) situated learning theory emphasises that learning extends beyond acquiring specific skills and knowledge; it is about becoming an integrated and contributing member of a "community of practice." For children, transformative learning includes understanding their place in society and how they can actively participate in their chosen communities. Dira, Zed, Qira, and Kara apply their environmental knowledge in different ways, integrating themselves into various communities of practice—be it local, digital, or professional. Dira's decision to support a local enterprise and Zed's campaign poster demonstrate how environmental learning goes beyond acquiring information, leading to active participation in local community initiatives. Similarly, Qira's podcast about eco-friendly products illustrates how she positions herself within a digital community, carefully considering her audience, particularly young people, and how best to engage them. Kara, on the other hand, reflected on how her environmental interests could align with her academic and career aspirations. In Indonesia, particularly in prestigious schools, there is a strong emphasis on early specialisation and planning for future educational and career paths (Parker & Nilan, 2013). Kara positioned her engagement with environmental issues as a strategic asset to enhance both her academic and professional profile, one that could distinguish her from her peers in both fronts. She viewed environmental concern—combined with communication

skills and critical thinking—as increasingly relevant qualities of leadership and readiness to enter the global professional community. These examples highlight how children's environmental learning intersects with becoming active and integrated members of their intended communities. The children in this study applied their learning in diverse ways—positioning themselves as local activists, digital influencers, and future professionals. They demonstrated that environmental knowledge is closely linked to the formation of social identity.

Children's use of social media and emphasis on English language skills to strengthen their engagement further exemplifies their aspirations to participate in global discussions, aligning with the concept of "virtual cosmopolitanism" (Sobré-Denton, 2016). Virtual cosmopolitanism emphasises how social media platforms provide opportunities for individuals to engage in digital community-building and participate in communication that fosters global citizenship. This concept helps explain how children's understanding of environmental actions is influenced by their perception of themselves as part of a global network.

In conclusion, transformative learning in environmental education emerges through the dynamic interplay between children and their social, digital, as well as material networks. Within these networks, children integrate their environmental knowledge into diverse communities of practice—whether through local initiatives, digital platforms like podcasts, or by shaping future professional identities rooted in environmental sustainability. However, driving change comes with challenges—some children feel unheard or dismissed when attempting to influence their family's habits, highlighting the social barriers they encounter. Furthermore, social media and the internet function as more than tools for accessing and sharing information; they actively mediate children's transformation by enabling participation in environmental discussions beyond their immediate social groups. Digital technology and language proficiency play a crucial role in their agency, allowing children to connect with global environmental initiatives.

This section contributes to the broader argument by presenting a situated and transformative approach to environmental education in an urban context. It advances Morgan's (2017) proposal for a "more-than-human" pedagogical approach for urban children by providing empirical evidence of how their learning is intertwined with global capital flows and broader economic systems that shape urban life. Additionally, it expands existing research on urban environmental education (e.g., Russ & Krasny, 2017) by illustrating how children in an Indonesian city develop, contest, and transform environmental knowledge, recognising the role of social and material assemblages in shaping this process. Overall, this approach not only reinforces the significance of relational learning but also draws attention to the power dynamics embedded in children's everyday relations. The following section will explore these dynamics further by examining cases of children's empowerment processes.

4.2.4 Empowerment processes: Children's micropolitical practises

This section explores how children's everyday actions and reflections contribute to micropolitical processes, shaping their engagement with environmental issues. Through small-scale yet meaningful activities, children challenge and transform power dynamics related to consumption and waste. These practices, while subtle, have the potential to reshape broader social and environmental structures. By highlighting how children critically engage with their daily realities and decision-making, this section reinforces the thesis' broader contribution to understanding children's participation in environmental matters.

Rafi's experience illustrates a growing awareness of the environmental impact of everyday consumption.

> The first thing that causes me concern is the use of everyday items. I've only started thinking about this recently. Every item we use daily, even though we might consider it trivial or insignificant, actually goes through a long [production] process. We might not be aware or even care that this process is actually exploiting our environment. The exploitation might not be felt directly by us, but its effects might be felt elsewhere. We might

> not notice or even care about it. I couldn't live without using things [sourced] from the environment, like the clothes I'm wearing or even the bricks of my house. But what I can do is use it [with care] to make it more durable. If the items are not frequently replaced [with new ones], maybe I can reduce the damage to nature, indirectly (Rafi, Online Focus Group 1, 22 October 2020).

He realised that even the most mundane objects require extensive production processes, often involving environmental exploitation. Although this impact may not be immediately visible to him, he acknowledged its broader consequences. His reflection implies critical questions: What is the environmental cost of everyday items? How does consumption shape ecological systems? How can individuals reduce their environmental footprint? By questioning these issues, Rafi demonstrated a deeper understanding of the power dynamics embedded in consumer behaviour.

His awareness extended to patterns of unnecessary consumption, as he reflected, "I bought clothes, then never wore them again. People often like to collect items. I also face this problem. I have two keyboards but only use one. Headsets too" (Online Focus Group 1, 22 October 2020). His remarks illustrate a personal reckoning with overconsumption and wastefulness, emphasising the role of individual choices in broader environmental challenges.

Children's environmental awareness also emerged in their reflections on waste management and market-driven solutions. Farhan, for instance, differentiated between making something appear less like trash and genuinely reducing waste.

> In my opinion, if, for instance, plastic bottles are turned into crafts, it doesn't actually reduce plastic waste, right? It just means that it's made so that it doesn't look like trash. So, in reality, the amount of waste doesn't decrease (Offline Focus Group 17, 28 November 2020).

He argued that converting plastic into another form does not address the larger issue of pollution and emphasised the need to eliminate single-use plastics altogether.

Meanwhile, Kara criticised the limitations of market innovations in supporting plastic waste reduction in Indonesia, drawing from an online example.

> We always think, 'Let's reduce plastic, use tumblers, and so on,' I once came across a video and a website about a zero-waste supermarket in the UK. This zero-waste supermarket provides containers that are easily accessible. It's really cool. I question why such innovations aren't adopted by our country (Kara, Offline Focus Group 17, 28 November 2020).

Marina, on the other hand, expressed admiration for zero-waste supermarkets, which encourage reusable containers and reduce reliance on plastic. She found inspiration in how these supermarkets put sustainability principles into practice on a larger scale.

Children also questioned systemic environmental issues. Faris, for example, critically examined the national electoral process, asking why it does not incorporate more environmentally friendly voting techniques.

> Faris: I'm just frustrated with the electoral system that still uses paper, disposable paper. Considering that there are over 256 million people, [if people age] 17 years and over [are legitimate voters], that's a lot [of ballot paper to provide], right? I'm so annoyed. We are already technologically advanced, why not use [an alternative] secured online system?
>
> Shinta: Well, online electoral systems have started to become common in some countries.
>
> Faris: Yes, they have started to go online.
>
> Shinta: It's a great idea and maybe many people aren't aware of it.
>
> Zed: [Voters] just punch [the paper] then throw it away (Offline Focus Group 17, 28 November 2020).

He highlighted the environmental cost of single-use paper ballots and suggested that technological alternatives could provide more secure and sustainable voting options. His reflections demonstrate a broader inquiry into how large-scale systems, such as

national elections, can be redesigned to minimise waste and mitigate environmental harm.

These findings highlight how children's reflections on everyday practices, market dynamics, and systemic structures contribute to environmental meaning-making. Their perspectives demonstrate an evolving understanding of environmental responsibility and a willingness to challenge dominant consumption patterns.

Rafi's reflections on consumption and waste illustrate a growing awareness of how everyday habits are connected to environmental exploitation and consumerism, highlighting the political dimension of waste. He moves beyond viewing waste as merely an inanimate and neutral entity, recognising its broader socio-environmental and political implications. His critique of overconsumption and the pressures of consumer culture in Indonesia highlights how lifestyle choices are shaped by social expectations rather than necessity (Gerke, 2000). For instance, Rafi admitted to buying new clothes solely for social events, only to leave them unused afterwards, and owning multiple electronic devices—such as two keyboards—that he rarely used. He acknowledged that these habits were driven by pressures to own, display, and accumulate things. In response, he began to critically examine his consumption patterns and proposed personal strategies to address them, including prioritising needs, reflecting on usage, and drawing inspiration from modest practices within his family. Rafi's evolving perspective aligns with Liboiron and Lepawsky's (2022) argument that critical thinking about waste requires questioning normalised consumption habits. By considering the entire lifecycle of products—from production to disposal—Rafi challenges power dynamics in consumption and waste production, positioning consumers as active agents in waste-generating systems (Foote & Mazzolini, 2012).

Farhan further illustrates this point through his critique of upcycling. He differentiates between transforming plastic waste aesthetically and actually reducing waste, recognising that upcycling does not necessarily decrease overall waste production. His stance challenges the broader discourse that normalises consumption by

presenting upcycling as an environmentally friendly solution while failing to address the root cause of the waste problem, namely, excessive consumption (Thurlow, 2022). This perspective highlights how waste management practices are embedded in the social and cultural frameworks that sustain consumerism.

Together, Rafi and Farhan's reflections illustrate a shift from passive participation in a consumer culture to active, critical engagement with environmental issues. This transformation represents an alternative form of subjectivity (Braidotti, 2006b), where children challenge dominant consumption patterns and redefine their relationship with waste and resource management. Their actions reflect a commitment to ecological justice, expressed both in their interactions and their material engagements (Rotas, 2016). Through their material practices, they contribute to knowledge production by deepening their understanding of how everyday objects, social structures, and power dynamics are interconnected (Marres, 2015; Walker, 2020). Ultimately, their perspectives highlight children's micropolitics (Alldred & Fox, 2019; Rousell & Cutter-Mackenzie-Knowles, 2023)—small-scale, relational actions that disrupt dominant norms and drive ecological change.

In summary, this section highlights how children transform from passively accepting consumer culture to actively engaging with the power dynamics of consumption and waste. Their micropolitical actions emerge through interactions with their material environments, social networks, and daily experiences, fostering a sense of empowerment. By challenging existing norms, they gain a voice in shaping their surroundings, demonstrating that environmental education is both a personal journey and a complex process influenced by broader social norms. When integrated with broader collective efforts, these small-scale actions contribute to meaningful social and ecological change, showing how everyday practices intersect with larger systemic transformations.

This section contributes to the broader argument by examining how children's empowerment emerges through environmental education assemblages. It builds on Barratt Hacking et al. (2007) and Hayward (2021) by expanding perspectives on

children's political participation, showing how their micropolitical actions can challenge and reshape power dynamics. Additionally, it broadens conventional understandings of empowerment, which are often narrowly defined. For example, Chawla and Flanders Cushing (2007) conceptualise political education as collective engagement, socialisation, and civic action aimed at resisting dominant forces such as businesses and governments. This study extends these discussions by demonstrating that children's empowerment is not limited to direct opposition but also includes subtle, everyday acts of resistance that reshape environmental and social structures.

This section broadens discussions on children's political agency by demonstrating how their critical engagement with everyday material realities can drive significant and meaningful change. First, it builds on existing discussions about children's politics in adult-dominated spaces (e.g., Hadfield-Hill & Christensen, 2021; Wood, 2012; Elwood & Mitchell, 2012) by emphasising that political agency also emerges through their interactions with material and environmental education. While Häkli and Kallio (2018) argue that children's political subjectivity is shaped by relational interactions in mundane spaces, this study pushes this argument further by illustrating how children's political agency is co-constituted through engagements with consumer goods, waste systems, and other material realities. Additionally, this study extends Pyyry's (2017) work on how material encounters foster children's wonder and engagement by showing how these experiences lead to empowerment—enabling them to challenge consumer culture and participate in environmental decision-making. It also elaborates Pyyry and Tani's (2019) concept of more-than-human playful politics by deepening the analysis of material interactions. While their work focuses on spontaneous and improvisational engagement with urban space, this study reveals how material interactions actively shape children's environmental advocacy, moving beyond play and improvisation. Finally, this study strengthens Duhn et al.'s (2017) call for rethinking environmental education. By providing empirical evidence of how Indonesian children challenge dominant systems and enact change through their everyday material practices, it offers a concrete pathway

for reconfiguring environmental education—one that fully acknowledges its political significance.

4.3 Conclusion

This chapter has demonstrated how children's environmental learning is deeply embedded in socio-material entanglements, offering a critical departure from traditional human-centred models of environmental education. It advances the posthuman framework developed throughout this study by demonstrating that children's environmental learning is a dynamic and relational process involving a socio-material assemblage, in which their knowledge production is co-shaped by interactions with materials, technologies, cultural narratives, and ethical considerations. This reinforces the idea that participation is distributed across human and nonhuman networks rather than residing solely in individual agency. In addition, rather than viewing knowledge as merely something transmitted from adults to children, this chapter highlights how children actively co-produce environmental understanding through their daily interactions with organic and inanimate material, technologies as well as social networks. Their transformation unfolds as a dynamic process in which objects such as waste, clothing, and food become active participants, shaping how children reflect on sustainability and their roles within broader ecological systems.

By reconceptualising participatory action research (PAR) as a socio-material assemblage, the chapter highlights how children's knowledge production is not developed in isolation but emerges through engagement with their everyday environments, from tracing the environmental impact of their consumption habits to researching the energy footprint of their digital practices. By documenting how children navigate and make sense of these entanglements, this chapter challenges the notion of individual children's agency, demonstrating that it is distributed across socio-material networks.

This also chapter extends the posthuman lens by integrating religious and cultural dimensions into children's environmental learning. It highlights how Islamic ethics of stewardship and responsibility inform children's interpretations of sustainability, revealing how spiritual and moral beliefs shape their environmental attitudes and actions. This approach enriches existing discussions on posthuman environmental education by acknowledging that knowledge production is influenced not only by material conditions but also by cultural narratives and spiritual worldviews.

Overall, this chapter contributes to broader discussions in environmental education by challenging dominant human-centred models and offering a more relational understanding of learning. For example, this chapter extends Ferreira's (2019) critique of environmental education as a tool for behavioural regulation, demonstrating how posthuman perspectives reposition children beyond the role of compliant environmental citizens. It highlights how posthuman knowledge production—rooted in critical, reflective, and relational learning—empowers children to engage with environmental issues in a more transformative way. Additionally, this chapter expands on Hayward's (2021) concept of critical environmental education by incorporating a posthuman lens, challenging the persistent anthropocentrism and humanism in environmental discourse. These assumptions maintain human-nonhuman hierarchies and continue to centre agency on rational and deliberative human subjects, while overlooking the material and affective entanglements that shape how children learn, feel, and act. By moving beyond human-centred political agency, this research broadens the critique of power—recognising how environmental participation is influenced not only by social inequalities but also by human domination over nonhuman life, and how children, as human actors, may themselves inadvertently reproduce such hierarchies in their everyday practices. Finally, this chapter contributes to participatory approaches in environmental education (e.g., Mordock & Krasny, 2001; Öhman & Öhman, 2013; Barratt Hacking et al., 2012) by demonstrating how a posthuman framework can be practically applied to children's environmental research. By situating participation within specific cultural, educational, and ecological contexts, it illustrates how

posthuman perspectives can strengthen children's agency, deepen environmental reflexivity, and challenge dominant paradigms of sustainability education that continue to privilege the idea of a singular and autonomous human agent as the primary agent of change.

After displaying socio-material integration in environmental education, the following chapter will delve into the centrality of technology in redefining children's participation space, emphasising the need for a critical approach to integrating digital technology within the human–nonhuman assemblages that shape participation.

Chapter 5 Beyond Screens: Understanding Children's Remote Participation

5.1 Introduction

To address how Indonesian children's involvement in environmental issues can be reimagined through a posthuman perspective, this chapter examines the techno-spatial dimensions of environmental education. It argues that digital technology actively co-produces participatory spaces, redefining how and where children engage with environmental education. Extending beyond functional tools (e.g., apps, computers, and internet access), this chapter investigates how techno-spatial conditions influence knowledge production. It contributes to a posthuman framework of children's participation by demonstrating technology's agency and rethinking power dynamics in remote participatory spaces. Ultimately, it shows how technology is an essential component of the environmental education assemblage, facilitating transformative knowledge production to address global environmental challenges and sustainability.

This chapter focuses on how participatory spaces facilitate children's remote educational experiences, which shape both their environmental consciousness and emotional engagement. It engages with key debates on participation, digital technology, and the emotional dimensions of children's environmental education. Building on discussions of digital technologies (e.g., Plowman, 2016), this chapter highlights how children's participatory spaces are co-created with these technologies. It extends debates on the space of participation (e.g., Cahill et al., 2007) by demonstrating how technological and spatial dynamics influence children's engagement in environmental education, particularly in online settings. Furthermore, this chapter expands on the emotional aspects of environmental education (e.g., Gurevitz, 2000; Greenwood & Hougham, 2015) by emphasising how affective experiences—such as excitement and a sense of discovery—shape children's engagement and agency. By integrating posthuman insights, it presents a more nuanced understanding of participation, one that accounts for the

entanglement of human and nonhuman actors in shaping children's learning and actions in environmental education.

The following sections discuss how the convergence of technology and spatial dynamics creates a complex setting for children, impacting their engagement with the Aksiku project.

5.2 Technology and spatial contexts in participation

5.2.1 Distributed agency of technology

This section explores how digital technologies co-create a space for participation in the Aksiku project. It examines how digital tools, when integrated with an affective approach, enhance children's engagement with Aksiku. Technology is not just a tool but a component of the dynamic assemblage that facilitates participatory experiences.

Digital tools

Digital tools play a crucial role in creating an engaging experience in Aksiku. A particularly important tool in this programme is YouTube, which features two documentaries. The first one is from TED Talks which focuses on planet Earth. Meanwhile, the second is an Indonesian documentary which explores local environmental issues. The Indonesian documentary specifically addresses concerns such as mental health, plastic pollution, water conservation, and biodiversity during the COVID-19 pandemic. Through this tool, children could watch these films and gain new perspectives that spark curiosity and inspire them to learn more about environmental issues. Kara's experience exemplifies this impact.

> Initially, I thought [Aksiku] would just be basic [environmental learning], like cleaning the environment, using brooms, etc., nothing as interesting as I imagined. Until I started with Pillar 1, there was a documentary film about the Earth, it was different. After Pillar 1, I started to see what the environment is like, what global issues are like, problems in our daily lives. After completing Pillar 1, I became more aware. Then, in Pillar 2, another documentary opened my eyes to how Indonesian creators can narrate

> global issues so brilliantly. [Through seeing] the documentary, with photos and documentation of issues, I became more aware that the general situation in Indonesia, for example state problems and so on, is only a small part [of bigger issues] we often dismiss (Kara, Offline Focus Group 16, 27 November 2020).

Arif, too, experienced a sudden realisation, mentioning how the content of the documentaries lingered in his thoughts, provoking reflection even after the session ended: "I kept thinking about [the films]. Especially the one about the Earth. So, from knowing nothing, I became informed. Things we thought were okay are not okay" (Online Focus Group 18, 27 November 2020). His reflection reveals a significant shift in perspective, triggered by the documentaries, particularly in recognising how everyday behaviours—such as overconsumption, single-use plastic reliance, and assumptions of human superiority over nature—carry harmful environmental consequences. What stayed with him was the exposure to impacts he had never previously considered, prompting him to question familiar habits and recognise his role in broader ecological issues. This process of re-evaluation aligns with the films' invitation to adopt more ethical, interdependent ways of living with the Earth. Similarly, Marina reflected: "[After watching] the film I became more aware of [the broader story behind] food, clothes, stuff like that" (Online Focus Group 14, 14 December 2020). Kara and Marina described how these educational tools deepened their awareness of environmental issues and everyday challenges. The narrative and visual elements of documentaries can make complex issues more understandable and interesting, as seen in Kara's reaction. Platforms like YouTube expose participants to a diverse range of topics, connecting them with real-world issues, encouraging them to think critically about these issues. This makes the participatory experience more engaging and impactful. YouTube, in particular, enables access to a vast array of non-local, non-experiential knowledge, democratising information access to some extent. However, this access is not entirely without barriers, as it depends on internet connectivity and the ability to stream videos.

Aksiku uses various digital tools to support remote environmental education activities. One of them is Google Slides, which is used to create interactive modules

and worksheets. This allows children to directly interact with learning materials and complete their assignments online. Google Drive serves as a platform for collecting completed assignments. Facilitators provide specific links for children to upload their work for review. WhatsApp connects facilitators and participants. Each school has its own WhatsApp group, fostering familiarity and ease of interaction while serving as a space for sharing Aksiku materials. Video conferencing tools such as Google Meet and Zoom enable virtual meetings, discussions, and workshops with facilitators, teachers, and child participants. These tools are crucial for maintaining engagement and continuity during remote learning. Additionally, in the initial sessions, facilitators also used Google Jamboard to encourage self-expression and interaction among participants. This tool allowed children to create drawings or collages representing their identities, fostering more relatable and humanised interactions even in an online setting. In the final week of Aksiku, children were encouraged to share their environmental campaigns on Instagram. This social media platform mediated their environmental campaigns, extending their learning outcomes to broader audiences and effectively communicating their environmental actions. Children had diverse experiences with digital devices. They mainly used smartphones, sometimes supplemented with laptops or computers, and in a few cases, tablets. Their choice of device depended on the specific tasks they needed to accomplish, with each device serving a unique purpose. For example, Faris explained, "I use three devices. The laptop is for converting [my] edited PDF, the tablet is for drawing, the mobile phone is for discussion; I work paperless" (Faris, Online Focus Group 10, 11 November 2020). His selection of digital tools reflected his personal preferences and the specific requirements of his assignments.

Beyond the digital tools assigned by Aksiku, children independently explored various applications to support their assignments. For instance, when seeking knowledge, Google and Wikipedia emerged as valuable resources for researching diverse topics. Creative applications such as MediBang Paint and Canva were used for image editing. The Notes app was utilised by Nadia to create drawings and collages, while TikTok tutorials were accessed to enhance her digital image editing skills (Online Focus

Group 9, 6 November 2020). Lastly, online marketplaces facilitated children's exploration of environmentally-friendly products. This engagement with digital tools illustrates how children actively integrate technology into their learning and participation. It reflects their ability to navigate digital resources effectively, adapting to the opportunities of remote participatory research while working within the constraints of their home environments.

These findings illustrate how digital tools actively shaped the participation experiences within Aksiku, facilitating everything from assignment creation and submission to communication, engagement, as well as awareness of global and local issues. Technology's influence extends beyond its physical form to include its capacity to enable actions and interactions within specific contexts.

The concept of "affordance" emphasises the relationship between humans and technology, focusing on how the material aspects of technology interact with social factors to create possibilities for action (Faraj & Azad, 2012). In Aksiku, different digital platforms—such as Google Slides for interactive learning and YouTube documentaries for enhanced awareness—showcase how technology's affordances are harnessed to support environmental education. These tools offer various possibilities for action that are essential for participatory learning, ensuring continued engagement among children, educators, and Aksiku facilitators during the COVID-19 pandemic. Understanding affordances is key to strategically designing and utilising technology to enhance environmental education practices. The following sections will further explore the specific actions enabled by these digital tools.

The role of different elements in the Aksiku learning process

An affective approach plays a crucial role in determining how technology supports children's engagement in Aksiku through various strategies and techniques that enhance participatory experiences.

Hands-on missions and module:

Aksiku's module is structured around five overarching "pillars," consisting of eleven creative missions. Each pillar contains mission briefings, additional reading materials, and worksheets. Digital platforms present these modules, allowing children to explore each topic in depth. The platforms provide a structured yet flexible approach to creating an engaging participatory environment. This particularly excited participants like Gavin, who appreciated the piecemeal approach. He explained, "What makes this module different is that it contains step-by-step, like, activities that I need to follow" (Online Focus Group 19, 21 December 2020). The gradual learning process helped him navigate the module, particularly in the context of studying from home during the COVID-19 pandemic. Another child compared this experience to their school learning, where they often receive minimal or unclear explanations from teachers, leading to frustration. Marina found the piecemeal approach refreshing, saying, "Usually when I receive an assignment at school, I will receive the instruction of this-this-this-this, [and] I['ll] feel dizzy, I won't understand. I feel embarrassed asking the teacher. [But] now [in Aksiku] I get an explanation. Or [we can] watch the films first. So, I [can] quickly figure it out. If we don't understand, we can directly ask [the facilitator]" (Online Focus Group 14, 14 December 2020). Her reflection highlights how Aksiku's methodology fosters a more supportive learning experience, making it easier for participants to engage with remote environmental education.

To make the module more accessible and user-friendly, it was created in Google Slides. The platform offered flexibility and interactivity, allowing children to engage directly with the content, copy materials, and complete assignments with ease. Moreover, for Farhan, the module provided a refreshing change from the traditional patterns of schoolwork. He appreciated the variety of missions, which allowed for personal involvement and a more engaging learning experience compared to the rigid classroom routines.

> Actually, I enjoy [it] the most when I have to [complete] Aksiku's missions. Because [it is different than] doing school assignments in which the subjects are different, [but] the pattern of the work is the same. [But in

> Aksiku] it really talks about different things. And when it's time for Aksiku, every Zoom discusses something different, even though the point is the environment, but [there are] different topics for each pillar, so I'm happy (Farhan, Offline Focus Group 16, 27 November 2020).

The variety of topics and the opportunity to explore new subjects through different missions sparked Farhan's enthusiasm. The chance to discuss different facets related to environmental actions kept the participation process engaging.

Personal learning:

Aksiku encourages children to engage in personalised activities within real-world contexts. It is designed to create participatory experiences that foster personal reflection. This was evident in Faris's response to a deceptively simple question: “What does it mean for me to be part of the environment?” The question prompted him to reconsider his relationship with the world around him.

> Faris: Well, the question was simple, but I didn't know why I found it difficult to think about. Because I'd never thought that before.
>
> Shinta: Okay.
>
> Faris: What does it mean for me to be part of the environment? I really [wracked my brain] thinking. I thought about it so much that I even asked my mom. "Do I mean anything to the environment?" [She replied,] "Yes. Of course." Really? I thought about it that much.
>
> Shinta: How do you feel now that you've written it down and read it again?
>
> Faris: [I feel] finally, it opened my mind to things I had never thought about before (Offline Focus Group 17, 28 November 2020).

Faris's reflection reveals a moment of transformation, where he began to see his relationship with the environment as reciprocal—not only recognising how the environment shapes his life, but also how he, in turn, matters to it. This shift emerged

through personal contemplation and dialogue with his mother, cultivating a deeper sense of ecological awareness and responsibility. His experience illustrated how self-discovery could spark motivation to participate. Other participants described similar experiences. Zed, for instance, reflected on a mission focused on self-capacity:

> What really boosted my mood in one of the missions… it was about self-capacity. In that mission, I was enthusiastic because I could evaluate what I am capable of now and what I want for the future. I was excited, like, this is it. What abilities do I have, and then what do I want to develop them into? That really motivated me, and it made a difference (Offline Focus Group 17, 28 November 2020).

Through this mission, Zed discovered his capacity for self-reflection and long-term thinking about his environmental role. When asked to map his daily routines and the ecological footprint of the products he used, he began to recognise the cumulative impact of ordinary actions. Rafi echoed this sense of discovery:

> I get the essence of Aksiku from these missions, especially the third mission. [It is when I] drew [a diagram] of what I do [daily], [I mapped all] products [I use, what it is] made from, and how it impacts [the environment]. It's something I never did before, like thinking about what I do when I wake up. I felt enlightened (Rafi, Online Focus Group 15, 4 January 2021).

Similarly, Zed reflected that participation encouraged self-examination. Being asked about his daily routine and its impact led to a moment of realisation and a shift in his self-perception. He explained: "This is the first time I was asked about my daily routine and its impact (chuckles), and that's what made me go 'Wow'. It just opened my eyes" (Online Focus Group 15, 4 January 2021). Following the activities, Zed began to critically examine practices he had previously unquestioned—using soap and shampoo, consuming meat, or relying on electricity for online classes. He became aware of how these everyday routines contributed to pollution, carbon emissions, and resource depletion.

Zed found a mission focused on self-capacity particularly meaningful, as it allowed him to assess his current abilities and set future goals (Online Focus Group 15, 4

January 2021). He became excited about discovering his potential and personal growth. Similarly, Nuri developed self-awareness through an activity that required her to prioritise different aspects of her environmental actions.

> In [the idea mapping] missions that [divide which ideas have] a big impact [and] a small impact, I realised [that] we actually can play a big role in environmental change. [We can] if we are willing to try or directly involve ourselves in changing the environment. Then [when I worked] on a mission to look for articles, it is when I got an insight, that it turned out there are many discussions about the environment, I just didn't know beforehand (Online Focus Group 11, 5 November 2020).

Through the idea mapping mission, Nuri developed her capacity for strategic thinking by evaluating the scale, feasibility, and potential impacts of different environmental actions. She came to recognise that even small, consistent efforts—such as sharing information, adjusting daily habits, and encouraging peers—can contribute meaningfully to environmental change. This process fostered a grounded sense of agency, rooted in her own capacity and choices. Aksiku's approach to integrating personalised, real-world activities enhances children's participation by promoting self-discovery, examination, exploration, and self-awareness. These elements help children understand the importance of their involvement and encourage meaningful engagement with the project.

Exploratory and contextual learning:

Aksiku encourages children to investigate and explore topics independently or with minimal guidance. It integrates real-world contexts into the learning material so that children can see the relevance of their learning to their own lives and the wider world. This helps to make participation in the project more meaningful and impactful. One example is the use of interviews as a research tool, which allows children to actively explore topics of interest. This hands-on approach both strengthens their research skills and fuels their curiosity, making their experience more enriching. Kara's experience with expert interviews on electricity conservation illustrates how hands-

on, inquiry-based learning deepens understanding and raises awareness. As she explained:

> Especially during interviews, it became more specific that the issue I chose was about saving electricity. After my interview, I learned how proper electricity usage isn't just about turning off lights during the day. It broadened my thinking and made me worry more... That really had an impact. In the last mission, I summarised again the issues I [was] worried about, and what I learned from these missions. In the article I wrote, although it's not a great article or anything, I thought about how to make people more aware, to know about the environment, even if it's just a small part of the bigger problem. I hope the article I made could be helpful and useful to others (Qira, Online Focus Group 14, 14 December 2020).

Her learning journey culminated in a written article, demonstrating how participation in Aksiku can lead to meaningful creative outputs. Qira further reflected on the skills she gained: "I was really happy learning how to conduct interviews, learning how to greet someone older, someone unfamiliar, and I really got that through online learning. Like, wow, I felt proud... And then I tried making a podcast, conducting research, asking friends. It was cool" (Online Focus Group 14, 14 December 2020). Qira's reflections reveal how engaging in research and producing creative content, such as interviews and podcast-making, contributed to her personal growth and self-perception. These experiences allowed her to see herself as capable and resourceful, fostering a growing sense of agency and confidence in her ability to engage with the world around her. Aksiku's approach enhances children's participation by making learning relevant, encouraging independent exploration, and providing opportunities for practical application, thereby fostering both personal and academic growth.

Children's explorations also include emotional experiences. Aksiku invites them to reflect on objects and events from their pre-pandemic routines, using drawings, sketches, or collages. Dira, Qira, and Zed's reflections highlight how their daily experiences were not only physical but also deeply emotional. Qira, for instance, shared drawings of her morning views of trees during her commute to school: "[Seeing] the trees in the morning [felt] airy. On exam day or debate day, when I was running for chairperson of the student council, in the morning during the ride to

school I liked to look up [to the trees]. It was a relief" (Online Focus Group 1, 22 October 2020). Similarly, Zed found himself missing the bustling 'city atmosphere,' recalling his daily routine of using public transportation to get home.

> [T]here were peddlers. Then I listened to music… it felt like… you know… I can't explain it… listened to music while stuck in traffic and the music felt so deep in my soul, like I was an actor in a music video (laughs). I don't know (laughs). I can't explain. It's just that, until now, I've only realised that even annoying things [from before pandemic] can be missed, [especially] given the current situation [of social distancing] (Online Focus Group 3, 24 October 2020).

Qira and Zed's reflections highlight that everyday life is not just about one's physical space, but also about the emotions it evokes. For them, the missions triggered positive emotional responses. Similarly, for Dira, revisiting fond memories of pre-pandemic life brought forth joy (Online Focus Group 4, 25 October 2020). Children's reflections illuminate the interconnectedness of emotions and the urban environment (Anderson, 2009a, 2016; Thibaud, 2015). Through the act of drawing and reflecting on their pre-pandemic routines, they were able to articulate and recognise the emotional layers of their urban experiences—how certain sights, sounds, and even inconveniences contribute to a complex emotional relationship with the city. By inviting children to reflect on their everyday urban interactions on an emotional level, the mission facilitated a deeper connection between them and the city. The mission prompted realisations of how urban environments shape and are shaped by personal feelings and emotions (Anderson, 2009a; Thibaud, 2015). This realisation fosters an appreciation of city life, recognising it as a rich fabric that contributes to their sense of self and belonging in the world. It adds an emotional dimension to children's participation, making their engagement more meaningful and personally relevant. The significance of emotional and affective learning in environmental education—particularly in interactive, participatory settings—will be discussed in greater depth in the following sections.

Interactive sessions:

Methodologies that promote interaction, such as live online discussions or collaborative projects, make participation more dynamic and engaging. Facilitated by digital platforms, these sessions provide opportunities for students to ask questions, share ideas, and learn from each other, fostering a sense of community and collaboration. Weekly facilitated online discussion sessions, using Zoom or Google Meet, proved effective in engaging children, as demonstrated by Faris and Zed. Unlike standard remote learning, which tends to focus on delivering material with minimal interaction, these sessions created an environment where students felt more connected and involved. Faris appreciated the opportunity to share his thoughts, explaining, "Every [Aksiku] Zoom [session] makes me happy. It's like having someone listen to your story" (Online Focus Group 13, 25 November 2020). For him, the sessions offered a valuable space for interaction and sharing his thoughts, making him feel heard. Similarly, Zed, compared Aksiku's small-group discussions with his school's online classes, which he found less engaging due to the large number of students—typically ranging from 35 to 55 students. "Well, because there are so many people, mostly, I guess. But with us, there are only about 5–6 people" (Offline Focus Group 17, 28 November 2020). He described the typical online school sessions as passive, with little opportunity for meaningful interaction (Offline Focus Group 17, 28 November 2020).

For many participants, Aksiku's synchronous sessions became moments they looked forward to. The discussions encouraged storytelling and allowed children to share their experiences with peers, facilitators, and a researcher. Marina and Raina particularly valued these sessions as opportunities to express themselves and listen to others, creating a sense of community during the quarantine. Raina explained, "During sharing sessions, I am interested in listening to the stories from Kemal, Haris, Rafi, [and] Marina. I enjoy finding out that they are all different, especially what struggles others feel" (Raina, Online Focus Group 6, 5 November 2020). The ability to hear real-life experiences from their peers made Aksiku's discussions more engaging and relevant. Additionally, the variety in discussion topics, such as everyday

challenges at home, allowed children to explore different aspects of their lives and the world around them. Being able to share their own stories and listen to others' personal struggles during the COVID-19 pandemic made learning more individualised and meaningful. These exchanges helped children appreciate the richness of others' perspectives, thereby forging connections and enriching their collective journey in Aksiku.

These findings demonstrate the key elements that foster affective engagement in remote environmental education. Modules, interactive sessions, and sensory experiences all played a crucial role in shaping children's participatory experiences during the pandemic. These elements provided structure, emotional engagement, and real-world relevance, making environmental education more impactful.

An affective approach harnesses the power of emotions in children's environmental education, shaping how technology enhances their participation. Four key aspects define this approach: emotional impact, embodied and sensory learning, the transformative potential of affect, and methodological design. First, emotions play a crucial role in shaping engagement and participation in knowledge production. Children's emotional responses to learning experiences enhance their ability to connect with environmental issues on a deeper level. This is evident in Zed and Faris's reactions to challenging questions, where increased emotional stimulation heightens their receptiveness to new information and creativity (Jackson, 2018; Cahour, 2013). Similarly, their emotional response to missions—particularly those that challenge their sense of self-value and capacity—shapes their level of engagement. Zed and Faris's resulting sense of enlightenment and enthusiasm demonstrates how missions transform routine activities into meaningful environmental awareness. Additionally, children's emotional connection to their surroundings is essential in shaping their environmental understanding. Qira and Zed's reflections on the city's atmosphere suggest that they 'know' the environment not just through scientific or intellectual understanding, but also through their emotional responses to it. Their feelings of longing and freedom exemplify how emotions influence their connection to the

environment, reinforcing the role of the affective approach in how children understand and relate to it.

Second, the affective approach is shaped by sensory and bodily experiences, where interactions with the environment produce new ways of knowing. Aksiku's missions engaged children in sensory-rich activities that allowed them to connect their everyday experiences with learning. For example, Qira's reflection on her pre-pandemic urban routine, particularly her daily commute to school, became an affective event that evoked vivid sensory memories. This linked her environmental awareness to personal, everyday experiences, prompting her to perceive her surroundings not just as a physical space, but as an emotional landscape. Similarly, Zed's experience of being stuck in traffic while listening to music transformed an ordinary urban moment into an affective learning encounter. He described the music as a feeling 'deep in his soul' during these moments, illustrating how sensory experiences create new ways of relating to urban life through learning. By engaging with the body, senses, and emotions, these experiences disrupt habitual ways of seeing and knowing. They demonstrate how affective encounters reshape children's relationships with and understanding of urban life.

Third, the affective approach goes beyond engaging emotions and senses—it has the potential to transform how children perceive their role in environmental action. Nuri's experience demonstrates this transformation. While categorising environmental ideas based on their impact, she experienced a moment of realisation about her own capacity to effect environmental change. The "felt intensity" of this moment triggered a shift in her self-perception (Ehret & Leander, 2019), transforming her from a passive observer into an active participant in environmental solutions. Crucially, these learning intensities are not solely driven by children's individual agency but emerge through a collective dynamic involving various actors, such as educators, learners, and learning materials (Ehret & Leander, 2019). In Nuri's case, her transformation was shaped by her interactions with multiple elements, including the Aksiku module, a facilitator, missions, digital platforms, and documentary films. This highlights how the affective approach is inherently relational.

Lastly, the impact of the affective approach is not accidental—it is deliberately designed through intentional methodological strategies to create immersive learning environments. Ernwein and Matthey (2019) highlight the importance of "dispositif" in shaping these experiences. A dispositif refers to a carefully structured material and affective arrangement that guides attention, shapes behaviours, and facilitates meaningful interactions in a particular space. It integrates physical, emotional, and cognitive elements to produce affordances that resonate with the experiences and anticipations of the target audience—in this case, children. For instance, the mission prompting children to answer the question, "What does it mean for you to be part of the environment?" serves as a dispositif designed to evoke deep cognitive and emotional responses. This is evident in Faris's reaction, where the structured experience led to moments of introspection and new ways of thinking. These carefully crafted experiences create affordances that encourage children to think differently and open their minds to new perspectives, thereby creating deeper environmental awareness. By integrating the senses, engaging the body, and provoking emotional responses, the mission opens new ways of knowing their surroundings in a more embodied and meaningful way (Ernwein & Matthey, 2019). The structured yet open-ended nature of the affective mission allows children to build a more personal connection to environmental learning. It creates an educational experience that is more impactful and resonates more with learners (Gurevitz, 2000).

In summary, technology plays a crucial role in co-creating participatory spaces by enabling new interactions and experiences. This section explores two key aspects: (1) technology as an affordance, and (2) the affective approach as a means of fostering deeper engagement. First, in the Aksiku project, digital affordances allowed children to overcome physical limitations during the pandemic and expand their identities as environmental learners. For example, YouTube presented documentary films that heightened children's awareness of global and local environmental issues. These films did more than convey information; they also evoked emotional connections with the topics discussed. Similarly, interactive digital tools such as Jamboard

encouraged children to create personal collages, breaking down the barriers of remote interaction and enabling a more personalised experience. These digital tools addressed the challenge of 'disembodiment' in online learning, transforming digital space into an environment where children could actively express their identities. From a posthuman lens, this illustrated how technology actively collaborates with humans to create engaging spaces for participation. Second, the affective approach enhances children's engagement by integrating emotions, bodily sensations, and personal experiences into the participatory process. Environmental education in this context goes beyond an academic exercise—it becomes a deeply relational and emotionally charged process. Affective methods trigger emotional responses, such as curiosity, sadness, excitement, anxiety, and pride, making participation more impactful. Moreover, by incorporating elements of children's everyday lives, urban atmospheres, and sensory-rich memories, these methods strengthen emotional connections to their surroundings. When combined with technology, affective methods create immersive and meaningful participatory spaces. Rather than functioning as separate components, digital technology and affective methods work together, making environmental education more dynamic, engaging, and transformative.

This section contributes to the broader argument by highlighting the distributed agency of nonhuman elements—particularly digital technology—within a network of interacting agents that co-create participation spaces. First, it extends Börner et al. (2023) and Mazzetti (2020) by applying a posthuman perspective to technology-mediated participation. It challenges the notion of technology as a passive tool, instead positioning it as an active agent that shapes children's engagement within the participation network. Second, this study builds on Gurevitz (2000) by demonstrating how posthuman perspectives enhance the integration of affective dimensions in environmental education. It emphasises how emotional engagements emerge through the entanglement of children, technology, and material environments. Third, it extends Jackson's (2015) work on emotion in learning by revealing a broader spectrum of affective responses—including excitement, frustration, and curiosity—

that arise from children's interactions with technology in educational settings. Fourth, it expands Plowman's (2016) study on the evolving role of technology in children's everyday lives by showing how digital tools actively co-construct participatory experiences. Technology operates within a broader network that includes learning materials, hands-on activities, physical contexts, and social interactions with adults and peers, all of which shape children's participation outcomes. Finally, this study underscores the methodological significance of optimising digital tools for environmental education, arguing that digital tools should not be viewed as mere supplements to traditional methods but as strategically designed components that enhance learning and participation.

5.2.2 Spatial considerations

This section examines how the shift to remote participation transformed children's experiences in Aksiku. The transition entangled their home environment with the participatory setting, creating complex situations where children had to navigate multiple interactions while remaining engaged.

At home during the COVID-19 pandemic

Throughout the Aksiku project, children joined online meetings from different parts of their homes, such as their bedrooms, family rooms, or even terraces. Ihsan described his daily workspace in his room: "mobile phone, laptop, study lamp, chargers, power plugs, stationery, bed, pillow, food, drinks, and snacks" (Ihsan, Online Focus Group 11, 5 November 2020). His account illustrates the blend of digital tools and everyday domestic items that shaped his participatory setting at home.

In the first group meeting, Qira shared how transitioning to home learning affected her daily routine.

> Before the pandemic, school started at 7 AM; back then, I sometimes had to wake up at 3 AM to study, until 5 AM. So, I had to sleep even earlier. But during the pandemic, I'm more relaxed. It's a holiday, and even if I'm late (for school), I can still catch up with my assignments. So, my schedule

> is a bit more disorganised during the pandemic. Not just a bit, actually quite a lot, but that's how it is (Online Focus Group 1, 22 October 2020).

Before the COVID-19 pandemic, children's activities were clearly differentiated by time and place. However, during the pandemic, school and domestic life became intertwined. The lack of a strict school schedule gave Qira more flexibility in her daily activities, blurring the boundaries between learning and home life. The following findings will further illustrate this shift.

The pandemic significantly altered children's daily routines, introducing new responsibilities and reducing structured activities. Nabil, for example, spent most of his day alone, managing household chores alongside his schoolwork. His routine now included tasks such as heating up food and handling other household duties (Online Focus Group 2, 21 October 2020). Similarly, Nuri's routine shifted significantly, as school activities, such as student council meetings and group work, were replaced by more self-managed routines. She now had to take care of personal needs, such as cooking, which had not been part of her daily schedule before (Online Focus Group 4, 25 October 2020). Like Nabil, she had to navigate the challenges of a home-based learning environment while managing domestic responsibilities. Faisal also had to adjust, taking on household chores that were not previously part of his routine. One significant change was doing laundry, which became a new responsibility during the pandemic (Online Focus Group 4, 25 October 2020). These experiences illustrate how home learning blurred the boundaries between education and domestic life, requiring children to adapt to new roles beyond their academic commitments.

Children had to navigate and negotiate their home spaces to balance school and household responsibilities. For example, Lina faced interruptions during remote schooling, which highlighted the challenge of managing domestic expectations while remaining engaged in school activities.

> Shinta: Is there any activity at home that you really dislike?
>
> Lina: Being ordered around (laughs).

Shinta: (laughs) How so?

Lina: Being told to leave my room, even though I have schoolwork to do. How's that supposed to work (laughs)?

Shinta: Why are you asked to leave your room?

Lina: They say, why are you just sitting quietly, come out of your room.

Shinta: (laughs) Who usually says that?

Lina: Mom (Online Focus Group 5, 28 October 2020).

Faris shared similar frustrations about learning during the pandemic, explaining how it disrupted both his academic and personal life. He reflected, "I have to focus on [supporting] myself since I live alone at home. [I have to not only] do things for myself, but also focus on [school] tasks that are just boring and confusing. For me, the learning process during the pandemic is just annoying. I feel disturbed; I can't get the feel of it" (Faris, Offline Focus Group 17, 28 November 2020).

These findings focus on how the shift to home schooling during the pandemic significantly influenced children's experiences through various household factors. Digital tools integrated into their personal spaces enabled continuous learning but also blurred the boundaries between school and home. Items such as beds, pillows, and snacks contributed to the personalisation of children's study environments, making it harder to separate work from rest. At the same time, household responsibilities, such as cooking and laundry, required children to juggle schoolwork with domestic tasks. Different areas of the home became learning spaces, each with its own nonhuman elements that influenced engagement. Together, these factors shaped children's participation in environmental education, revealing both the complexities and challenges of remote participation.

Space adaptation

During the COVID-19 pandemic, home spaces had to be adapted for remote learning and online participation, involving both emotional and practical considerations. A more sedentary, indoor routine and a less consistent study space shaped the spatiality of remote participation. Moreover, children had to find specific areas in their homes to attend online meetings and complete schoolwork. Mita's experience illustrates the challenges of adapting to remote learning in a shared and dynamic household (Online Focus Group 3, 24 October 2020). Without a personal room, she constantly moved between spaces to find a suitable study area. Since her workspace was in the living room, distractions such as television noise and family activities made it difficult to focus and maintain a consistent routine. She had to adapt by using different rooms depending on their availability. Marina took a flexible approach to her study environment, choosing locations based on comfort, convenience, Wi-Fi access, and the need for a neutral background for video calls (Online Focus Group 8, 4 November 2020). She explained that her study location was largely dictated by internet connectivity, forcing her to work in areas with a stable signal. For online meetings where she had to turn on her camera, she preferred the upstairs living room because her bedroom walls were entirely pink, "(chuckles), so it hurts the eyes for others to see [through the camera]" (Marina, Online Focus Group 8, 4 November 2020). Qira, on the other hand, took a more structured approach by creating a dedicated study space with a study table and organised bookshelves. Interestingly, she also interacted with a photograph as a way of coping with the isolation and stress of studying alone. She explained:

> Qira: I'm someone who needs to have everything organised. Then there is this picture of a gentleman, I often talk to this picture when I'm stressed, like 'Sir, I'm stressed, what should I do?' It's like having a conversation. Or when I'm happy, like 'Sir, I'm really happy,' and then I shake the picture a bit. That's about it.
>
> Shinta: In your imagination, when you talk to the gentleman, what does he reply?

> Qira: He just nods as if looking at me tiredly, like 'Oh you...' (Online Focus Group 8, 4 November 2020).

Qira adapted to remote learning by organising her physical space and also using imaginative strategies to cope with emotional challenges. Her engagement with the photo represented a form of emotional and mental escape, providing her with a sense of companionship in the isolation of remote engagement.

Temporal and spatial factors significantly shaped children's remote learning environments. Zed, for instance, struggled with discomfort during afternoon sessions because his desk was positioned in direct sunlight. The heat made studying difficult, yet he had to endure it as that spot provided the strongest Wi-Fi connection (Zed, Online Focus Group 3, 24 October 2020).

These findings highlight how remote participation led to spatial reconfigurations as children navigated their domestic environments, digital infrastructures, and the challenges of the pandemic. These spatial adaptations emerged through dynamic interactions between children's bodies, technologies, and everyday objects, shaping how children engaged with environmental education. Home environments played a crucial role in this process, influencing participation through the need for dedicated study spaces, managing distractions, ensuring access to technology, and using personal objects for emotional coping. These adaptations—both practical and emotional—illustrate the intricate relationship between home life and effective participation. Remote participation was not just about logging into a digital platform; it required integrating digital activities into the rhythms of daily life (Watson et al., 2021; Hardley & Richardson, 2021). As a result, children developed new strategies to balance these complexities and maintain engagement in both their school activities and personal lives.

When examining children's experiences in remote participation, particularly those of Mita and Qira, it is essential to consider the spatial dynamics that shape these experiences. In online participation, the concept of "physical space" goes beyond a

fixed context; it is a dynamic environment shaped by social and material interactions (Gallagher et al., 2016). Space functions as an interactive setting where educational activities unfold, requiring children to navigate and negotiate their engagement with home materiality. For example, Mita's constant movement between rooms illustrates the diverse ways children adapted to online participation during the COVID-19 pandemic. Meanwhile, Qira took a proactive approach by customising her study space, using material objects and areas to establish a personal territory for learning. These examples illustrate how children actively shape their spaces within domestic environments, balancing the demands of learning with the constraints and opportunities presented by the material conditions of their homes (Gallagher et al., 2016).

Beyond the material challenges, it is also important to acknowledge the emotional and social barriers children face in online learning environments (Cleveland-Innes & Campbell, 2012). For example, Nabil and Faris struggled to balance self-reliance with the constraints of their home environments, while Lina found it difficult to concentrate due to household distractions. The emotional toll of these spatial adjustments, as described by many children in this study, reveals the stress and frequent interruptions they faced while balancing household demands with educational responsibilities. Moreover, Delahunty et al. (2014) highlight how the absence of physical presence in online settings can lead to feelings of isolation, loneliness, and disconnection, which, in turn, impact participants' motivation and engagement. This was evident in the experiences of children in Aksiku, where reduced interaction with peers and facilitators—particularly for Nadia and Kara—contributed to a sense of detachment from the Aksiku community. These examples underscore the complexity of home as a remote participation setting, demonstrating that online learning is not just a matter of access to technology but is also deeply intertwined with emotional and social dynamics.

In summary, this section explores the intricate nature of children's spaces in remote learning, emphasising that online participation is not merely about digital or physical settings. Instead, it is a dynamic space where children actively shape their

engagement and interactions. It demonstrates how children must continuously navigate and adapt, balancing new modes of learning, communication, and collaboration to maintain meaningful engagement during the pandemic.

This section contributes to the broader argument by demonstrating how the dynamics of remote participation impact children's ability to actively engage in an environmental education initiative. First, it expands on Delahunty et al. (2014) by integrating a posthuman perspective into discussions on digital technology and remote learning. Rather than merely facilitating learning, technology also introduces constraints, shaping learning spaces in both enabling and limiting ways. Second, it builds on Cahill et al. (2007) by reinterpreting participatory spaces through a posthuman lens. While Cahill et al. conceptualise participation as structured by institutional constraints and spatial contestations, this study pushes the argument further, demonstrating that participatory spaces are not solely determined by policies but are dynamically co-constituted through human and nonhuman interactions. This reinforces the idea that technology is not a separate entity but is rather intertwined with the participatory space. It operates within a collective network of material elements, human interactions, and emotional experiences, all of which shape the assemblage of environmental education.

5.2.3 Navigating power dynamics

This section explores how children manage their feelings in a remote participation setting. It reveals the strategies they use to mitigate these challenges, focusing on the role of nonhuman elements such as apps, computers, and internet connections. These digital tools not only provide access to educational content but also support children's engagement, helping them to stay connected and motivated throughout the project.

Managing feelings

The final discussion between Zed, Faris, and Shinta highlights the role of peer support in remote participation. Their conversation reveals how uplifting one another's spirits plays a crucial role in this context.

> Faris: I also feel Zed helps too.
>
> Zed: You help as well.
>
> Faris: You always cheer me up.
>
> Zed: How do I do that?
>
> Faris: When I'm feeling unmotivated, Zed keeps on talking to me on a high note. So, I get carried along with his energy.
>
> Shinta: What does talk on a high note mean?
>
> Faris: I don't mean that he's angry, but when I'm feeling tired, he always lifts the energy up, so I get influenced.
>
> Shinta: Through chat or phone?
>
> Faris: Yeah, chat.
>
> Zed: Yes, that's right. I do that for my friends. If someone is feeling down or tired, I leave them for a while, but I don't want them staying in that state. They must move on, keep going (Offline Focus Group 17, 28 November 2020).

This exchange demonstrates the importance of peer support, mutual encouragement, and communication, even in online settings. Beyond text-based interactions, other children also highlighted the role of video calls in fostering collaboration. Marina and Raina, for instance, utilised Zoom to work together despite being physically apart (Online Focus Group 14, 14 December 2020). Video conferencing platforms helped to recreate the dynamics of group work, allowing

children to stay connected and maintain a sense of teamwork despite the social restrictions imposed by the pandemic.

The children generally did not perceive attending synchronous meetings and completing missions as overwhelming. They attributed this sense of ease to the Aksiku programme's manageable eight-week duration and the belief that individual missions required relatively little time and effort. However, they acknowledged occasional exhaustion, particularly concerning the synchronised meeting schedule in the evenings. These meetings, following a full day of schoolwork, occasionally proved to be quite draining. Each week, they had to balance their time and energy between Aksiku, school, extracurricular activities, organisation, and social life (Faris, Offline Focus Group 17, 28 November 2020). This led to feelings of being overwhelmed due to the need to allocate time and energy across various demanding tasks. Nabil elaborated on the time and effort needed to complete missions, particularly for data collection. He explained, "[First] we need [to spare the time] to think about each of these missions. Then missions [such as] interviewing experts mean [we have to ask for] their time and willingness to be interviewed" (Nabil, Offline Focus Group 17, 28 November 2020). The process of planning, strategising, and executing missions required significant mental effort, which could be taxing, especially when combined with other academic and extracurricular demands. The effort to complete the Aksiku project while managing school responsibilities during the pandemic illustrates the emotional challenges faced by children.

Children managed their participation by practising self-regulation and balancing various aspects of their lives. Faris described how he coped with stress, explaining, "I calm myself down for a few days, then I continue [with Aksiku and school] work" (Offline Focus Group 17, 28 November 2020). Meanwhile, Gavin adopted a different approach, choosing to relish the process rather than rushing to meet deadlines. He shared, "I let myself enjoy the process. So, I don't rush myself to finish the mission. That's okay. [When] I have free time [I continue] the work. But I make myself a note so I don't go past the deadline" (Online Focus Group 19, 21 December 2020). These

different strategies highlight how children navigated their responsibilities by finding ways to maintain motivation and manage their workload effectively.

A group of children from a particular school shared a strong sense of responsibility that motivated them to continue participating despite the challenging situation.

> Nabil: So [becoming a student] at the favourite schools, apart from [having to excel in] our respective schools, we also bear the burden of maintaining the good name of the school as well, [so that our school] can still earn its favourite status.
>
> Shinta: Is that what motivates you in this programme, to maintain the good name of your school?
>
> Kara: Yes. We also feel that pressure from the teachers, which I think is good pressure. Once [a teacher] said, 'you got into this school [by beating] others queued before you, you should be grateful.' I think [what the teacher meant] is not merely about the favourite label. But they prevented the kids [from thinking] 'I've [made it into] SMA Y. I'm something special'. Meanwhile, the [children's] effort compared to the schools' label itself is far [inverse]. That's why [I think giving my best] is very important, even though [now we are] learning online (Online Focus Group 13, 25 November 2020).

Nabil and Kara reflected on their sense of responsibility in upholding the reputation of their school. Kara was particularly aware of the risk of complacency, recognising that attending a prestigious school should not be a reason to rely solely on its reputation for self-validation. Instead, she stressed the importance of continuous effort and personal growth. A teacher's reminder about the privilege of studying at such a school reinforced her appreciation for the opportunity, making her more mindful of not taking it for granted.

Throughout the online delivery of Aksiku, participation levels varied (Research Journal, 2020). Initial weeks were marked by high enthusiasm and frequent mission completions, but engagement declined over time due to academic demands, digital fatigue, and limited peer interaction. While some children remained active, most displayed sporadic involvement. However, participation tended to rise again during

synchronous sharing sessions and in-person final meetings, where children showed greater openness and depth in their reflections.

Overall, these findings offer insight into how children navigate the challenges of remote participation through emotional regulation. Hochschild's (1979) concept of "emotion work" provides a useful framework for understanding how children manage their emotions to adapt to the demands of remote participation. Emotion work refers to the effort involved in modifying one's feelings—either by evoking or suppressing emotions—to align with social expectations in specific contexts. In this study, children demonstrated various forms of emotion work, such as managing frustration, sustaining motivation, and fostering positive interactions. Participation in Aksiku required children to actively engage in activities, share their opinions, and make decisions, which carried implicit expectations about emotional engagement, such as displaying enthusiasm or curiosity (Bosco & Joassart-Marcelli, 2015). For instance, Faris used a strategy of pausing to calm himself down before continuing with his school and Aksiku work, adjusting his mindset to maintain a positive attitude despite difficulties. His method illustrates "suppression" of negative emotions. Similarly, Gavin approached participation with a sense of enjoyment, deliberately avoiding stress by pacing himself and focusing on the process rather than deadlines. His method of sustaining positive emotions illustrates "evocation," where he cultivated feelings of satisfaction to support his engagement.

Children's emotion work was central to their ability to participate, balancing the need to meet expected emotional norms while dealing with personal challenges in the home environment. This effort played a key role in maintaining motivation and ensuring continued engagement in learning (Baker et al., 2013). However, excessive emotion work could become overwhelming, making it difficult for children to sustain their participation in the long term.

In this case, the interaction between Zed and Faris illustrates the significance of peer support in their emotion work. Zed's encouragement and positive energy helped uplift Faris's spirits, demonstrating how emotion work is not just an individual effort

but also a collective process. Mutual support among peers fosters emotional resilience, highlighting the importance of encouragement and effective communication in sustaining engagement (Ehret & Hollet, 2016). These interactions underscore the significance of social connections in helping children navigate the challenges of remote participation. Additionally, the findings reveal how nonhuman elements, such as digital communication tools, play a crucial role in facilitating emotion work. Platforms like chat applications and video calls enable children to maintain connections, provide reassurance, and motivate one another despite physical distance. These digital tools, alongside peer interactions, help create a supportive participatory environment, reinforcing the idea that remote participation is shaped by both human relationships and technological infrastructure.

Additionally, the findings highlight power dynamics that influence children's motivation, particularly the role of institutional influence in shaping their attitudes towards learning and personal performance. The motivation of children such as Kara and Nabil to sustain their participation in Aksiku, despite its challenges, is deeply rooted in the cultural expectations surrounding education in Indonesia. Their sense of responsibility—driven by their school's prestige and the implicit emotional expectations of teachers—illustrates a broader cultural narrative that links education to achievement and moral obligation. Robinson (2016) explores how Indonesian youth navigate this moral framework, noting that parental expectations are often framed around trust rather than direct pressure. Children are implicitly expected to honour the opportunities given to them, with failure leading to disappointment rather than anger. This moral framework influenced Kara and Nabil, shaping their participation as not just a personal choice but as a way to demonstrate their dedication and respect for their teachers' trust.

Furthermore, their commitment to academic excellence aligns with the broader cultural emphasis on educational success as a pathway to independence and social approval. The concept of "*prestasi*" (achievement or performance) in the context of Indonesian education highlights the high value placed on accomplishment and public recognition (Parker & Nilan, 2013). This concept relates to Kara and Nabil's

experiences, where their participation provided a means to both uphold the reputation of their school and meet societal ideals of responsible and capable individuals. These insights provide a deeper understanding of the emotional labour that children invest in meeting these expectations. Their experiences highlight the complex interplay between personal ambition, institutional influence, and broader cultural values.

In summary, a participatory initiative involves more than just physical and cognitive engagement—it also requires significant emotion work. A posthuman participation framework integrates emotion work by highlighting how emotions are entangled in human–nonhuman relationships within participatory spaces. Participants often navigate implicit expectations that regulate their behaviour, shape their emotional expressions, and reinforce social norms. Emotion work also necessitates cooperation and mutual support among participants to sustain motivation and engagement. Moreover, power dynamics in children's participatory spaces are deeply influenced by cultural contexts, particularly educational expectations in Indonesia. These expectations not only shape children's behaviour but also drive their motivation to engage in initiatives like Aksiku. Schools, families, and society place pressure on children to excel, reflecting broader cultural values that link education with achievement, responsibility, and moral obligation.

This discussion contributes to the broader argument by showing how children's emotion work is shaped by the power dynamics of remote participation. It advances Bosco and Joassart-Marcelli's (2015) work on children's emotional engagement by integrating a posthuman perspective, illustrating that emotion work is not purely a human-centered experience. Instead, it emerges through interactions with digital technologies, home environments, and broader socio-material assemblages.

The dual role of technology

The shift to online learning significantly impacted children by increasing their reliance on digital devices and platforms. Prolonged screen time on mobile phones and laptops led to physical discomfort and health concerns. Nadia shared her frustration:

"My phone screen time today is already 8 hours and 32 minutes. I have not checked on the laptop yet. I feel dizzy looking at screens for that long, but I can do nothing about it" (Nadia, Online Focus Group 9, 6 November 2020). Nadia's expression of helplessness highlights a critical issue with the situation—the lack of viable alternatives to screen-based interactions. Nabil echoed this concern, "I hate having to stare at the computer screen without taking a break for seven hours. My eyes are tired" (Nabil, Online Focus Group 9, 6 November 2020). On average, children spent seven to eight hours attending online school, not including the additional time they spent on Aksiku. Beyond academic activities, they also engaged in leisure activities like watching Korean dramas, reading online comics, and interacting on social media. These overlapping digital spaces blurred the boundaries between school, personal life, and remote participation, increasing both physical strain and emotional exhaustion. Moreover, having to navigate multiple platforms for remote participation added to the complexity, making it challenging for children to fully engage in the learning process.

Understanding these influences helps to contextualise children's online participation environments. Drawing on Haraway's (1987) "cyborg" metaphor, the following discussion explores how digital learning technology blurs the boundaries between children (the organic) and the mechanical. Complementing this, Grosz's (2001) perspective on virtuality offers insights into the fluid relationship between physical and digital learning spaces, challenging the conventional distinction between the two. Grosz argues that virtual and physical spaces are not separate and must be understood as part of a continuous spatial experience.

In online participation, children embody Haraway's (1987) cyborg metaphor, seamlessly integrating digital technologies into their everyday activities. Their transition from conventional classrooms to digital learning illustrates the cyborg-like fusion of human capabilities with technology. This integration not only reshapes their identities as learners but also expands their capacities for interaction, reflecting the transformative essence of the cyborg concept. For example, Zed and Arif viewed their remote participation in environmental education as a refreshing break from the

monotony of pandemic life. Additionally, children's preferences—such as Rafi opting for smaller group discussions due to discomfort in larger settings—demonstrate the nuanced ways in which children experience and navigate their cyborg existence. Grosz's discussion of virtuality provides a critical lens for understanding how remote participation functions. Nuri's need to balance Aksiku activities with home responsibilities and Faris's frustration with pandemic disruptions illustrate how physical and virtual spaces are intertwined rather than separate. These experiences demonstrate that children's engagement with the virtual environment is not isolated from their real-world contexts; instead, it is interwoven with their physical surroundings, daily routines, and emotional landscapes. While the cyborgian integration of digital technology into participatory environments creates new opportunities for creativity and exploration, it also introduces multifaceted challenges such as screen fatigue, isolation, and emotional strain. These complexities highlight the emotional and spatial negotiations that children must navigate in hybrid learning, emphasising technology's dual role as both an opportunity and a challenge. Recognising children's participation in this way enables a more nuanced and context-sensitive approach to evaluating their experiences.

In summary, this section underscores how human and nonhuman actors co-create children's participation assemblages, positioning children as cyborg entities who dynamically engage across multiple spatial environments. By applying Haraway's and Grosz's theories to reimagine children's participatory experiences, it demonstrates how remote participation expands learning opportunities, despite pandemic restrictions, while also introducing new challenges that children must navigate.

By examining children's experiences and the roles of nonhuman elements in remote participation, this section contributes to the broader argument by illustrating the emotional dimensions that shape children's engagement. By highlighting the need to consider technological and spatial emergence, this study advances Greenwood and Hougham's (2015) critique of the tension between digital technologies and environmental education. It expands the discussion to include the emotional and

affective dimensions of children's engagement with environmental education in digital spaces.

5.3 Conclusion

This chapter has demonstrated how children's participation in environmental education is co-produced through interactions between digital technologies, spatial contexts, and affective experiences. It advances the posthuman framework of children's participation developed throughout this study by illustrating how their engagement in environmental education emerges through entanglements with digital technologies, spatial contexts, and affective experiences, highlighting participation as a dynamic, relational, and contextually embedded process of knowledge production. By moving beyond human-centred approaches, this chapter highlights the distributed agency of technology in shaping participatory spaces, positioning digital tools not merely as functional instruments but as active co-creators of environmental knowledge. Through platforms like YouTube, Google Slides, and WhatsApp, children engage with environmental issues in ways that extend beyond traditional classroom settings, integrating affective dimensions into their participatory processes. It challenges static understandings of environmental education, illustrating how digital participation fosters new ways of knowing, experiencing, and responding to environmental challenges.

In addition to its technological dimensions, this chapter has explored how children's environmental participation is deeply entangled with their spatial and domestic realities, particularly in the context of remote learning. The shift from school-based to home-based education during the pandemic transformed children's learning environments, routines, and emotional engagements, blurring the boundaries between school, home, and digital space. Children had to negotiate their domestic spaces, adapting to the constraints of their households while engaging in participatory activities. These findings underscore the spatial complexities of remote participation, highlighting how environmental education is not only about content

delivery but also about the everyday negotiations of space, technology, and the broader social dynamics.

Finally, this chapter has foregrounded the affective dimensions of children's engagement, revealing how emotions and sensory experiences play a crucial role in shaping their participation. Engaging with environmental issues is not a straightforward process—it is felt, embodied, and deeply influenced by affective intensities that emerge through children's interactions with digital tools, learning materials, and their everyday surroundings. This chapter demonstrates how children's curiosity, frustration, excitement, and reflection shape their engagement, expanding the discourse on environmental education to embrace emotion as a critical force in participatory learning.

Overall, this chapter contributes to broader discussions on children's participation by offering a more nuanced understanding of participatory spaces. Rather than viewing participation as something that happens within predefined physical settings, the chapter expands existing theories—particularly those of Cahill et al. (2007), Cornwall (2004), and Kesby (2007)—by showing how participatory spaces are dynamic social fields shaped by intersecting power relations within digital and physical spaces. A central insight from this chapter is the reconceptualisation of remote participation. It challenges the notion that remote participation is simply a spatial or technological adaptation by demonstrating how it emerges through an assemblage of human and nonhuman actors—including household structures, technological infrastructures, and pandemic constraints. This chapter also deepens the conversation around spatial practices in participatory action research (PAR). Drawing on and extending the work of Mannion (2010), it highlights how techno-spatial arrangements—such as the use of digital tools in domestic spaces—can not only support but also transform participatory processes. By attending to these arrangements, the chapter foregrounds the importance of affective dimensions in understanding how participation is organised and experienced in practice. In addition, this chapter contributes to wider discussions in environmental education by showing how digital and physical spaces are interconnected. By emphasising the role of digital technology

as a mediator in remote learning, it extends Jukes et al.'s (2023) study on technology's role in environmental education. Lastly, this chapter also contributes to children's emotional geographies, exploring how digital and physical environments influence children's emotional responses during remote learning. Extending Bartos (2020), Blazek (2015), and Kraftl (2013, 2016), it examines how emotional geographies emerge from the interactions of human and nonhuman actors in technology-mediated environmental education.

Having discussed techno-spatial integration in environmental education, the next chapter will explore the role of teachers in co-creating environmental education assemblage within school systems. It will emphasise the crucial contributions of teachers in overcoming institutional obstacles and highlight the importance of strategically integrating environmental education into institutional practices.

Chapter 6 The Struggle for Environmental Education in Schools

6.1 Introduction

To address how Indonesian children's involvement in environmental issues can be reimagined through a posthuman perspective, this chapter focuses on the socio-political dimensions of environmental education. It examines power dynamics and tensions within Indonesia's environmental education landscape, highlighting the crucial role of adults in facilitating children's participation. Rather than viewing adults solely as authority figures, this chapter considers their embeddedness within broader power networks, where they navigate institutional limitations and create supportive spaces for children's engagement. It explores how institutional processes shape children's participation and how adults work to secure legitimacy and resources for the Aksiku project in schools. This chapter contributes to a posthuman framework of children's participation by demonstrating how institutional power, adult mediation, and material conditions actively shape knowledge production.

In Indonesia's education system, environmental education is shaped by overlapping institutional layers—including national and regional regulations, school leadership, and teacher agency. It is not always offered as a standalone subject; instead, it could be integrated into existing curricula such as Biology or treated as an extracurricular activity, resulting in fragmented and inconsistent implementation. This marginal status creates ambiguity around its institutional legitimacy, placing the burden of implementation largely on individual teachers. These educators must navigate shifting curriculum priorities, school-level decision-making, and certification constraints, while adapting content to align with their pedagogical values and the practical realities of their schools.

Teachers, therefore, play a central role in shaping environmental education assemblages through their practices, interaction with materials, and engagement with institutional power. This chapter engages with debates on teachers' agency, environmental education, and institutional assemblages by illustrating how

educators navigate and strategically engage with power structures to sustain environmental education. Expanding on discussions of teachers as active agents within institutional dynamics (e.g., Campigotto & Barrett, 2017), this chapter demonstrates how their material practices and activism co-create and sustain environmental education initiatives. Additionally, it extends research on adult roles in children's environmental participation (e.g., Kudva & Driskell, 2009) by showing how teachers both challenge and work within institutional constraints, forming strategic collaborations to ensure the continuity of children's environmental engagement.

The following sections will outline the complex interplay between educational policies, administrative support, teacher agency, and personal motivations in implementing environmental education. Ultimately, this chapter underscores the need for stronger systemic support to cultivate greater environmental awareness and responsibility among young people.

6.2 Examining teachers and state processes

6.2.1 Teachers as agents of environmental education and social reproduction

This section examines the role of teachers as key human actors in shaping environmental education within school settings. It explores how teachers actively engage with practices and materials to co-create children's environmental participation. First, it highlights how teachers conceptualise environmental education, emphasising the importance of hands-on experiences and fostering emotional connections with both the natural and built environments. It then examines how teachers integrate nonhuman materials into their institutional practices, demonstrating how these elements actively shape educational processes and contribute to cultivating environmentally-conscious citizens.

Practising environmental education

A biology teacher, Elina, underlined the importance of hands-on experiences in helping students connect environmental principles to real-world applications.

> Environmental education should involve a lot of practice. Practice that makes them gradually become conscious [of environmental care]. It's not about repeating advice that they already know. So, the children are instead invited to engage directly with more practical activities. In the book I wrote, there's theory and case studies. And then students are encouraged to put it into practice. For instance, after a compost bin is set up, every day they put food waste into it. Then, eventually, they will see the results. They have to understand that the purpose of the compost bin is to manage waste, with [producing] compost being a bonus. Such success should not be spelled out by us; let them [reach conclusions in their language]. So, the practice is done alongside conversation. For example, when they are getting dirty mixing the soil and compost, we talk about why we use sugar. Even though [the explanation] is in the book. I explain why, while inviting them to imagine the biological process (Online Interview 2, 4 February 2021).

Similarly, Roslina, an environmental education teacher, prioritised practical engagement by involving students in activities such as garden maintenance and classroom cleaning.

> Before me, there was male teacher who taught environmental education. He rarely taught students [environmental care] practices. Whereas I teach care [practices], like going to the garden to weed or remove unhealthy parts of plants. I also teach cleaning the classroom. Students at my school rarely handle a broom at home. So, I instil environmental care by encouraging students to tidy up their classrooms. I hope there's a change in the students, no matter how small. But I see that the children are happy when they are involved in cleaning. It's very apparent. They sing while cleaning the classroom. I let them as long as they work. So, I make an effort to shape their character to improve their level of care (Online Interview 3, 10 February 2021).

Her approach contrasted with her predecessor's theory-based teaching style, as she believes these tasks cultivate a sense of responsibility and care for students' immediate environment. Siti, another environmental education teacher, focused on shaping students' habits through consistent practice and reinforcement, encouraging the gradual adoption of environmentally responsible behaviours.

> What is expected is that in their daily lives, they exhibit environmentally conscious behaviour. During the pandemic, we relied solely on online methods. The physical evidence of their environmental concern included

> sending photos and videos. The hope is for a change, because this was about forming habits. Habits don't develop immediately, and their impact isn't immediately noticeable. Initially, habits need to be enforced. Then, with our guidance as teachers, students gradually adopt these habits voluntarily. Starting with coercion, through repeated practice it eventually becomes a habit. For example, bringing a tumbler (Online Interview 1, 4 January 2021).

Elina took a different approach by emphasising the emotional connection between students and the environment.

> I want them to really feel their place in the environment at the beginning—where am I in relation to the environment, who am I, and what should I do. They need to realise that they are not alone in the environment. There are many other beings around them, and all of their actions should take this into account. If they don't, they will be the ones who suffer. [The negative impacts on] nature will eventually [come back to] affect them. They need to understand that they shouldn't act in certain ways, not because they are prohibited from doing so but because they understand the consequences. So, it ends up being about love for the environment, affection. Love is higher than awareness, so, I hope they develop a love for the environment. If they are just aware, they won't do anything. If they care, they start to act. But if they love, they are willing to sacrifice themselves for the environment. However, as a teacher, I need to set an example (Online Interview 2, 4 February 2021).

Elina encouraged students to understand their roles within environmental systems and believed that educators should model a strong commitment to sustainability. Similarly, Roslina stressed the importance of instilling environmental ethics, advocating for a reflective approach, in which students consider the consequences of their actions before taking them.

> In all activities that they undertake, students must understand the principles of environmental ethics. Principles of responsibility, harmony, and justice with the environment. Before engaging in any behaviour, they should think about it first. For example, in the principle of harmony with the environment, one might claim to have principles but, in reality, while talking, they unconsciously pluck leaves or branches from a living tree. Or when camping outside of school, they might gather firewood by plucking live branches or fail to clean up the remains of their campfire. These actions are destructive. So, how can you relate your behaviour to the

> environmental ethics you understand? (Online Interview 3, 10 February 2021).

This reflective practice was aimed at ensuring that students' behaviours align with environmental ethics. Additionally, Elina shared an example of a former student who only realised the significance of their environmental education after entering university.

> There was a student who contacted me on Facebook saying, 'Thank you, for the environmental knowledge you gave us in high school; I'm only feeling its impact now.' So, this student is engaging in environmental activities by forming a community. They carry plastic bags from their boarding house and pick-up trash along the way to their campus. The student then encouraged other friends to participate, and the community grew. So, indeed, the process takes time. It doesn't happen instantly, that students immediately follow what's taught in class. It seems to have an impact later in their personal life (Online Interview 2, 4 February 2021).

Elina's former students applied their high school learning to establish a community focused on sustainability. This example highlighted how the impact of environmental education may not be immediately visible but can manifest later in life.

These findings illustrate the diverse strategies teachers use to foster environmental responsibility, highlighting the role of hands-on learning, ethical reflection, and emotional connection in shaping students' environmental awareness.

My findings highlight how teachers like Elina and Roslina prioritise hands-on activities that directly engage students with their physical environment, signifying social reproduction work. Tanyildis et al. (2021) define social reproduction as encompassing both physical labour—whether paid or unpaid—and various resources such as land, time, technology, financial means, and environmental elements. These factors collectively sustain the existence of both human and nonhuman life, address daily material and emotional needs, shape societal customs, and influence future generations. Applying this framework, environmental education can be seen as an essential aspect of social reproduction. For instance, Elina and Roslina's activities—

such as composting, gardening, and classroom cleaning—require physical effort and resource management, including the use of outdoor spaces, time dedicated to environmental activities, and tools like gardening equipment and compost bins. This work extends beyond economic productivity, emphasising care and responsibility for maintaining the environment. Through activities such as weeding or pruning plants, Roslina teaches students to care for nonhuman entities, reinforcing the interdependence between humans and nature. Similarly, classroom cleaning fosters life skills that ensure a healthy and safe environment—fundamental aspects of daily well-being. The environmental ethics embedded in these practices—such as respecting nature, managing waste responsibly, and cultivating sustainable habits—are more than just school activities. They are societal values meant to be internalised, shaping students' long-term attitudes toward environmental stewardship and influencing how future generations engage with sustainability.

Di Chiro (2008) argues that all environmental issues are, in essence, reproductive issues. This perspective emphasises that protecting natural systems—such as water, air, soil, and biodiversity—is essential for sustaining ecosystems. These ecosystems, in turn, support both human and nonhuman life, ensuring the continuity of production and reproduction processes. By engaging students in hands-on activities, such as waste management and fostering an emotional connection with nature, teachers help them develop an appreciation for the critical role of ecosystems in sustaining life. This experiential learning process embodies the act of caring for and maintaining the very systems—water, air, soil, and biodiversity—that Di Chiro highlights as fundamental to the reproductive system.

Focusing on schools' roles, they serve as vital institutions for preparing children to become responsible members of society. Ferguson (2017) argues that institutions like schools do more than reproduce labour power for capitalism; they also serve to meet human needs, shape social relations, and foster ethical consciousness. This perspective goes beyond a narrow economic view, emphasising the importance of cultivating children's sense of responsibility and awareness of the broader relationships that sustain society. This thesis extends Ferguson's argument by

focusing on environmental relations. Teachers such as Roslina, Siti, and Elina exemplify this approach by equipping students with the knowledge, values, and habits necessary for long-term sustainability. Through practical activities, fostering deep emotional connections with nature, and instilling ethical values, their work reflects the core principles of social reproduction feminism. This feminist perspective recognises the everyday, often undervalued, labour of care and maintenance—typically carried out by women—that sustains both human and ecological life. In the context of these schools, teachers enact this through relational practices such as communal gardening, cleaning shared spaces, and guiding children to nurture both their surroundings and one another.

In conclusion, teachers like Elina, Roslina, and Siti not only actively engage students in environmental stewardship but also embody feminist principles. They incorporate these practices not only to cultivate environmental responsibility but also to affirm interdependence, collective care, and the nurturing of life—values central to feminist ethics. These approaches highlight often overlooked aspects of urban life and contribute to a broader understanding of environmental care. Through their teaching, these educators play a crucial role in social reproduction, shaping students' environmental consciousness and fostering sustainable habits. Their efforts demonstrate how teachers co-create environmental education assemblages, integrating material, ethical, and emotional dimensions into children's environmental engagement. They prepare children not just as future workers but as environmentally conscious individuals who actively contribute to sustaining life (Backer & Cairns, 2021). The following section delves deeper into how teachers incorporate various materials into their practices, further enriching these assemblages and enhancing students' interactions with their environment.

Materiality in environmental education

When asked how environmental education is sustained at her school, Roslina described the ongoing effort required to maintain the programme amidst institutional constraints. Her account reveals that promoting environmental learning often involves active negotiation and justification within a system that does not

inherently recognise its importance. Teachers like Roslina must continually assert the relevance of their work by building trust, demonstrating tangible outcomes, and aligning their initiatives with school priorities. Further analysis of these power dynamics and institutional tensions will be discussed in section 6.2.2.

> We must strive to build [school community] trust. I try to create activities that involved students and show that these activities were beneficial and essential for them. Perhaps the school also feels this. I also try to provide tangible evidence to the school. I show them what I work on with the students. For example, the activity of making terraria. When there are guests [coming to our school], they see and ask for terraria. Even [other] teachers have learned to make terraria with us, creating tangible evidence [for environmental value is key]. We make terraria as a distinctive feature of our school. We have sought something to distinguish SMA Y from other schools (Online Interview 3, 10 February 2021).

The creation of terraria in Roslina's classes served multiple purposes. They were not only educational tools but also a means of connecting with and engaging the broader school community, including teachers and external visitors. In addition, terraria distinguished the school and enhanced its reputation.

> I also teach planting pak choi and lettuce hydroponically, from sowing seeds, nurturing, and harvesting plants to selling. When sold, I give the profits to each class. Each class has a two-metre hydroponic setup in front of their classroom. There are ten classes, each with one hydroponic setup. Pak choi has a short harvesting period of just one month. I divide the students into groups for harvesting, packaging, marketing, and profit reporting. It's funny when harvesting time comes; students sell to teachers. In the end, the profits vary. It really depends on the students' sales skills (Roslina, Online Interview 3, 10 February 2021).

Similarly, Roslina's hydroponic gardening initiative incorporated entrepreneurial elements, as students take part in the entire process—from planting to selling produce. By involving students in these sales, she connected environmental education with real-world business practices, allowing them to see the tangible outcomes of their efforts and reinforcing the economic value of environmental activities within the school. Esti, another biology teacher, also integrated economic

aspects into environmental education. She taught students to calculate the profits from their planting projects, demonstrating the financial benefits of environmental stewardship (Online Interview 5, 23 February 2021). Both Roslina and Esti's approaches highlighted how environmental education must align with a school's value system, requiring teachers to strategically navigate these dynamics.

Esti also emphasised the importance of material practices in shaping environmentally responsible habits.

> In our school, environmental culture is about habit formation, teaching children to care for the environment, both the physical environment and their peers. For example, they shouldn't throw trash in other classes while keeping their own class clean, which used to happen... In our inter-class [cleaning] competitions, we also count how many tumblers are brought. This is combined with cleanliness and other aesthetic scores. The effect of this tumbler assessment is very good. Trash from plastic cups has been greatly reduced... We gathered all canteen employees and announced no Styrofoam, no excessive use of plastic cups. They may only serve students who use containers for buying food, or they must use washable plates, [rather than] disposable ones (Online Interview 5, 23 February 2021).

She instilled mindfulness about the physical environment through simple actions such as proper waste disposal, using reusable tumblers and food containers, and reducing waste. Additionally, she worked with school administrators and canteen employees to implement policies that eliminate Styrofoam, reduce plastic use, and promote healthier eating habits. These initiatives illustrate how environmental education extends beyond the classroom, shaping school-wide practices and fostering long-term behavioural change.

The findings reveal that material elements such as terraria, hydroponic systems, and planting are not isolated components of environmental education. Instead, they are part of broader material practices through which teachers actively shape children's environmental engagement. Drawing on the concept of urban assemblage, which emphasises the intricate workings of power in shaping urban spaces (McFarlane, 2011), these findings provide insights into how material practices intersect with

power dynamics in educational settings. Material practices in environmental education are embedded within the structured and hierarchical environment of schools, reflecting the institutional logic that governs policies and administrative priorities. This logic plays a crucial role in shaping the environmental education assemblage. Teachers like Roslina strategically navigate these power structures by using terraria and hydroponics to demonstrate the value of their activities to school administrators, fellow teachers, students, and visitors. They also include economic aspects, such as selling hydroponic produce and calculating profits, to connect environmental education with real-world entrepreneurial skills. The tangible success of these activities—such as the visibility of terraria and the financial gains from hydroponic sales—reinforces the perception that environmental education is both valuable and integral to the school's mission. This normalises environmental education within the school community and integrates it into the school's identity and narrative. Furthermore, by aligning with the interests of school authorities and stakeholders, teachers such as Esti strategically engage with the power structures of the school to implement and sustain environmental education.

By aligning their initiatives with the interests of school authorities and stakeholders, teachers like Esti leverage institutional power to implement and sustain environmental education. Integrating material practices into school policies allows them to work within the school's hierarchical structure to cultivate environmental awareness and habits among students. This process demonstrates how environmental education is deeply embedded in the social and institutional fabric of schools. Through their engagement with material elements, teachers are able to build trust, involve the broader school community, and foster long-term behavioural change, shaping the environmental education assemblage of their schools.

In summary, this section emphasises the pivotal role of teachers in social reproduction as they co-create the environmental education assemblage while navigating material conditions and power dynamics. Schools, as sites of social reproduction, have traditionally prepared children for societal roles, often with a focus on economic productivity. However, in the context of environmental

education, this role must extend beyond a narrow economic priority, instead focusing on cultivating responsible, environmentally conscious citizens who contribute to the sustainability of life. Moreover, environmental education is embedded in urban assemblages, highlighting how schools intertwine with broader material practices and power dynamics. Under the influence of capitalist logic, schools often prioritise measurable outputs, efficiency, and academic performance tied to economic productivity. These priorities tend to marginalise slower, reflective, and ecologically attuned practices central to environmental care. In this context, the environmental education teachers' material practices—such as gardening, composting, or maintaining shared green spaces—extend beyond their pedagogical function. They become strategic acts of negotiation, allowing educators to challenge dominant institutional values and assert alternative priorities rooted in environmental relations and ethical commitment.

This section contributes to the broader argument by showing how teachers' material practices and strategic engagement with power shape environmental education. Expanding on the work of Campigotto and Barrett (2017) and Jorgenson (2013), it offers a deeper understanding of teacher agency, material practices, and structural tensions within environmental education. While previous studies have primarily focused on teachers' motivations and institutional barriers, this chapter presents a more dynamic perspective—showing how environmental education is actively created, negotiated, and enacted within complex networks of power and material relations. However, as the next section will explore, integrating environmental education within institutional settings also generates new tensions and challenges.

6.2.2 Institutional tensions in environmental education

This section explores the institutional context of environmental education, highlighting the challenges and opportunities that teachers encounter within school systems. It examines how policies, administrative structures, and the broader educational landscape shape environmental education. Teachers navigate curricular and extracurricular approaches, integrate national initiatives like Adiwiyata, and

collaborate with Aksiku to foster environmental awareness. By analysing these institutional dynamics, this section reveals how teachers adapt their strategies to engage students in environmental care.

School curricula

The implementation of environmental education in Indonesian schools, particularly in West Java, involves multiple institutional elements, including government regulations, school leadership, teachers, and teaching certification.

In 2007, the Governor of West Java issued Regulation No. 25 on Local Curriculum Content (LCC) for Environmental Education, marking an official commitment to integrating environmental education into school curricula. This commitment was further reinforced in 2014 when the Indonesian Ministry of Education and Culture (MOEC) introduced Ministerial Regulation No. 79 on Local Content in the 2013 Curriculum. While the regulation does not explicitly mention environmental education, it allows schools to develop ecology-based content relevant to the local context. However, as an elective subject, environmental education remains a low priority in many schools. Its implementation varies, leading to discrepancies between policy commitments and school practices (Darmawan & Dagamac, 2021).

Teachers observed a significant decline in environmental education hours beginning in 2015, forcing educators like Roslina to condense lessons and focus only on basic concepts (Online Interview 3, 10 February 2021). By 2017, some schools had completely removed environmental education from their curricula. This shift may be attributed to changing educational priorities, resource limitations, administrative policies, or shifting perceptions of the importance of environmental education. Further research is needed to determine the specific factors driving this decline.

Teachers reported that school principals had the authority to decide whether environmental education was included in or excluded from the curriculum. This meant that the presence and quality of environmental education depended largely on the priorities and attitudes of individual principals. Many teachers observed a

reduction in teaching hours dedicated to environmental education, with some schools removing it entirely. Ironically, teachers certified in subjects like biology or chemistry found that their credentials did not strengthen their advocacy for environmental education. Instead, when school management deemed the subject irrelevant, their certification became a disadvantage (Elina, Online Interview 2, 4 February 2021).

In Indonesia, professional teaching certification formally recognises a teacher's qualifications and expertise, impacting their status, responsibilities, and remuneration (Faisal & Martin, 2019). However, during what teachers described as a transitional period, even those certified in local content subjects faced uncertainty about their administrative status. While accounts of this transition period varied, all teachers agreed that environmental education could only continue with the principal's approval (Offline Focus Group 22, 22 January 2022). When the principal decided to discontinue it, the teachers felt powerless to challenge the decision, as their subject certification did not support—or even undermined—their ability to advocate for environmental education (Elina, Online Interview 2, 4 February 2021).

Teachers view the environmental education curriculum as essential for legitimising their efforts to engage students in environmental care. They see it as the primary institutional mechanism that ensures environmental education is formally recognised and integrated into school practices. A dedicated curriculum not only reinforces the importance of environmental care but also guarantees assigned teaching staff and allocated instructional hours for the subject. Before their school transitioned to the new curriculum in 2015, Elina and Esti, both biology teachers, felt that having environmental education as a subject validated their roles and made their contributions more valued. However, with the curriculum changes limiting teachers to subjects aligned with their certifications, they now struggle to incorporate environmental education into their lessons. Without an official framework, integrating environmental topics into non-elective subjects, such as biology, has become increasingly challenging.

Teachers recognised the importance of policy and regulatory support in securing the place of environmental education within schools. They believed that its formal inclusion in the curriculum not only legitimises the subject but also provides structure and continuity to its implementation.

> It's easier because there are specific hours and teachers dedicated to [teaching] environmental education. It's more straightforward. Without the environmental education [subject], it would only involve coercion through competition. Maybe it wouldn't resonate with each student. Just because one class looks neat doesn't mean all 36 students feel the same way (Esti, Offline Focus Group 22, 22 January 2022).

Esti's comment underscores the limitations of relying on inter-class competitions as the primary means of promoting environmental practices. In the absence of a dedicated subject, such competitions may serve as indirect forms of pressure rather than fostering genuine engagement. A clean classroom, she argued, may reflect surface-level compliance rather than meaningful internalisation of environmental values. Without formal learning spaces that encourage reflection and connection, student participation risks becoming performative and uneven. Teachers also observed that the removal of environmental education from the curriculum has made it increasingly difficult to sustain student involvement. With full academic schedules and various extracurricular demands, students struggle to find time for environmental activities. As Elina noted: "[Students] simply don't have the time," highlighting the challenge of integrating environmental initiatives without institutional backing (Online Interview 2, 4 February 2021).

The findings outline the evolving regulatory and curricular context. The discretionary power of school principals and the professional certification of teachers have emerged as critical factors influencing the presence and quality of environmental education. Despite official commitments to integrating environmental education into the local content curriculum, the significant reduction in teaching hours—and in some cases, its complete removal—reveals systemic barriers to embedding environmental stewardship within formal education.

Extracurricular programmes

With environmental education removed from some school curricula, extracurricular activities have become the primary avenue for teachers to impart practical environmental skills. Environmental clubs, promoted alongside other extracurricular programmes, provide teachers with a means to continue their commitment to environmental education. However, leading these clubs comes with distinct challenges, as Elina explained:

> So, the bottom line now is that environmental activities at school have become noticeably more difficult [to conduct] after the removal of environmental education [from the curriculum]. The existence of extracurricular activities helps, but only to a limited extent because only a few children participate. I tried shouting, 'Join the environmental club and get extra biology marks!' but it only attracted a few [students], despite the fact that there really were extra biology marks. [The students] said they were interested but claimed [that] they didn't have time. I couldn't force them (Online Interview 2, 4 February 2021).

Participation in these clubs is voluntary, making student engagement unpredictable. Elina's attempt to attract students by offering additional biology marks had limited success, highlighting a gap between her expectations and the students' priorities. In contrast, Esti took pride in her school's environmental club, which played a role in strengthening the school's reputation. She actively sought municipal support for its annual event (Online Interview 5, 23 February 2021). Meanwhile, Elina faced challenges as her school's environmental club pursued agendas that did not align with her vision of environmental care, leaving her unable to intervene (Online Interview 2, 4 February 2021).

These clubs depend on the school's infrastructure, requiring dedicated spaces such as club rooms, schoolyards, and gardens for activities. Their existence is contingent on the availability of these spaces and materials within the school environment. As part of the wider extracurricular system, they rely on the school's overall infrastructure for non-academic activities.

The findings highlight both the challenges and opportunities of positioning environmental education as an extracurricular activity. While these programmes provide a platform for hands-on environmental engagement, their reach is often limited by voluntary participation and conflicting agendas.

Adiwiyata

With environmental education removed from some school curricula, it is essential to examine the role of the Adiwiyata programme in this context. This shift in the educational landscape calls for a closer look at how initiatives like Adiwiyata have adapted in response. The programme presents a significant opportunity to foster a culture of environmental care, making it a key component of schools' environmental agendas.

The Adiwiyata programme has evolved significantly over time. Initially a one-off award initiative, it has developed into a more advanced system. Now, schools receiving the Adiwiyata award undergo evaluation every four years by the Ministry, as outlined in Ministerial Regulation No. P.53, issued by the Ministry of Environment and Forestry in 2019. Teachers viewed this shift positively, as regular assessments ensure that environmental education and practices remain a continuous priority rather than a short-term effort for recognition. This ongoing evaluation ensures schools' commitment to environmental standards. Teachers saw the Office of Environmental Service (OES) as instrumental in this process, exerting pressure on schools and securing principals' support for environmental programmes. Esti pointed out the vested interest of the Bandung municipal government in maintaining environmental programmes in schools. She highlighted that a downgrade in a school's Adiwiyata status (see Chapter 3) would be seen as an embarrassment for local authorities (Esti, Offline Focus Group 22, 22 January 2022).

Esti highlighted that in schools where environmental education is no longer a standalone subject, the Adiwiyata programme plays a crucial role by requiring the integration of environmental principles across all subjects.

> [S]ince environmental education is no longer [a stand-alone subject]… But Adiwiyata requires, one of its points is, the integration of all subjects with the environment. We teachers already know that it must be done. At a minimum, it should be mentioned in the lesson plans, for example, 'Before we start learning, children, please check if your desks are neatly arranged,' because that's one of the points of beauty [as prescribed in Adiwiyata] (Esti, Offline Focus Group 22, 22 January 2022).

She believes that Adiwiyata helps embed practical environmental actions into daily school routines. For example, simple practices such as ensuring desks are neatly arranged or sweeping the classroom before lessons can be incorporated into regular teaching activities in Adiwiyata schools.

Teachers emphasised Adiwiyata's role in promoting environmental education. They noted that the Office of Environmental Services (OES) targets new schools annually as candidates for the programme, which can support environmental education under certain conditions. Firstly, school principals must view Adiwiyata recognition—whether at the district, provincial, or national level—as beneficial to their school's prestige. This belief encourages them to invest in environmental activities. Secondly, municipal government pressure can drive schools to actively engage in environmental initiatives to meet Adiwiyata standards. However, teachers also pointed out a drawback: once a school attains the highest Adiwiyata status, the momentum for environmental activities may decline, as the immediate goal has been achieved.

The process of being nominated for the Adiwiyata programme leads to the formation of an official Adiwiyata team within the school, which is formalised through a decree from the principal. This recognition legitimises the teachers involved, enabling them to implement environmental initiatives more effectively.

To achieve the highest Adiwiyata status, a school must also formally assist other schools in maintaining and improving their environmental status, as stipulated in the Regulation of the Minister of Environment and Forestry No. P.53 (2019). This collaboration is formalised through an agreement letter, which the teachers view as

an opportunity to build a network of environmentally focused schools at the city level. Through these networks, teachers can share resources, exchange knowledge, and collaborate with peers from other schools that prioritise environmental issues. Teachers had high expectations for the Adiwiyata programme, viewing it as a powerful tool for expanding environmental education and fostering a community of schools committed to sustainability (Offline Focus Group 22, 22 January 2022). This indicates the potential of structured programmes such as Adiwiyata not only to enhance environmental practices within individual schools but also to cultivate broader networks that strengthen environmental education at a systemic level.

Teachers emphasised that maintaining Adiwiyata policies in schools requires both top-down support and a genuine commitment at the school level. Esti explained, "It seems that something like this can't be bottom-up. Bottom-up is for our needs, like the needs of the school. But [Adiwiyata] is the need of the city government. If we don't get pushed by those higher up, things will just drag on" (Esti, Offline Focus Group 22, 22 January 2022). Esti expressed scepticism about the continuation of Adiwiyata if it is driven solely by a bottom-up approach. Broader programmes set by the city government require top-down enforcement to ensure consistent implementation and long-term commitment. This connects to the challenge of maintaining momentum, as without external pressure, schools may deprioritise environmental initiatives once the immediate goal of achieving Adiwiyata recognition has been met.

The findings present the Adiwiyata programme as a key national initiative that promotes environmental care practices in schools. In schools without a formal environmental education curriculum, Adiwiyata influences policies and activities, ensuring that environmental concerns are integrated into school practices. When a school applies for an Adiwiyata status, it must establish policies that prioritise environmental initiatives and student involvement. Through Adiwiyata, teachers can secure the principal's support in terms of budget, time, and personnel, thereby strengthening the school's commitment to environmental care. All the teachers I interviewed were appointed as Adiwiyata team leaders in their schools. This

appointment legitimises their role in implementing and sustaining environmental programmes.

Drawing on Katz' (2006) analysis of public divestment of children's play spaces, the declining emphasis on environmental education, the reliance on extracurricular activities, and initiatives such as Adiwiyata represent a form of disinvestment in children's environmental learning. These limitations restrict children's opportunities to engage with and develop ethical environmental practices. The neglect of environmental aspects in social reproduction is evident in the inadequate spatial and material conditions for effective environmental education. Changes in environmental education directly impact social reproduction by influencing children's capacity to confront and address environmental challenges (Di Chiro, 2008; Cutter-McKenzie-Knowles et al., 2019). The less emphasis schools place on environmental education, the more it impacts society's ability to maintain a healthy environment. A diminished focus on environmental education in the school system risks weakening society's ability to sustain a healthy environment.

Barriers to environmental education

Teachers highlighted the difficulty of integrating environmental education into school activities, where academic performance and university entrance preparation take precedence. In Indonesia, subjects deemed essential for economic success—such as mathematics, Indonesian language, English, and specialised disciplines like physics, chemistry, biology, or economics—are prioritised due to their inclusion in national examinations and university entrance assessments. As a result, schools tend to allocate more time and resources to these 'strategic' subjects, often marginalising or excluding environmental education from the curriculum. Both Roslina and Elina reflected on these institutional pressures. At the time of her interview, Roslina was the only remaining environmental education teacher at her school and just three months away from retirement. She recounted a gradual decline in the subject's status:

> There's a high possibility [that when I retire, environmental education will no longer be available starting next semester]. Initially, in 2010, it was still available in all grades and was handled by three teachers. In 2015, it was reduced, and in 2017, it was reduced again. I do feel that gradually environmental education will no longer be part of the curriculum at my school... The issue lies in the specialisation. The total [number of hours] for each subject per week for each student is a maximum of 46 hours. The maximum of 46 hours has to be divided among several subjects. Local content curriculum subjects are elective. The subjects that appear in the national exams [meanwhile] are mandatory lesson hours and additional specialisation hours (Roslina, Online Interview 3, 10 February 2021).

Her account underscores how time constraints and curriculum structures prioritise exam-oriented subjects, leaving little room for local or non-exam content. Elina echoed this concern, noting, "It's just that SMA Z finds it hard to participate in Adiwiyata because students are focused on studying. Environmental activities don't relate [to their success in getting into] university" (Online Interview 2, 4 February 2021).

As the school's Environmental Coordinator, Elina also expressed frustration over the lack of financial support for environmental activities. She often had to cover expenses using her own funds.

> In some other schools, they are valued, but in SMA Z, they're not. What I want to suggest to the OES is that the position of Environmental Coordinator be placed under the Vice Principal as staff. This way, they can be valued, and when there are environmental activities, they can be officially assigned. It's not about expecting an honorarium, but there are times when environmental activities require expenses. This is for the benefit of the institution (Online Interview 2, 4 February 2021).

She strongly advocated for fairer treatment within her school, believing that the environmental coordinator's role should be properly supported and recognised. Similarly, Esti voiced her disappointment and frustration over the contradiction between the school's administrative decisions and its claimed commitment to environmental stewardship, particularly given its status as an Adiwiyata school (Esti, Offline Focus Group 22, 22 January 2022). Despite attending extensive environmental

training and attempting to share her knowledge with the school administration, Esti encountered a lack of enthusiasm and commitment. She pointed to actions that directly undermined environmental efforts, such as the removal of healthy trees and the burning of waste in the schoolyard—practices that contradict the goals of the Adiwiyata programme. Esti was also disheartened by administrative changes that affected the Adiwiyata programme. Despite her dedication and contributions, she lost her official role and recognition, leaving her feeling undervalued. Furthermore, she felt excluded from decision-making processes, citing an unnecessary beautification project for the school greenhouse imposed by the management. Although she disagreed with these decisions, she felt powerless to challenge them, ultimately resigning herself to the changes.

Elina expressed frustration over the difficulty of finding colleagues who genuinely care about the environment and take action to protect it (Elina, Offline Focus Group 22, 22 January 2022). She shared an example of her own efforts to promote recycling and waste reduction by separating and folding used cardboard food containers. However, instead of following her lead, her colleagues simply handed her their used containers, demonstrating a lack of willingness or understanding to actively participate in environmental initiatives.

All teachers emphasised the pivotal role of school principals in supporting and driving environmental initiatives. Elina explained:

> But actually, when I talk to friends who are also environmental activists like me, it's not much different [everywhere]. The school principal really needs to care about the environment to give support. If the principal doesn't care, then [every effort goes to waste]. Schools that were doing well under a previous principal can be ruined when the next principal, who doesn't care as much about the environment, comes in. So, leadership plays a role, even if there are teachers who are consistent in wanting to take care of the environment, but [they can] lose out [if] the principal's policies [are contrary]. But if the principal is enthusiastic [things can still happen]. If the teachers don't want to, the principal just needs to form a team. There are incentives, and then there's performance evaluation. So [even if teachers initially] aren't interested in environmental activities, [they] have to [participate] because they are

> assigned. It's different when the teachers are willing, but the principal isn't, that's difficult. From top to bottom [it's easier], than bottom to top. Right, all policies are from the top (Elina, Offline Focus Group 22, 22 January 2022).

Elina suggested that, while individual commitment is important, the hierarchical structure of schools makes top-down leadership far more effective in mobilising environmental efforts. Further, Esti expressed frustration over the lack of support from the Local Education Office (LEO)—a regional government agency responsible for managing and overseeing educational matters. She highlighted the contrast between LEO's limited involvement and the proactive support provided by other government departments. Teachers often encountered bureaucratic hurdles when seeking LEO's assistance for environmental initiatives—ranging from limited institutional endorsement and the absence of formal recognition for their activities to the burdensome process of securing official recommendation letters, which often required personal lobbying. This fragmented support system leaves educators navigating a complex terrain of limited institutional backing, administrative barriers, and reliance on informal networks simply to sustain environmental programmes in schools.

The findings reveal systemic challenges in integrating and sustaining environmental education in schools. These include the prioritisation of subjects linked to economic success, the lack of support and recognition for environmental coordinators, and a general disinterest from colleagues and school administrators.

Elina and Roslina's experiences reflect the concerns raised by Lightfoot-Rueda (2018) about the "flattening" of the curriculum, where an excessive focus on economic demands sidelines other important areas of learning. This shift means that schools prioritise subjects and skills directly related to the job market or in-demand industries (Mappiasse, 2014), potentially marginalising other vital areas of learning. Elina and Roslina's remarks illustrate how environmental education is overlooked in favour of market-driven subjects. Their efforts to teach practical environmental care and foster a sense of responsibility contrast sharply with the prevailing emphasis on economic

utility. This highlights the broader struggle to ensure that environmental education remains a valued part of the curriculum in an increasingly market-oriented educational system.

Building on Lightfoot-Rueda's (2018) critiques, the study raises a critical question: Is it enough for education to focus solely on preparing students for the workforce, or should it also nurture broader values such as environmental stewardship? This question is particularly relevant in urban contexts, where environmental challenges are more pressing (Frantzeskaki et al., 2017; Chan, 2019). Teachers' commitment to environmental education reflects a response to this concern. By incorporating practical experiences and fostering emotional connections with the environment, they challenge the dominant narrative in Indonesia that education exists primarily to drive economic productivity (Mappiasse, 2014). Instead, they advocate for an approach that not only equips students for future employment but also instils a sense of environmental responsibility. In doing so, they navigate the tension between Indonesia's developmental focus on producing economically valuable human capital (Naafs & White, 2012) and the need to foster ethical, ecologically conscious individuals.

Additionally, Binet et al.'s (2023) concept of "infrastructure of care" highlights how urban infrastructure supports caregiving activities through spatial (physical spaces), social (community networks), and material (resources and facilities) affordances. Applying this framework to education, schools can also function as infrastructures that sustain environmental care. Just as urban settings provide essential resources for caregivers, schools—through national programmes like Adiwiyata and well-designed policies—can establish structures that provide support for environmental care practices. By creating a supportive framework, this approach ensures that environmental education remains embedded in school culture, even amid institutional challenges.

In summary, this section highlights the challenges of sustaining environmental education within an economically driven educational landscape. It examines how

institutional factors contribute to the marginalisation of environmental education, limiting children's ability to develop the critical skills needed to address ecological challenges. In Indonesia's neoliberal context, education prioritises economic and labour market demands, positioning schools primarily as sites for producing human capital. As a result, environmental education is often sidelined in favour of market-oriented subjects. This neglect risks social reproduction by reducing opportunities for children to engage with environmental issues and care practices.

This section contributes to the broader argument by demonstrating how adults are both shaped by and actively respond to institutional challenges in co-creating and sustaining an environmental education assemblage. It builds on the work of Kudva and Driskell (2009) and Freeman et al. (2003), who examine how institutions influence children's participation. Expanding on their work, this section illustrates how adults navigate, adapt, and reshape institutional spaces to sustain children's engagement with environmental issues. It highlights their critical role as adaptive agents who actively shape the conditions that enable children's engagement to persist despite institutional constraints. Additionally, by examining school systems and practices, this study expands the analysis of public divestment from children's spaces (e.g., Katz, 2006). It empirically outlines the tension that restricts children's opportunities to develop ethical environmental relationships, potentially weakening society's capacity to sustain a healthy environment.

6.2.3 Teachers' non-oppositional approaches to effecting change

Change within environmental education is not solely driven by direct conflict or confrontation; it can also emerge through cooperation and integration. This section examines how teachers adopt this approach in their activism, finding common ground and working within existing systems to drive change.

Working within the system

Teachers recognise the importance of building relationships with municipal agencies to gain support for environmental activities. However, they find securing assistance

from the Local Education Office (LEO) challenging due to differing sectoral priorities. A common response from officials is that environmental activities fall under the Office of Environmental Services (OES) and therefore lack dedicated funding within the education sector. Despite this, schools still require the LEO's approval and legitimation for all activities, including those related to the environment. Esti highlighted the necessity of persistence and strategic networking, which enabled her to secure formal support from the LEO:

> So, if we want recommendations, we go directly to the Administrative Office. But we also need a special approach, lobbying, being social (laughs). That's how it is; we have to be brave, we have to insist, and it's kind of like being a tough guy too (laughs). If we wait and are too soft, they will just do as they please (Online Interview 5, 23 February 2021).

Her experience illustrates how educators often need to adopt an assertive and strategic stance to overcome bureaucratic inertia. She described how persistence—and, in her words, being "a tough guy"—was necessary to persuade officials, highlighting the importance of navigating unspoken cultural codes of authority and respect. Rather than relying solely on formal procedures, educators build strategic relationships with key individuals in government agencies, cultivating informal ties through repeated interactions and mutual familiarity. These relationships enable them to secure approvals more efficiently or access resources otherwise difficult to obtain. Such relational strategies reveal that environmental activism within the Indonesian education system is not only pedagogical, but also deeply entangled with navigating institutional power and cultural norms.

Teachers also seek support from other municipal agencies with the resources to assist in school-based environmental activities, such as planting, reforestation, and sanitation. They identified the Office of Public Works, the Office of Health, and the Office of Agriculture as valuable partners, providing plant seeds, funding, and prizes for environmental competitions. Schools also invited officials to attend environment-related events, fostering stronger institutional ties. Teachers appreciated the information shared by municipal offices. For instance, Esti joined a WhatsApp group

managed by the Office of Public Works and occasionally received updates on its cycling activities, enabling her to send students to participate (Online Interview 5, 23 February 2021). This shows how collaboration with government agencies enhances environmental education efforts in schools.

Given the absence of environmental education as a dedicated subject and the lack of resources, teachers proposed establishing a forum for Adiwiyata schools, organised by the municipality.

> After all, schools in Bandung are the pride of the city government. If the schools are in disrepair, it's the city government that will be embarrassed. If we succeed, the city government is happy because it adds to their reputation. What if the OES and the LEO created a forum for Adiwiyata schools to gather? Those that have [achieved the status of] Adiwiyata Mandiri could meet every three months. We are evaluated every four years anyway. So, there should be a forum [for them] to meet (Esti, Offline Focus Group 22, 22 January 2022).

Esti views the government as a key stakeholder in advancing environmental education. She recognises that the success of schools in implementing environmental initiatives is closely linked to the city's reputation and performance in national competitions. This underscores the mutual benefits of collaboration between schools and local authorities on environmental issues. Her perspective aligns with the broader Clean City politics in Indonesia, where waste management and urban cleanliness are top priorities for local leaders (Dethier, 2017). This political emphasis on cleanliness and waste reduction is particularly important in the competitive landscape between Indonesian cities at the national level, where municipalities strive to enhance their reputation and status. Esti's approach is further reinforced by formal regulations, specifically the Solid Waste Management Act (Law No. 18, 2008), which provides a legal framework for community participation in waste management efforts (Damanhuri et al., 2014). This legislation underscores the importance of collective action in achieving environmental goals. Within this political context, Esti believes that the city could take a more proactive role in encouraging schools to engage in environmental initiatives. She suggests that the municipality could support

these efforts by facilitating forums where schools can meet, exchange knowledge, and collaborate. Such initiatives would help sustain programmes like Adiwiyata, ensuring the long-term success of environmental education across the city.

Esti also explained how she secured the school principal's support for her environmental activism. She adopted a strategic approach, aligning her proposal with the interests of the newly appointed principal to gain his endorsement. By framing the environmental initiatives in a way that complemented his career ambitions, she effectively secured his endorsement.

> I just gave him the activity report book. He said, 'This is very interesting. Would you like to continue?' Then I said, 'Oh, if you support this activity, it's not only the school that will be famous, but the principal will also become popular,' (laughs), 'Why?' 'Because I have seen the success of other schools where the principals were acknowledged by the president [if we can achieve the National Adiwiyata]' There's a photo displayed [showing the principal shaking hands with the president] (Online Interview 5, 23 February 2021).

Weekly class cleaning contests exemplify how teachers creatively engaged students in environmental care, despite the absence of formal environmental education classes.

> So, we hold a competition between classes, with evaluations every week. On Monday, it's announced which class is the cleanest, with the highest score, and which one is the dirtiest. That's our strategy (chuckles) because we really want to force the children. I'm the one who insists, because it would be such a pity if the children no longer have environmental education. We have janitors, but that's not good for the students, not good for their education. Thankfully, [the class competition proposal] has been approved by my colleagues and the management staff (Esti, Online Interview 5, 23 February 2021).

Esti viewed these activities as a small but valuable opportunity to cultivate a culture of environmental care within the school community. She considered this the least she could do, especially when the principal showed little interest in environmental education or related activities.

Esti also actively sought to involve younger teachers in various environmental initiatives and leadership roles. She emphasised the importance of ensuring continuity in environmental efforts, even in the absence of official appointments. To strengthen engagement, she included these teachers in communication channels with relevant government departments, ensuring they received timely updates on citywide events and initiatives.

The findings highlight that, despite significant challenges in integrating environmental education into schools, teachers adopt various strategies to navigate these obstacles. These include assertive and strategic engagement with bureaucratic systems, building networks and collaborations with municipal agencies, aligning environmental initiatives with the interests of key decision-makers and creatively engaging students in environmental activities.

Leveraging networks and alliances for environmental advocacy

Teachers regard the Adiwiyata network as a crucial platform for strengthening communication and fostering mutual support among educators across different schools (Offline Focus Group 22, 22 January 2022). This network allows them to exchange experiences, strategies, and insights related to environmental initiatives, thereby amplifying their collective impact. Being part of this network lends them legitimacy, which could be instrumental in persuading more school principals in Bandung to join. This legitimacy is seen as a means of expanding the network, creating a broader community of schools committed to environmental education. The network also serves as a bridge between the Office of Environmental Services (OES) and schools. This intermediary role helps schools stay informed and adequately equipped to implement environmental programmes. Teachers value their experience in integrating their schools into the Adiwiyata programme and see it as an asset for supporting other schools through the administrative process. By sharing their knowledge, they aim to make it easier for new schools to successfully join the programme. Beyond procedural guidance, teachers hope to use this network to develop environmental education content and integrate sustainability programmes into school bureaucracy and administration. Through this network, teachers aim at

assisting one another in developing environmental education contents and embedding environmental awareness into school bureaucracy and administration. This ensures that environmental education is not just a classroom subject but is also embedded in the schools' operational and policy framework. Lastly, they recognise the potential of the network to activate both 'top-down' and 'bottom-up' approaches simultaneously. This involves coordinating with higher authorities like the OES while directly engaging schools—an approach they see as essential for the effective and lasting implementation of environmental initiatives.

Elina expressed both satisfaction and enthusiasm about her involvement in the organisation.

> When I was invited by the [local] Adiwiyata organisation, I was happy, rather than at school [where environmental activities are not valued] Then, when you were (inviting me to participate in) Aksiku, I was really pleased. (Environmental activities in school are only happening when) there is an Adiwiyata assessment, [that's when everyone] gets busy. Within a few days [new facilities suddenly appear]. But on regular days [they are indifferent] (Online Interview 2, 4 February 2021).

Her positive response highlighted how collaborations with external entities could serve as powerful motivators, offering much-needed support and recognition for teachers engaged in environmental activities. Similar to Elina, other teachers expressed a strong preference for collaborating with the Aksiku project, viewing this partnership as highly beneficial for both their students and their environmental efforts.

> I really like Aksiku because it truly involves the students. You get to know the students very well over several months. Most other activities are just for a day. For example, there's a one-day energy-saving training, and that's it. It's just a brief hello to the children. Or, for instance, when there's a competition, you don't meet the individual organisation personnel. But with Aksiku, you meet the facilitators, the individuals, and the activities leave a lasting impression on the students. It's practical. That's why it's really good (Esti, Online Interview 5, 23 February 2021).

The findings highlight how networks among educators facilitate the exchange of resources, experiences, and strategies, strengthening the collective impact of environmental education efforts. These networks not only legitimise and expand environmental initiatives but also serve as crucial links between schools, governmental bodies, and external entities—such as Aksiku—thereby ensuring the necessary flow of support and information for the effective implementation of environmental education.

Embedding environmental topics across subjects

In response to the removal of environmental education from the curriculum, teachers have proactively explored ways to incorporate environmental topics into existing school subjects. Elina, for example, explained how she integrated environmental education into her biology lessons.

> I explain it in relation to respiration. Respiration is related to pollution. Pollution means the air is not fresh. Where does this pollution come from? It can come from burning waste. So, the question arises: why does waste appear? It's because people don't reduce [waste]... And then there's a lot of plastic waste, because there's high usage of plastic. And then there's a lot of plastic waste because of its high usage. Imagine if they used cloth bags [for shopping], then this plastic waste wouldn't appear. And if plastic is left unprocessed [and discarded], it becomes soil pollution. Some burn [their waste], causing air pollution; others dump it in the sea, causing water pollution. So, it's all connected in essence (Online Interview 2, 4 February 2021).

Elina also incorporated environmental education into her entrepreneurship class. "[T]he entrepreneurship teacher retired; I was given the subject" (Online Interview 2, 4 February 2021). In this subject, environmental themes are introduced in the context of developing entrepreneurial solutions to environmental challenges. Similarly, other teachers have integrated environmental topics into subjects such as chemistry and sociology (Research Journal, 2020).

The findings highlight teachers' innovative approaches to embedding environmental themes across various subjects, reflecting their strong commitment to sustaining

environmental education despite its formal exclusion from the curriculum. They must navigate the complexities of incorporating environmental education while adhering to institutional norms and balancing their dual roles as educators and government employees. As Bjork (2003, 2013) argues, these dual roles carry expectations of loyalty and conformity to state agendas—conditions that often complicate efforts to introduce content not explicitly prioritised in national or regional education policies. This tension is especially pronounced in a policy environment shaped by market-oriented imperatives, where subjects tied to economic productivity and university entrance exams are privileged, leaving limited space for nurturing environmental awareness. In response, teachers like Elina strategically embed environmental issues within school-approved subjects such as entrepreneurship and biology. This allows them to maintain institutional legitimacy while advancing their environmental commitments. Similarly, participation in government-endorsed programmes such as the Adiwiyata offers another strategic entry point. By aligning with state agendas, teachers strengthen the presence of environmental education in schools without directly challenging existing school policies.

However, this culture of conformity also imposes constraints. As government employees, state school teachers are discouraged from openly questioning policy decisions, particularly those that devalue environmental education or marginalise the non-economically oriented subjects. In Indonesia's bureaucratic context—where dissent may be seen as a threat to institutional legitimacy or personal authority—open criticism can lead to being sidelined in school decision-making processes or even administrative repercussions. Within these constraints, teachers' actions reflect a form of non-oppositional activism: negotiating institutional expectations while subtly advancing alternative educational values rooted in ecological awareness.

The role of affect and ethics in sustaining engagement

Amidst enormous challenges mentioned above, teachers' engagement with environmental education is deeply shaped and sustained by their personal beliefs, gender perspectives, and spiritual convictions. Their commitment—both personal and professional—is driven by a strong sense of responsibility, fostering resilience

and perseverance in overcoming challenges. These elements contribute to the affective labour that sustains environmental education, ensuring its persistence despite institutional and systemic barriers.

Elina observed a gender disparity in environmental education, noting that women tend to be more actively involved in environmental activities. She attributed this to women's qualities such as patience, attentiveness, and a keen eye for detail, which she believes are essential for environmental work.

> It seems in our school, those involved in environmental [education] are mainly female teachers. Men think, 'ah, that's women's business'. Maybe men aren't as patient. Men probably wouldn't want to fold [cardboard] food boxes. It seems like men prefer things that are practical, simple, and fast. [Tasks like] folding [cardboard boxes take] a long time. [But] work related to the environment requires patience and attention to detail. Men don't naturally lean in that direction. So, in reality, there are indeed more women [active in environmental activities] than men (Elina, Online Interview 2, 4 February 2021).

Elina's reflections underscore the prominent role of women in environmental education, but they also risk reinforcing gender stereotypes by linking this involvement to supposedly inherent feminine traits. Her remarks suggest how traditional gender roles continue to shape perceptions of environmental care as "women's work," particularly when such tasks are seen as laborious and low-status. Esti shared a similar perspective, suggesting that women tend to be more collaborative and content with non-monetary rewards, whereas men may prioritise financial gain and individual recognition. She remarked, "Men, on the other hand, might think, 'What's the point if it's not profitable?' They feel the need to bring something back home, something that's financially rewarding. If it's not profitable, they might as well spend their time on something else" (Esti, Online Interview 5, 23 February 2021). These teacher's narratives reflect what Manjrekar (2013) refers to as the gendering of educational labour—where tasks requiring patience, care, and cooperation are naturalised as feminine, and thus often undervalued. Esti's comments further demonstrate how gender norms influence the way environmental care is taken up and sustained in schools, reinforcing a division of labour that renders

female teachers more responsible for the role. Viewed through the lens of social reproduction feminism, the fact that nearly all teachers involved in the Aksiku programme are women highlights how females continue to bear the responsibility of sustaining both human and nonhuman life, often without institutional recognition or material compensation. These dynamics point to broader structures of gender socialisation, where cultural and institutional expectations encourage women to embrace care-related roles, while subtly disincentivising men from participating in them.

Furthermore, Elina and Roslina were able to sustain their environmental education work despite the challenges because they viewed it as a form of worship (*ibadah*). They saw their efforts to promote environmental care not merely as professional responsibilities but as acts of faith and service to a higher purpose. Elina expressed a deep sense of commitment and fulfilment, stating, "What can I say? I feel it's worship. Everything we do is worship... even though I don't hold any [official] position and there's no reward for it. I do the best I can. Hopefully, it counts as a good deed" (Online Interview 2, 4 February 2021). Similarly, Roslina emphasised that caring for the environment and engaging in community service are also acts of worship. She believed that order, cleanliness, and beauty in the environment are manifestations of IMTAQ (an acronym made up of two words: *iman*—faith, and *taqwa*—God-consciousness), a concept deeply rooted in Islamic teachings. This religious framing aligns with West Java Governor Regulation No. 25 (2007), which incorporates IMTAQ as a basic competency for high school students within environmental education. The regulation translates IMTAQ into concrete environmental behaviours—such as showing gratitude for well-maintained natural environments, keeping surroundings clean and orderly, and avoiding actions that cause ecological harm (West Java Governor Regulation No. 25, 2007). To reinforce this value, Roslina suggested encouraging acts of charity (*infaq shodaqoh*) in the form of tree planting (Roslina, Online Interview 3, 10 February 2021). She argued that such practices would help students understand that environmental stewardship is not only essential for sustainability but also a reflection of their faith and devotion to God.

Teachers demonstrate a deep passion for environmental education, as reflected in their long-term involvement in various programmes. Each has been engaged in this work for over 15 years, with their commitments beginning between 2005 and 2008. Their entry points were shaped by different yet interconnected influences: for instance, Siti's interest was sparked by early exposure to conservation training through an NGO-led programme, while Elina's motivation grew from her success in mentoring students for national-level environmental competitions (Online Interview 1, 4 January 2021 and Online Interview 2, 4 February 2021). Elina believes that teaching environmental education requires genuine enthusiasm and a wholehearted commitment. She explained, "We need to have that passion, and when the students see it in us, they become more convinced and follow suit, which sets it apart from other subjects. In environmental education, it's not just about talking; it's about practising what we preach" (Online Interview 2, 4 February 2021). Elina sees herself not only as a teacher, but as a role model. In her everyday practice, she exemplifies environmentally conscious behaviours—bringing reusable cups to school, sorting and folding food packaging waste, and consistently separating sachet wrappers for recycling. Through such actions, she demonstrates the integration of environmental values into daily life, reinforcing the idea that environmental education is lived, not merely taught.

Teachers consider their dedication to environmental initiatives essential to their professional identity and success. For example, Elina believes that her background in environmental education played a key role in securing her teaching position (Online Interview 2, 4 February 2021). Her successful transfer to a higher-ranked school was largely due to her achievements in helping her previous school excel in the Adiwiyata programme. When she applied for the transfer, the principal reviewed her curriculum vitae and noted that she had authored a handbook on environmental education, published by the Local Education Office (LEO). According to Elina, the book was a product of the extensive knowledge and expertise she had gained through her involvement with the environmental activist community. Copies were distributed to high school libraries, further reinforcing her credentials. She was subsequently

accepted as the new biology and environmental education teacher, and the principal appointed her as the Adiwiyata team leader at her new school.

The findings show that teachers' approaches to environmental education reflect a deeply personal and multifaceted commitment, shaped by their beliefs, gender perspectives, and spiritual values. This dedication goes beyond professional responsibility, positioning teachers as activists who integrate their personal convictions, faith, and advocacy into their efforts to foster environmental care both within and beyond the classroom. In doing so, they transform environmental education into a platform for advocacy.

For Elina and Roslina, environmental education is not merely a professional duty but also a spiritual practice, embodying the principles of Islamic ecological stewardship. This stewardship, deeply rooted in Islamic ethics, emphasises human responsibility to care for and protect the environment. As highlighted by Ammar and Gray (2017) and Arnez (2014), this ethical framework positions humans as *khalifa* (stewards), entrusted with maintaining balance and harmony in the universe through good deeds—a perspective central to these teachers' approach to environmental education. Specifically, they view their environmental efforts as aligned with Islamic concepts such as *infaq* (donation) and *shodaqoh* (charity) in environmental relationships. These efforts extend beyond the classroom to include tree planting, community service, and other acts of worship, reflecting the findings of Cahyaningtyas et al. (2022) and Gade (2019). More broadly, Indonesian Muslims perceive environmentalism as an expression of faith and devotion to God (Cahyaningtyas et al., 2022; Gade, 2019). This belief reinforces their dedication to environmental action as a spiritual duty, highlighting religion as a key driver of their engagement.

These findings highlight the interplay between religious and economic considerations in shaping Muslim teachers' approaches to environmental education. Their commitment to environmental initiatives is influenced by a combination of spiritual and material incentives (Amri, 2021). Elina's reflection illustrates this integration, as

her dedication to environmental care serves both as a religious commitment and a means of professional advancement (Rudnyckyj, 2009). Her perspective aligns with the teachings of popular Muslim self-help trainers and preachers in Indonesia, such as Aa Gym and Ary Ginanjar. As described by Hoesterey (2012), these figures combine Islamic psychology and management theory, framing Islamic teachings through the lens of modern self-help and personal development. This approach resonates with how teachers incorporate religious values into their environmental activism, framing their engagement as both an act of worship and an expression of personal virtue in their professional lives. Crucially, these findings highlight the role of religion and belief in the assemblage of posthuman environmental education. Connecting to the discussion in Chapter 4 on religion, this section highlights the limited engagement with religion and spirituality in existing posthuman theories, revealing a potential gap in the literature that warrants further exploration.

Teachers like Elina and Roslina draw strength from their passion for the environment and their spiritual convictions, enabling them to persist in their environmental activism despite various challenges. They view their work as a form of worship, aligning with Katsikana's (2021) concept of "affective labour" in sustaining resistance movements. Affective labour, as defined by Katsikana, refers to the gendered and often invisible emotional work that supports resistance movements by creating safe spaces and enabling the social reproduction of activism within a hostile environment. Just as gendered and emotional work is essential for sustaining resistance, spiritual convictions provide a foundation that sustains teachers' and students' commitment to environmental care. Teachers' motivations for environmental activism illustrate how the spiritual dimension of affective labour underpins the creation of supportive environmental care movements. In this way, the classroom becomes not only a space where environmental care is taught but also one where it is spiritually understood and actively practised. Ultimately, their ongoing efforts to integrate environmental education into the curriculum, engage with municipal agencies, and navigate administrative constraints highlight the physical labour required to maintain and repair the "infrastructure of care" (Binet et al., 2022) within schools. By considering

these broader influences, this section provides a deeper understanding of how environmental education is assembled through both affective and physical work within state processes.

In summary, this section highlights how change in environmental education emerges through cooperation and integration. Rather than confronting institutional structures, teachers strategically navigate them to sustain environmental care practices in schools. As activists, their influence can be understood through three key aspects: institutional strategies, personal subjectivities, and their role in connecting human and nonhuman actors in the environmental education assemblage. First, teachers' commitment to environmental education extends beyond the classroom, as they engage in strategic networking and institutional manoeuvring to drive change. Their ability to secure support for environmental initiatives relies on their connections with government agencies, schools, and local communities—including Aksiku—while balancing their dual roles as educators and civil servants. Second, teachers' environmental activism is shaped by personal beliefs, including gender norms and spirituality. They view their engagements in environmental education as a moral responsibility and an extension of their personal values, which in turn influence their teaching approaches and interactions with students. Lastly, teachers act as connectors between different stakeholders—students, communities, government institutions—and material elements such as policies and school infrastructure. Their role is essential in sustaining the assemblage of environmental education, where social, institutional, and material forces converge.

This section contributes to the broader argument by emphasising the role of teachers-as-activists in establishing and sustaining environmental care through strategic and collaborative approaches. It builds on the work of Marshall and Anderson (2009) by expanding the discussion on educators as activists, specifically by linking their notion of social justice activism with environmental care. While Marshall and Anderson's work primarily focuses on educators' activism in Western contexts, this study situates their discussions within the Global South. It demonstrates how teachers navigate specific institutional, social, and political constraints to advance

environmental education, offering a nuanced perspective on activism in educational settings beyond the Western framework.

6.3 Conclusion

This chapter has explored the socio-political dimensions of environmental education, demonstrating how environmental education in Indonesian schools is deeply shaped by institutional structures, material conditions, and the agency of teachers as key actors within environmental assemblages. It strengthens the posthuman framework of children's participation by illustrating how environmental education emerges from dynamic assemblages of human and nonhuman interactions, where teachers act as mediators navigating institutional structures, material conditions, and political constraints to sustain children's environmental engagement beyond a human-centred model.

Teachers play a crucial role in environmental education, not merely as educators but as strategic agents who navigate bureaucratic, institutional, and political constraints to ensure the continuity of environmental learning. Rather than directly opposing systemic barriers, they work within existing structures by aligning environmental initiatives with school leadership priorities, leveraging municipal partnerships, and building advocacy networks. Their ability to mobilise resources, negotiate policies, and sustain engagement in environmental education highlights the often-overlooked labour of school teachers on environmental issues.

Beyond institutional challenges, this chapter has foregrounded the role of material practices and social reproduction in environmental education. By integrating hands-on activities such as composting, gardening, classroom cleaning, and hydroponic farming, teachers cultivate a sense of environmental responsibility that extends beyond formal instruction. Drawing on feminist social reproduction theories, this perspective repositions environmental education as a form of care work that maintains environmental health and ensures the continuation of ecological responsibility across generations.

Finally, this chapter advances a posthuman understanding of environmental education by framing it as a dynamic assemblage rather than a static school subject. It moves beyond human-centred models by recognising how nonhuman actors—such as school infrastructure, policies, and natural environments—co-shape environmental participation. Teachers act as mediators among students, institutions, and material infrastructures, ensuring that environmental education remains embedded within school systems despite shifting policies and administrative challenges.

Overall, this chapter contributes to broader discourses on children's participation by offering a more process-oriented and contextually embedded understanding of how participation takes shape. Rather than viewing participation as a static act or outcome, it is shown to be a fluid, evolving practice that adapts to institutional contexts and is shaped by multiple, often competing, forces. It extends the work of Wilks and Rudner (2013) and Hart (2008) by showing how teachers actively leverage their expertise to support children's engagement despite structural limitations. Rather than seeing teachers solely as institutional negotiators, this chapter reveals how their agency is co-produced through interactions with materials, social networks, and institutional forces. In addition, this chapter contributes to wider discussions on social reproduction. Building on critiques by Ferguson (2017) and Backer and Cairns (2021) regarding the role of schools in social reproduction, this chapter expands the discussion by demonstrating how workforce preparation, environmental ethics, and planetary sustainability are deeply interconnected. Instead of viewing schools solely as a means to prepare future workers, this perspective reframes them as a process that cultivates ecologically conscious citizens who navigate multispecies interdependencies and sustainability challenges while also engaging with the realities of economic systems. Lastly, this chapter contributes to broader discussions in environmental education by placing it within wider power dynamics, exposing the socio-political tensions that influence how it is practiced. Using posthuman perspective, this chapter reveals how institutional forces, material conditions, and nonhuman elements co-construct environmental education. By

foregrounding these entanglements, it advances a more relational understanding of how schools function as spaces for environmental care, ethical responsibility, and systemic change.

After discussing socio-political integration in environmental education, the next chapter will explore the organisation of the Aksiku project. Specifically, it will focus on how Aksiku staff and facilitators transitioned during the COVID-19 pandemic and delve into the reflexivity needed to maintain the integrity of the project assemblage.

Chapter 7 Collaboration and Adaptation during Times of Crisis

7.1 Introduction

To address how Indonesian children's involvement in environmental issues can be reimagined through a posthuman lens, this chapter examines the organisational dimensions of environmental education. It argues that adult reflexivity is a critical element in the assemblage of knowledge production, playing a key role in maintaining its integrity. By adopting a reflexive stance, adults recognise how power dynamics influence collaboration, resource distribution, and project orchestration. This chapter contributes to the posthuman framework of children's participation by emphasising the need to critically examine power structures within human–nonhuman interactions, particularly in organisational contexts. Reflexivity emerges as a crucial practice, enabling adults to confront biases, navigate complexities, and gain deeper insights into the forces shaping knowledge production.

To support the argument, this chapter explores the involvement of actors beyond the school–state nexus in an environmental education assemblage. It highlights the pivotal role of the Aksiku Lab, a social enterprise, in developing and implementing environmental education initiatives. By bringing together stakeholders from diverse backgrounds, the Aksiku Lab harnesses their strengths and resources to advance these initiatives. The chapter examines how the enterprise navigates and adapts to shifts in the environmental education landscape, including challenges posed by events such as the COVID-19 pandemic in early 2020. Through an analysis of project organisation dynamics, it illuminates human–nonhuman interactions and the difficulties faced in maintaining a cohesive assemblage during periods of change.

This chapter engages with and extends debates on organisational adaptability, reflexivity, and the role of human–nonhuman elements in shaping project assemblages. It contributes to discussions on children's participation models (e.g., Shier, 2001) and social enterprises (e.g., Defourny & Nyssens, 2013) by illustrating how adults navigate shifting circumstances to sustain environmental education

initiatives within a social enterprise framework. Building on scholarship on organisational assemblages (e.g., Kumar, 2021), this chapter highlights how posthuman interactions—such as the entanglement of digital tools, policies, and logistical infrastructures—shape the cohesiveness of a project, particularly during global disruptions like the COVID-19 pandemic. Furthermore, it extends debates on reflexive practices in organisations (e.g., Smith-Nonini, 2016) by demonstrating their crucial role in maintaining the integrity of the Aksiku project assemblage, ensuring its continuity and responsiveness in evolving contexts. Overall, this chapter builds on Kina's (2012) work by positioning reflexivity beyond personal responsibility of adults working with children, but also as a strategic and collective organisational practice that is crucial for sustaining children's participation initiatives.

The following sections examine the evolving dynamics of the Aksiku organisation, focusing on how interactions among staff and external pressures shape the effectiveness of a children's participation initiative. Key challenges include power imbalances, communication gaps, and varying levels of commitment, all of which must be navigated to sustain the initiative successfully.

7.2 Navigating an environmental education organisation amidst disruptions

7.2.1 Organising environmental education as a social enterprise

This section assembles Aksiku Lab as an environmental education initiative functioning within a social enterprise model, with a central focus on children's participation. It examines how Aksiku's practices are influenced by its organisational structure and how its position as a social enterprise creates both opportunities and vulnerabilities—particularly regarding external funding, institutional partnerships, and long-term sustainability.

Framing a social enterprise approach

The Aksiku Lab operates as a social enterprise in environmental education, characterised by its strong social mission and entrepreneurial activities (Defourny & Nyssens, 2013; Adhikary & Lingard, 2020). It began as a grassroots initiative in 2013,

experimenting with ways to involve children in urban environmental decision-making in Bandung. Over time, it formalised its role through collaborations with government agencies, academic institutions, and community-based organisations. Aksiku sustains its initiatives through a hybrid funding model that includes consultancy work for government agencies, support from international donors, and university research grants (Research Journal, 2019). These funding streams are mobilised in varying configurations—often overlapping—to cross-subsidise different aspects of the project. For instance, donor funding may support field implementation while research grants fund innovation and experimentation. Aksiku is anchored by a small core team—comprising co-founders and project-based staff—supported by a network of volunteers, in line with social enterprise models that blend paid and unpaid work (Defourny & Nyssens, 2013). While its organisational structure remains flexible, this core group leads programme design, fundraising, and overall management. Around it, Aksiku mobilises a rotating pool of facilitators, designers, and local collaborators, whose involvement shifts based on the project needs and resource availability. This adaptable model allows Aksiku to scale responsively while maintaining alignment with its mission and values.

As a social enterprise, Aksiku faces constant economic risks due to its reliance on diverse funding sources all of which are vulnerable to policy changes, market shifts, and evolving donor priorities (Defourny & Nyssens, 2013). This financial uncertainty was evident during the COVID-19 pandemic when Aksiku shifted from government consultancy work to smaller university research grants. The shift underscored Aksiku's ongoing struggle to secure stable and predictable funding. While Aksiku embraces a degree of uncertainty as intrinsic to its mission of delivering social and environmental impact, financial constraints have, at times, necessitated significant adaptations. During the pandemic, the programme was scaled back from 15 participating schools to just 5; at other moments, activities were temporarily halted until new sources of funding was secured. These disruptions highlight the fragile yet adaptive nature of Aksiku's organisational model, where flexibility and

responsiveness become survival strategies for navigating volatile funding environments.

Aksiku brings together diverse actors—including city government officials, Adiwiyata networks, youth groups, researchers, urban planners, architects, educators, and creative professionals such as graphic and communications materials designers—to explore how children can meaningfully participate in environmental decision-making. By integrating multiple forms of knowledge and expertise, Aksiku addresses real-world challenges in children's environmental engagement through a transdisciplinary framework. For instance, in developing participatory learning modules, urban planners contributed spatial insights on city infrastructure and vulnerability, which were then translated by educators and designers into age-appropriate prompts and visual materials. Local youth groups further enriched the process during field explorations by sharing context-specific knowledge grounded in everyday community life. This approach fosters knowledge co-production by bridging disciplinary boundaries and incorporating perspectives from both academic and non-academic stakeholders (Phillips et al., 2013; Gibbons, 2020; Robinson, 2008). However, transdisciplinary collaborations are not without tensions. They are prone to failure when unable to integrate diverse perspectives, anticipate differences among collaborators, or adapt to institutional constraints, leading to ineffective collaboration or even project collapse (O'Rourke & Fam, 2020). Aksiku's experience highlighted these challenges. Although the initiative emerged from grassroots actors, it collaborated with publicly funded institutions such as the Office of Environmental Services (OES), whose institutional structures influenced power dynamics and decision-making processes. For instance, the municipal government expected children's contributions to be formalised into policy recommendations, whereas Aksiku prioritised children's creative autonomy. In another case, OES's rigid administrative procedures, fixed project timelines, and hierarchical decision-making structures limited Aksiku's flexibility and responsiveness. These experiences underscore the complexities of sustaining transdisciplinary collaboration—

particularly when differing expectations, values, and ethical commitments must be continuously negotiated and aligned.

As a co-founder of Aksiku, I played a key role in shaping and expanding the initiative, with my responsibilities evolving at each project phase. During pre-production, I focused on gaining access and mediating interactions between multiple stakeholders, including teachers, school authorities, and district officials, while navigating differing agendas. I also co-developed learning materials, managed funding applications, oversaw project expenses, and handled logistical challenges. In the production phase, I transitioned to project coordination, addressing facilitators' challenges and making real-time decisions, often through digital platforms like WhatsApp (Research Journal, 2019). The COVID-19 pandemic and my doctoral studies further shifted my role to that of a remote practitioner and researcher, requiring me to facilitate online focus groups, conduct remote interviews, and collect data while managing the complexities of digital engagement (Research Journal, 2020). Beyond research, I maintained relationships between Aksiku, institutional actors such as the Office of Environmental Services (OES), and broader stakeholders, including local communities, positioning Aksiku as a bridge between environmental education and municipal policies. These responsibilities, along with the challenges of securing partnerships, negotiating stakeholder access, and aligning diverse agendas in collaborative work (Bennett and Brunner, 2022; Brydon-Miller, 2008), illustrate the emotional and mental strain involved, setting the stage for the discussion on emotional exhaustion and knowledge bottlenecks in Aksiku's organisational structure.

Organisational assemblages and reflexivity

By building on the theoretical foundation of organisational assemblages, Aksiku's experiences highlight the interconnectedness of human and nonhuman actors in sustaining its cohesiveness. Additionally, they underscore the crucial role of reflexivity in shaping decision-making, collaboration, and power relations within an environmental education project assemblage.

Initially, Aksiku relied on face-to-face interactions and collaborative workshops to help children map and address local environmental challenges. However, the COVID-19 pandemic disrupted this approach, forcing the organisation to adapt to the Indonesian government's pandemic measures, including school closures, stay-at-home orders, and the cancellation of public gatherings (Kusumaningrum et al., 2022; Susanna, 2020). These changes exposed Aksiku to operational vulnerabilities, particularly as economic disruptions, isolation, and psychological distress reshaped physical and social landscapes (Pedrosa et al., 2020; Lupton, 2022). While transitioning to digital platforms allowed Aksiku to maintain engagement with children, budget constraints and disrupted collaboration with the OES further challenged its operations, underscoring the need for greater organisational self-awareness in navigating emerging complexities.

The pandemic disruption provided Aksiku with an opportunity to critically examine its organisational practices through reflexivity. In multi-actor dynamics, organisational coherence depends on continuous negotiation, where diverse interests, expertise, and power relations interact through alignment and adaptive reassembly (Li, 2007a). When actors operate with divergent intentions, lack mutual intelligibility, or engage in non-communicative interactions, organisational assemblages fail to cohere, preventing the formation of a sustained or functional system (Huang, 2020; Colona & Jaffe, 2016). Aksiku's experiences highlight the central role of reflexivity in maintaining cohesion, particularly in addressing conflicts, navigating power dynamics, and coordinating multi-actor collaborations in a rapidly changing pandemic environment. Unlike reflection, which involves an internal review of thoughts and actions, reflexivity is outward-facing and relational (Chiseri-Strater, 1996). It critically examines how one's actions are shaped by, and in turn shape, interactions with others and broader conditions. Given the complexity of maintaining organisational integrity during disruptions, this chapter also explores situations where the Aksiku assemblage faces the risk of failing to cohere. The final section will expand on this discussion, examining how the organisation reassembles by conducting reflexive practices to shape long-term organisational sustainability.

Overall, it argues that adults' reflexivity helps them navigate power dynamics and institutional constraints in environmental education projects.

In summary, this section demonstrates the diverse range of actors involved in environmental education within a social enterprise framework, laying the foundation for a deeper exploration of reflexivity in organisational practices. It also underscores the critical yet vulnerable role of the Aksiku Lab—a social enterprise committed to developing and implementing environmental education initiatives. Aksiku fosters collaboration among diverse stakeholders to tackle the challenges of engaging young people in environmental action. Through its transdisciplinary approach, it integrates knowledge, practices, and actors across sectors, positioning itself as a dynamic hub for knowledge production. However, the organisation faces ongoing challenges, including external uncertainties, resource constraints, and the complexities of collaboration. These challenges intensify during crises such as the COVID-19 pandemic, which disrupted the coherence of Aksiku. The next section will explore these vulnerabilities in greater detail, examining how Aksiku adapted to disruptions, restructured its operations, and leveraged digital platforms to maintain the assemblage in rapidly changing conditions.

This section contributes to the broader argument by highlighting the role of social enterprise assemblage in environmental education, demonstrating its adaptability in response to changing circumstances. First, this study extends Shier's (2001) model by moving beyond its focus on child–adult power relations to encompass the broader organisational processes that shape participation. By introducing a social enterprise framework, it reveals how child–adult interactions are embedded within wider power dynamics, which also influence adults' roles, constraints, and decision-making. Second, this study builds on the work of Defourny and Nyssens (2013), Amin (2009), and Bornstein (2007) to advance discussions on social enterprises. Through an empirical analysis of an organisation operating at the intersection of education, environmental action, and children's participation in the Global South, it illustrates how diverse stakeholders and resources are mobilised to sustain knowledge production and participatory engagement.

7.2.2 Crisis, adaptation, and reflexivity in organisational practices

This section examines how the COVID-19 pandemic disrupted Aksiku's organisational assemblage, exposing structural weaknesses and reshaping its modes of collaboration. It explores how digital platforms became central to maintaining project continuity, requiring staff and facilitators to adapt to new ways of working. The discussion highlights how they engaged in reflexive practices to navigate the transition to digital formats, uncovering tensions in remote teamwork, online adaptation, and emotional labour. Drawing on empirical accounts, this section illustrates how reflexivity enabled Aksiku to manage uncertainty and sustain its operations despite the challenges of digital engagement. It further demonstrates that reflexivity is not merely an individual trait but a relational process shaped by human–nonhuman interactions, institutional contexts, and crisis-driven disruptions.

The fragility of remote teamwork

The sudden shift to remote work disrupted Aksiku's staff coordination and workflows, creating challenges such as fragmented communication and unresolved conflicts. This transition also exposed emotional strain, leading to fatigue and tension within the team.

As a designer in the Aksiku project, Anisa played a key role in the organisational assemblage. During the pre-production phase, she provided crucial input on selecting and integrating digital tools and platforms to enhance the project's effectiveness. Each tool served a specific function, helping to streamline workflows and improve coordination. As the project advanced, her role evolved to supporting and guiding staff, particularly in the production phase, when she organised facilitators, ensuring they had the necessary resources and support for effective online engagement. Even after the project was fully operational, Anisa continued to assist the team, ensuring smooth day-to-day operations (Research Journal, 2020; Online Interview 4, 15 February 2021).

The shift to online collaboration presented significant challenges, particularly in conceptualising and developing project content and structure. Anisa reflected on this phase as a period of extensive exploration and experimentation, requiring substantial time and effort before settling on a clear approach. She stated,

> [W]e experimented [with many approaches]. The module kept changing. It's difficult to find a smooth flow... For several months we went back and forth. [Until finally, we decided] to use a very personal and reflective approach. That was quite an exploration (Online Interview 4, 15 February 2021).

The lack of physical meetings further complicated the process of aligning the team's vision, making it difficult for the Aksiku staff to design and develop their environmental education module effectively.

Anisa found it especially challenging to unify the team's ideas when working with new concepts or methods in an online environment.

> My experience is that when we have many [new things like this]. To unify our thoughts, we need to discuss together, and that's hard to do online. Usually, online [work] can be done when each personnel already has a workflow, is already clear. For example, a facilitator's work, there is already a framework, so they can proceed individually... [In our case] If we were still using last year's approach, it might be different. But this time we want to create a new framework. So, there needs to be a lot of dialogue. That becomes difficult for team members whose commitment levels are different, and also with different understandings of what we aim to achieve. So, I think that's where the difficulty lies (Online Interview 4, 15 February 2021).

As Anisa explained, the absence of in-person interactions made it difficult to engage in conceptual dialogue—especially when working with a novel framework such as *assemblage thinking*, which demanded deep, collective reflection. Offline meetings had previously enabled spontaneous idea exchanges, immediate feedback through gestures and expressions, and a stronger sense of shared energy—all of which were diminished in the online setting. Virtual discussions became fragmented, with turn-taking disrupted conversational flow, and the lack of affective cues led to frequent

misalignments and uncertainty. These challenges were further compounded by differing levels of commitment—some team members were constrained by institutional responsibilities, while others were less familiar with the theoretical underpinnings. In contrast, in-person/face-to-face meetings would have allowed for more embodied, iterative dialogue, fostering mutual understanding and clearer alignment of expectations.

Anisa described the adaptation process as complex, involving new team dynamics, evolving concepts, and the challenges of operating entirely online.

> Because of the [limitations in] physical meetings, right. There are many adaptations. First, a new staff, second, a new concept, third, very challenging conditions, everything has to be online. Then, as a team, we must strategise a lot. The character [of each staff] is very different. And each has a different level of understanding [of the Aksiku project] and each has a different [level of commitment] (Online Interview 4, 15 February 2021).

The lack of physical interactions necessitated a rethinking of communication styles, as online meetings—despite providing structured platforms for discussion—lacked the spontaneity and depth of face-to-face brainstorming sessions. Anisa noted that team members often 'waited their turn' to speak during online meetings, making it hard to build on each other's ideas in real time, while the absence of facial expressions and embodied energy reduced emotional connection, causing loss of immediacy and shared rhythm. Aksiku staff struggled to adjust to the digital work environment, where emotional and non-verbal cues were less visible, impacting knowledge exchange and collaborative decision-making.

Further challenges emerged due to disparities in staff involvement and commitment levels. As Anisa reflected, the team operated with a small core and relied heavily on project-based staff, but lacked clear mechanisms for setting expectations or distributing responsibilities fairly. The sudden shift to remote work made this even more challenging, resulting in some members becoming overburdened while others contributed very little—creating stress and straining day-to-day operations.

> I felt that there were some parts that had to be covered by ourselves, or by two people, for that matter. Gita was a bit constrained [time-wise] when she had to finish [her other work]. She was under a lot of pressure from a senior department member. In the beginning, we didn't set our expectations for Ibu Farida because she could only do so much. We each had our agreements in weekly meetings, but maybe from Farida, as a senior academic, we expected she would only appear at specific points. But again, there weren't clear expectations at the beginning because we were confused by the sudden [pandemic] situation (Online Interview 4, 15 February 2021).

Some staff members faced external responsibilities and pressures that limited their contributions, while others had to compensate for these gaps, increasing stress and frustration. She also reflected on the initial lack of clear expectations for a senior staff role, which had not been explicitly discussed or agreed upon at the start of the project.

Towards the end of the project, these challenges culminated in increased tensions among the team. Anisa recalled:

> Actually, towards the end of [creating] the module, I felt there was tension among us, things weren't going well. Maybe we were all tired, and our needs were different and not fully met. So, because I sensed the tension, during the course of the project as [part of] a team, I wasn't very open. So, we just 'followed the book', you know, as we had a system in place, every day was scheduled by me, and every Monday, we had [facilitator meetings], so we just followed that (Online Interview 4, 15 February 2021).

Anisa identified the root causes of conflict as stemming from exhaustion, unmet emotional needs, and a perceived lack of control. Tensions escalated as unequal workload distribution went unaddressed—some staff felt overwhelmed, while others remained disengaged, with expectations left undefined from the outset. Unmet needs included a lack of emotional support, unacknowledged fatigue, and unclear task division. Simultaneously, the sense of lacking control emerged as timelines shifted and remote collaboration limited the team's ability to manage workflow effectively during the pandemic. To restore some structure, Anisa introduced daily

schedules and weekly check-ins, which provided a degree of order. However, these mechanisms were insufficient to address the deeper interpersonal disconnection and emotional strain that had taken root within the team. This situation underscored the difficulty of maintaining staff cohesion and alignment in a rapidly changing and uncertain environment, further illustrating the emotional and logistical strain of remote teamwork.

Overall, this conversation illustrated Anisa's reflexivity in adapting to the sudden transition to remote work, demonstrating her awareness of challenges, iterative problem-solving, and adjustments in collaboration dynamics. It highlights the complexities of co-creating a new framework while navigating uncertainties in remote teamwork, shifting expectations, and emotional strain. Ultimately, it underscores the challenges of sustaining an organisational assemblage in times of crisis.

Armstrong and Cole's (1995) insights on fragmented communication and escalating conflicts in distributed teams are valuable for explaining the challenges faced by Aksiku staff in adapting to remote work. Fragmented communication, as described by Armstrong and Cole (1995), refers to the frequent misunderstandings, information gaps, and misalignments that arise in geographically distributed teams due to the lack of immediate face-to-face interactions. This was evident in Anisa's experience at Aksiku, where the absence of immediate discussions and physical meetings made it difficult to align perspectives during a period of extensive exploration and experimentation. Her reflections also addressed information gaps, as expectations regarding staff roles and contributions were unclear.

Armstrong and Cole (1995) argue that conflicts in geographically distributed workgroups often escalate unpredictably and resist resolution due to fragmented communication and the tendency of remote team members to reinforce local grievances before expressing them, leading to a build-up of frustration and entrenched divisions. This was evident in Anisa's reflections, where there was a reluctance to address staff tensions openly and a tendency to suppress issues until

they became unavoidable. She addressed how misaligned expectations, uneven workload distribution, and unclear role definitions created tensions among team members. She also reflected on how the staff delayed addressing conflicts, allowing negative emotions to accumulate before being acknowledged or resolved.

Despite these challenges, there was a concerted effort to strategise and manage the Aksiku project. Armstrong and Cole (1995) highlight the necessity of creating a sense of unity and shared identity among group members. This was evidenced by Anisa's experience in Aksiku. While remote work and differing levels of commitment created challenges, she reflected that regular discussions and a sense of shared decision-making helped to maintain the team's cohesion, even in a difficult and uncertain working environment.

In addition, Klein's (2021) insights on collective identity help explain the challenges faced by Aksiku staff. The transition from "I" to "We" in collective identity underscores the importance of relational capital—trust, reciprocity, and shared understanding—in fostering teamwork and collaboration. In the early stages of collaboration, teams often exhibit secondary-group relations, where individuals prioritise their own contributions rather than collective goals. Over time, they should move towards a shared sense of purpose, thereby strengthening group cohesion. This challenge was evident in Aksiku, where staff had different levels of understanding of the Aksiku approach, while Gita and Farida lacked a sense of shared ownership. This persisted because initial role expectations were not clearly articulated, and the sudden shift to remote work limited opportunities for collective sense-making. With minimal in-person engagement and a lack of structured onboarding, Gita remained on the periphery in her role as project assistant, while Farida's academic obligations prevented her from engaging deeply, making it difficult to build a shared sense of purpose across the team. Without mutual commitment and alignment, it is difficult to establish a collective identity in Aksiku, reinforcing individualistic approaches ("I" thinking) rather than fostering a cohesive team dynamic ("We" thinking). This lack of cohesion made collaboration more difficult and ultimately hindered Aksiku's organisational coherence.

In summary, the empirical insights reveal the challenges and strategies of managing teamwork in a digital environment. They highlight the fragility of the organisational assemblage, where conflicts in Aksiku stemmed from misaligned expectations, unclear roles, and a reluctance to openly address tensions, leading to accumulated frustration among staff. The absence of immediate discussions and physical meetings further complicated efforts to align perspectives, creating information gaps and reinforcing individualistic approaches. To mitigate these challenges, the Aksiku staff organised regular online weekly meetings—both internal and with facilitators—and used collaborative digital tools such as Milanote and Google Slides to build shared workflows and ensure project continuity. While these strategies supported operational continuity, they were not enough to build a strong collective identity, as emotional disconnection and unspoken expectations continued to affect team cohesion.

Adapting facilitation practices in a digital context

This section explores how facilitators adapted to online facilitation through reflexive practices, transitioning from in-person to digital formats. It examines the loss of intimacy, spontaneity, and natural flow in facilitator–child interactions, which led to frustration, self-doubt, and reduced confidence in their ability to connect. The discussion also highlights the active role of digital platforms in shaping engagement, as facilitators had to manage disruptions and children's shifting attention spans. This underscores that facilitation is not only about human adaptability but also about navigating nonhuman constraints in digital learning environments.

Delayed and fragmented interaction

Facilitators highlighted how online facilitation affects real-time interaction and responsiveness. Unlike face-to-face meetings, which allow for immediate engagement, online interactions are often delayed, fragmented, and prone to distractions.

Fragmented communication in online settings led to a loss of intimacy between facilitators and children. Citra, for instance, observed a diminished sense of

connection during online session with the children compared to in-person sessions, raising doubts about the depth of their relationship (Offline Focus Group 21, 6 December 2020). In offline settings, spontaneous conversations, shared physical presence, and informal exchanges—such as humorous banter (Sundanese: *heureuy*)—fostered emotional resonance and helped build trust more quickly. These relational elements were difficult to replicate online, resulting in slower emotional bonding and a growing sense of disconnection. Citra's reflections underscore the fragility of the Aksiku project assemblage, demonstrating how shifts in interaction modalities can weaken personal connections and challenge overall cohesion.

Similarly, Lutfi noted that the lack of face-to-face interactions created barriers to understanding students. He found it difficult to read their emotions and assess their learning progress (Offline Focus Group 21, 6 December 2020). Other facilitators, such as Nasir, noted the stark contrast between in-person and online facilitation. In face-to-face settings, immediate engagement fosters a dynamic exchange, where facilitators can quickly gauge children's reactions, adjust their approach, and maintain momentum.

> Meeting them in person can [directly] boost [their] spirits, and we receive immediate responses. Our interactions [with the children] are quick [when we meet face-to-face]. However, online, we often have to wait, especially if the children are busy [with school assignments]. In my group, during Zoom meetings when the video isn't turned on, I can't see their responses or gestures while they're talking (Offline Focus Group 21, 6 December 2020).

Online facilitation often involves delays—not only in joining synchronous sessions, but also in eliciting responses or sustaining engagement during asynchronous facilitations, particularly when children are overwhelmed with schoolwork or distracted by multitasking. The absence of nonverbal cues such as facial expressions, gestures, or body language further complicates communication, making it harder for facilitators like Nasir to gauge reactions and sustain meaningful interactions.

Dian raised concerns about smartphone distractions, wondering whether children's focus was compromised by constant digital interruptions. While they might have intended to engage, distractions from their phones could delay responses and reduce concentration. She reflected on her own experience, stating,

> Sometimes, I [know that I] need to quickly follow up with the children, but when I'm on WhatsApp, suddenly a message from my boss at another job pops up. So, I end up responding to the other work-related messages first (Offline Focus Group 21, 6 December 2020).

Her experience underscored how digital platforms blur boundaries between responsibilities, with diverse distractions competing for attention during WhatsApp-based facilitation. These reflections reveal how online formats not only alter the rhythm of facilitator–child interactions but also require facilitators to navigate digital distractions and competing demands, ultimately reshaping the way they sustain engagement. Without proactive adaptation to these challenges, facilitators risk weakening the overall cohesion of the project assemblage.

Loss of depth and authentic engagement

Facilitators highlighted the loss of depth and spontaneity in children's knowledge-building processes. They were concerned that the hands-on experiences that once sparked children's enthusiasm for learning were missing in the online setting.

Dian expressed concern that the depth and spontaneity of children's knowledge-building processes were diminished during remote participation. She noted that, before the pandemic, direct field surveys served as initial triggers that sparked children's engagement with environmental learning.

> So, the process of them gaining knowledge about their environment [before the pandemic] initially had its sparks, its triggers. I can't be sure if the triggering element is still there now. What's missing is the method that brought about those initial sparks. That's why all the children's responses seem normative and quite general (Offline Focus Group 21, 6 December 2020).

Although YouTube videos were an essential part of Aksiku, many children in her group did not watch them in full, which she believed contributed to their declining interest in learning. She observed that their responses lacked depth and critical thinking. She reflected on whether the initial 'sparks' that once ignited children's interest in environmental learning could still be sustained in a digital format. She concluded that the shift away from direct field activities led to lower enthusiasm, reduced interactivity, and diminished engagement.

Lutfi shared that the infrequent synchronous sharing sessions made it difficult for him to get to know his group better.

> … if I only rely on reading their mission reports and asking them questions [asynchronously through chat], I don't get [as many stories]. However, during sharing sessions, the children spoke more freely and even shared some personal thoughts or concerns, like how Budi prefers to have conversations in person rather than online. Such preferences should ideally be identified at the beginning to make the [facilitation] process smoother (Offline Focus Group 21, 6 December 2020).

He stressed the limitations of asynchronous communication, noting that children's digital assignments and chat-based discussions fail to capture the richness of children's thoughts and experiences. He acknowledged that in live sharing sessions, children were more open and willing to express personal reflections, reinforcing the idea that online facilitation struggles to replicate the relational depth of face-to-face interactions. This uncertainty about the effectiveness of their methods contributes to facilitators' feelings of self-doubt and frustration as they navigate the constraints of digital engagement.

These findings highlight that while digital tools enable remote participation, they lack the tangible and interactive qualities of face-to-face interactions—elements crucial for fostering relationships and sustaining engagement. Facilitators must bridge this gap by adapting their methods to maintain interest and connection. However, the constraints of the online environment continue to challenge their ability to sustain motivation, deepen participation, and facilitate meaningful learning experiences.

Disrupted communication styles and cultural nuances

Facilitators highlighted how online facilitation disrupts their usual approach to communication, particularly in building rapport and creating a lively, engaging atmosphere.

Lutfi, for example, expressed frustration at the lack of lively responses in online interactions. His usual approach—starting conversations with humour and light-hearted topics to create a comfortable atmosphere—did not translate effectively into the digital format.

> Now, when I try to present something outside the project content, it's not as lively [as face-to-face]. There's no enthusiastic response. That [lively enthusiastic response] is what I actually expected. I enjoy talking. Serious communication usually starts with me joking around, with light-hearted topics. Maybe it's a Sundanese thing, we enjoy being light-hearted at the beginning. But for this online project, it doesn't work that way (Offline Focus Group 21, 6 December 2020).

He noted the absence of enthusiastic responses, making interactions feel less dynamic and diminishing the natural flow of engagement. Similarly, Dian struggled with unresponsive online group chats, attempting to engage children with cheerful and creative greetings but receiving little interaction. This lack of response made her question her ability to connect with them (Offline Focus Group 21, 6 December 2020). Citra reflected on whether her communication style resonated with the high school students she was working with, wondering if her messages were too forceful or needed to be framed differently (Offline Focus Group 21, 6 December 2020). This highlights how online facilitation demanded a rethinking of engagement strategies, as traditional methods of fostering interaction and enthusiasm were disrupted by the limitations of digital communication.

The findings illustrate the complex impact of digital technology on communication styles, engagement strategies, and interaction dynamics with children. Facilitators had to navigate digital distractions and children's fluctuating attention spans in online

settings, recognising that effective facilitation involved not only human adaptability but also managing nonhuman constraints in digital learning environments.

To address these challenges, facilitators participated in weekly debriefings to refine their approach to online facilitation. These sessions focused on reflective dialogue and continuous learning, helping them to adapt their strategies based on their experiences. Luguetti et al.'s (2023) study of a "contact zone" provides a useful lens for understanding facilitators' experiences. This zone, shaped by facilitator–child interactions, is a socially and politically charged space where diverse perspectives intersect, often marked by tensions (Luguetti et al., 2023). It is evidenced in Aksiku, where facilitators used debriefing sessions to acknowledge disruptions in online engagement, identify the loss of "sparks" in learning, and reconsider the role of informal and nonverbal communication in digital settings.

Weekly debriefings fostered "radical openness", a concept from Luguetti et al. (2023) that describes a collaborative process of critical reflection and dialogue aimed at disrupting power dynamics and fostering shared understanding. In Aksiku, this openness was evident as facilitators engaged in self-examination, identified challenges, reassessed their roles, and adapted their strategies collectively. This reflexive process allowed them to navigate tensions and refine engagement methods within the evolving assemblage of online facilitation. Their experiences in these debriefings highlight the importance of a learning laboratory as an interactive space where facilitators collaboratively reflect, challenge assumptions, and co-create knowledge, actively negotiating power and privilege within a participatory setting.

In summary, this section examines how Aksiku staff and facilitators navigated and adapted collaborations during the COVID-19 pandemic, focusing on the reconfiguration of the organisational assemblage to sustain the project. It highlights three key aspects: collaborative work restructuring, organisational vulnerabilities, and the emergence of a learning laboratory approach in response to these disruptions. First, the shift to digital engagement required a fundamental restructuring of collaboration, as Aksiku staff had to rely on digital tools to coordinate

their efforts and sustain the integrity of the project assemblage. Facilitators adapted their engagement strategies by learning to use digital tools effectively and modifying their communication styles to maintain meaningful interactions with child participants. As collaboration became increasingly dependent on digital mediation, technology itself played an active role in shaping team dynamics, influencing communication patterns, triggering tensions, and contributing to uneven workload distribution.

Second, Aksiku's vulnerabilities became more apparent, requiring a nuanced analysis of team dynamics, technological adaptation, and operational challenges. As the next section will demonstrate, these vulnerabilities were shaped by personal motivation, institutional support, and resource management—all crucial for maintaining project cohesion. Reflexivity was essential in recognising these vulnerabilities, allowing Aksiku to adjust its strategies while balancing the challenges of remote engagement and organisational sustainability.

Finally, beyond logistical adaptations, Aksiku functioned as a "learning laboratory"—a reflective space where staff and facilitators critically assessed their approaches and refined their strategies. This reflexive practice helped them respond to the shifting dynamics of children's participation, particularly within the constraints of the pandemic. By embedding reflexivity into its organisational practices, Aksiku was able to manage uncertainty and continuously evolve in the face of adversity.

This section contributes to the broader argument by demonstrating how reflexivity maintains the cohesiveness of a social enterprise assemblage. It builds on Kumar's (2021) insights by exploring how a social enterprise in environmental education continuously navigates moments of cohesion and fragmentation through reflexive practices, especially during the global pandemic. Additionally, it highlights the interplay between human actors and digital technology, demonstrating how continuous adaptation to new modes of communication, facilitation, and collaboration shapes engagement in digital spaces.

7.2.3 Reflexivity, care work, and learning from organisational tensions

This section examines how facilitators' engagement with children encompasses care work, emphasising its ethical and political dimensions in children's environmental participation. It also explores how organisational pressures impact staff well-being, contributing to emotional exhaustion and knowledge bottlenecks. By framing organisational tensions and breakdowns as opportunities for reflexivity, this section highlights how discomfort and uncertainty foster deeper learning and resilience.

The politics of care and reflexivity

Facilitators such as Dian and Citra stressed the importance of recognising limitations, practising empathy, and letting go of perfectionism, especially in online facilitation where many factors are beyond their control. For Citra, perfectionism meant expecting a seamless process where all children completed their missions on time, fully engaged with each assignment, and demonstrated visible change.

> Every child has a different character. While their school schedules may be similar since they attend the same school, they are also influenced by their home conditions. I've noticed that some children even help their parents at home. That certainly consumes their time and energy, in addition to schoolwork and project activities. So, not all children can be treated the same way. This has taught me to be more empathetic and patient. I also agree with what Dian said. I've learned to say to myself, especially since I'm a perfectionist, that due to these circumstances, I've learned to be more capable of saying, 'Okay, Citra, this is enough. It's not about you, but about the children's process.' Your level and the children's are different, your situation and theirs are different, and it's all about the development of the children. So, let them be, don't intervene. The important thing is that they've been through the process, the output is visible, their effort is visible. Whatever the result, their effort is already apparent, their progress is evident, so let's just appreciate it. There's no need to be overly perfectionist (Offline Focus Group 21, 6 December 2020).

Citra's expectations were challenged by the fragmented nature of online learning, prompting her to shift toward a more process-oriented facilitation style—one that valued emotional attunement, adaptation to each child's pace, and appreciation of partial progress, such as a child choosing to join the final session despite incomplete

assignments. Acknowledging the diverse circumstances that shaped each child's engagement—such as home responsibilities and fluctuating energy levels, Citra learned to step back and acknowledge children's progress, rather than focusing solely on outcomes, demonstrates reflexive engagement with her own facilitation mindset.

Lutfi, focused on illustrating interconnections within children's digital mission, positioning himself as a co-learner alongside them.

> When I facilitate, it's more about wanting to see things from the children's perspective. When they have opinions A or B, then I try to offer my own perspective, how I see it. Like, when I redraw their missions. I attempt to summarise all of their missions, and it's clear that all of these issues are interconnected. Even if you throw trash around your home, it can eventually end up in the sea or the river. That's my perspective. Now, I want to know how the children see it. So, I don't feel like I know a lot about environmental matters; instead, I'm trying to learn a lot from them. I have this thought, like, what do you think? I want to know (Offline Focus Group 21, 6 December 2020).

Lutfi's approach further exemplifies reflexivity through his intentional positioning as a co-learner and his adaptive response to online constraints. By redrawing and reinterpreting children's missions, he affirms their ideas while making his own meaning-making process visible. His admission that he is "trying to learn from them" reflects a critical awareness of his own role within a participatory learning environment. Through context-sensitive strategies—such as visual approach and the use of his sketching skills—Lutfi sustains connection and deepen engagement, demonstrating the value of reflexivity in navigating digitally mediated settings.

These findings illustrate facilitators' reflexive practices in adapting their approaches to children's diverse needs and learning processes. Facilitators fostered a sense of care, creating a more responsive, empathetic, and effective participatory environment. "Care refers to a situated and vital everyday maintenance practice (often referred to as 'care work'), an affective engagement, as well as an ethico-political obligation to challenge unequal power relations" (Staffa et al., 2022, p. 48). Tronto (1993) identifies four key elements of care: caring about (recognising the need

for care), taking care of (assuming responsibility for providing care), care-giving (the actual work of care), and care-receiving (the response from the care recipient). These elements highlight that care is not only an action but also a moral practice shaped by attentiveness, responsibility, competence, and responsiveness. This framework is evident in facilitators' experiences. First, Citra demonstrates caring by recognising the diverse home conditions of the children and the additional responsibilities they bear, such as helping their parents. She transitions to taking care of by adjusting her expectations, acknowledging that each child has different capacities for engagement. Her decision to let go of perfectionism reflects care-giving, where she prioritises the children's process over rigid outcomes. Lutfi, meanwhile, embodies care work through a relational and dialogic approach. His method of redrawing children's missions illustrates taking care of, as he actively helps them see the interconnections between environmental issues. Rather than imposing knowledge, he positions himself as a co-learner, valuing the children's perspectives and fostering reciprocity in knowledge exchange. This responsiveness to children's viewpoints aligns with care-receiving, ensuring that their agency and lived experiences remain central to the learning process. Through these practices, both facilitators create an ethic of care that sustains an inclusive participatory space. Care is fundamental in facilitating children's participation, as it fosters trust, responsiveness, and ethical engagement, enabling adults to navigate power dynamics, adapt to children's needs, and create an inclusive space (Torre & Fine, 2008).

In summary, this section demonstrates how reflexivity extends beyond critical self-awareness to caring for and sustaining relationships with child participants, shaping how knowledge is produced in environmental education.

Rethinking failure

This section examines how the experience with "failure" when coping with crises brought by the COVID-19 pandemic prompted reconfigurations within the Aksiku Lab assemblage. It begins by describing moments of conflict and discomfort, drawn from staff discussions as well as my journal entries. This section uses this reflexivity to explore the idea of failing to cohere—including sense of failure, tension and

vulnerability—within transdisciplinary collaboration. Rather than viewing these moments as setbacks, the discussion moves towards the notion of reassembling, highlighting how such experiences can become part of a successful and evolving collaborative process.

Aksiku staff openly shared the emotional toll of sustaining Aksiku under challenging circumstances.

> Shinta: [During the project] I just didn't have the energy to [write] comment on each child's [submitted] mission individually [as we planned]. I had to attend every [online] workshop for children. If it was just one per day, it would be almost every day.
>
> Anisa: Yes, we didn't have [check-in] meetings with the internal team either.
>
> Shinta: Right. We didn't have the energy [for the check ins]. What do you think?
>
> Anisa: Well, I feel like we miscalculated. When we were creating the [module] content, we were all pretty clueless. I was, well, clueless about going digital, clueless about the new concept, clueless about everything. Everyone had their own anxieties. So, we ended up exhausted by the time we finished the module [but project production hadn't even started yet]. And yes, our team is quite small. Seeing as Ibu Farida couldn't participate much, that was a bit challenging. So, when it was time to run the project [production], I was already tired, I was exhausted.
>
> Shinta: Yes, that's true and it should be noted that I felt the same way. [I felt that] the peak of this project was when the module was completed (laughs). But, it wasn't. The peak was when the children started the [participation] project. There were so many things to learn. We were all so clueless in this entirely new situation. For me, there were many responsibilities, including the processes involving teachers and children. [It resulted in] many anxieties, as you mentioned. Even the process of creating the module itself was a massive undertaking. I felt like creating the modules was like running a marathon. The student workshops also required a lot of energy. So, it really should be highlighted that, in my opinion, designing online workshops turned out to be...

Anisa: Exhausting (laughs).

> Shinta: Very exhausting. In the middle of the project, in November, I couldn't get out of bed for two days because I was completely drained. Managing the teachers' [regular meetings] was also exhausting. It was truly beyond [my expectations]. The energy required was much more than anticipated. And the small team issue is true. It was just the two of us, towards the end of the project (Online Interview 4, 15 February 2021).

The emotional toll expressed in Shinta and Anisa's conversation reveals the overwhelming fatigue and burnout experienced by Aksiku staff as they navigated the complexities of remote project implementation. They describe feeling physically and mentally drained due to the intensity of their responsibilities, particularly the demands of developing digital modules, facilitating frequent online workshops, and managing school's engagement—all within the constraints of a small team. Their reflections further highlight a miscalculation in workload expectations, as they underestimate the energy required for both content creation and project execution. The transition to digital facilitation, coupled with uncertainties and anxieties about the new format, compounded their exhaustion. Shinta's admission of being unable to get out of bed for two days underscores the depth of their fatigue, illustrating how the emotional and intellectual demands of distributed teamwork led to severe depletion. This discussion sheds light on the challenges of sustaining engagement and motivation when team members are stretched beyond their capacity, revealing the critical need for better workload distribution and institutional support in a social enterprise.

The narrative took a deeper turn with Gita's perspective, revealing underlying issues in staff engagement. Gita, a project assistant, reflected on her limited involvement during a staff–facilitators meeting:

> I am Farida's assistant; she is a lecturer who collaborates with Aksiku Lab to run the Aksiku [project]. [I was involved] until the early facilitators meeting. But after that meeting, I didn't really participate much; I mainly observed [activities to create the social media content] because I handled

> the [Aksiku] Instagram account (Gita, Offline Focus Group 21, 6 December 2020)

Gita's statement reflects a sense of detachment from the core activities of the Aksiku project. While she initially participated in the early stages, her role gradually became more peripheral, limited to observing and managing social media content rather than actively contributing to project implementation. As a junior assistant appointed by ITB, this detachment may have resulted from unclear role expectations, limited experience in collaborative projects, or a lack of deeper connection with the project's objectives. Her positioning as a senior staff assistant rather than an independent contributor further reinforced her disengagement, highlighting a disconnect between her role and the broader project goals.

The conflict extends to my disappointment regarding my position within the Aksiku project. In my research journal (2020), I reflected on the centralisation of my role, the resulting knowledge bottleneck, and the disparity in staff involvement. My role became too central and irreplaceable because staff were not engaged in all key aspects of the project. As Anisa noted, "Multi-stakeholder [collaboration] feels exciting. But I'm not directly involved with the municipality or the teachers. The scope is really huge [for me]. That's why I somewhat limit myself" (Online Interview 4, 15 February 2021). She deliberately narrowed her focus to specific tasks to manage her workload, which ultimately concentrated knowledge and decision-making in me. Collaboration in Aksiku required extensive preparation, from drafting proposals to handling logistics, much of which fell under my responsibility. While broader collaboration brought complexities due to differing communication styles and stakeholder interests, I realised that Aksiku staff needed specific set of skills, knowledge, and resources to navigate these challenges—especially during the unexpected shift to digital collaboration (Research Journal, 2020). This became even more challenging without team members had both the time and expertise to take on key responsibilities. Additionally, Aksiku staff acknowledged that while they valued their involvement in the project, their main priority was securing financial stability for their families (Research Journal, 2020). The organisation's financial instability,

worsened by the transition to smaller university grants, further constrained staff capacity and commitment, increasing the risk of Aksiku's assemblage failing to cohere.

The transition to remote working increased the risk of Aksiku's assemblage failing to cohere by exposing and intensifying several underlying vulnerabilities. Firstly, institutional shortcomings—such as limited support systems and inadequate communication—created uncertainty and hindered effective collaboration. These gaps made it difficult for the team to navigate new working conditions smoothly. Secondly, knowledge bottlenecks emerged, where decision-making processes became concentrated in only a few individuals. This not only slowed down workflows but also created uneven workload. Thirdly, emotional strain played a significant role: staff members faced heightened stress and self-doubt, particularly as responsibilities became unevenly distributed and centralised leadership left little room for shared decision-making. The lack of mutual understanding and a sense of shared ownership among team members further eroded collective commitment. Altogether, these factors interacted in ways that disrupted the coherence of Aksiku's organisational assemblage, making it increasingly difficult to sustain a sense of unity and collaborative purpose.

Despite these challenges, Aksiku demonstrates the potential for reassembly (Li, 2007a). Through reflexive practices, Shinta and Anisa's conversation highlight how openly acknowledging exhaustion, uncertainty, and the pressures of remote work enabled critical self-examination within the organisation. Rather than suppressing discomfort, they confronted it, aligning with Pillow's (2003) argument that discomfort can serve as a catalyst for deeper learning and organisational change. By embracing this reflexive approach, Aksiku began to uncover wider issues that were hindering effective collaboration. Miscalculations in workload distribution, time management, and knowledge centralisation underscore the complexities of working together to support children's participation, reinforcing the need for distributed responsibilities and institutional support. The shift to remote work further intensified these challenges, exposing gaps in organisational practices. By embracing discomfort,

Aksiku demonstrates its potential for reassembly by addressing emotional strain, institutional issues, and setbacks in collaboration.

First, Aksiku shows the potential for reassembly by acknowledging and working through the emotional impacts of the pandemic. Although the emotional strain heightened existing tensions within the organisation, it also opened up space for reflexive practices and more ethical ways of working together. Scholars such as Hubbard et al. (2001) and Phillips and Kristiansen (2013) remind us of the emotional dimensions embedded in collaborative work, particularly when navigating unexpected tensions and dilemmas. Within Aksiku, staff were required to juggle personal and project responsibilities, navigate exhaustion, and cope with institutional limitations—circumstances that exposed vulnerabilities. Clift et al. (2023) suggest that these vulnerabilities, when acknowledged, can become a productive force. In Aksiku's case it opens up space for dialogue, care, and rethinking roles and expectations within the team. Rather than collapsing under pressure, Aksiku began to demonstrate a capacity for transformation. By recognising the emotional strain as integral to the collaborative process it prompted deeper critical engagement with the organisational practices.

Second, Aksiku demonstrates the potential for reassembly by revealing the broader institutional issues in collaboration. Gray (2008) argues that successful collaboration requires a balance between personal motivation, institutional support, and external resources. While Aksiku staff demonstrated strong personal commitment—Anisa, for instance, persisted despite exhaustion—limited institutional support and a small team size proved to compound these challenges. Without sufficient funding and structured organisational mechanisms, staff were left to navigate the complexities of remote work with minimal resources. These constraints reinforce the need for stronger institutional frameworks to sustain socially impactful initiatives (Martinelli, 2013). Aksiku's reflexivity has opened up conversations about long-term sustainability, prompting the staff to reconsider their funding strategies and seek new forms of collaboration to ensure more stable resources to support children's participation initiatives.

Finally, Aksiku highlights the potential for reassembly by turning setbacks into opportunities for transformation and growth. In line with Klein's (2020) view that failure should be reframed as part of an evolving learning process, Aksiku responded not by retreating but by engaging in opportunities to reassess working practices and relational dynamics. While initial struggles with workload, digital adaptation, and knowledge bottlenecks were perceived as failures, they contributed to a deeper understanding of how transdisciplinary collaboration works—especially when it involves children, schools, and a wider range of stakeholders. Viewing these challenges as learning opportunities fosters resilience and adaptation, allowing Aksiku to refine its approaches and develop more sustainable strategies over time.

In summary, this section has explored the role of reflexivity, productive failure, and care work, highlighting their significance in addressing and managing challenges within children's participation initiatives. First, reflexivity is essential to the success of these initiatives as it requires creating spaces where adults can critically engage with their personal experiences, biases, and subconscious reactions—both shaping and being shaped by the project. Crucially, reflexivity situates these personal experiences within broader organisational contexts, acknowledging the systemic influences on individual roles and decisions. It also involves recognising the emotional strain—such as increased workload, fatigue, uncertainty, lack of interaction, and pressure to adapt—and the feeling of failure faced by adults, especially during crises like the pandemic. By reflecting on these discomforts, organisations can critically identify challenges, implement necessary shifts, and strengthen organisational resilience to better support children. Second, care work plays a crucial role in effective facilitation. Integrating care work principles means recognising limitations, fostering empathy, and maintaining flexibility in navigating complex situations. These practices ensure that children’s needs remain central to the project's objectives.

This section contributes to the broader argument by illustrating the crucial role of reflexive practices in maintaining the integrity and coherence of the project assemblage. It expands Smith-Nonini's (2016) concept of reflexivity in social enterprises by demonstrating how systematic reflexive practices are intentionally

integrated into project strategies. It also highlights a more detailed view of the relational nature of reflexivity, illustrating how organisational efforts emerge through dynamic interactions among facilitators, staff, an academic researcher, digital technologies, resources, institutions, and children. This section demonstrates failure as an integral part of knowledge production in organisation, offering opportunities for critical reflection and structural adaptation. By unpacking these interconnections, this study reveals the specific human and nonhuman elements that both shape and complicate efforts to sustain children's participation initiatives.

7.3 Conclusion

This chapter has explored the organisational dimensions of environmental education, focusing on the role of a social enterprise in developing and implementing environmental education initiatives. It strengthens the posthuman framework of children's participation by illustrating how environmental education operates as an evolving assemblage shaped by human and nonhuman interactions, where organisational adaptation, reflexivity, and care work are essential in sustaining participatory initiatives and navigating power relations, reinforcing the idea that children's participation is a dynamic, relational, and contextually embedded process of knowledge production. The case of Aksiku Lab demonstrates how social enterprises must continuously adapt, negotiate, and reassemble to sustain an environmental education initiative, particularly in times of crisis. It argues that adult reflexivity is essential for maintaining this initiative, as it allows practitioners to navigate power relations and organisational constraints while ensuring that children's participation remains dynamic and responsive. Additionally, this chapter highlights the affective and ethical dimensions of care work, showing that sustaining participation requires ongoing emotional labour and that failure should be seen as an opportunity for deeper organisational learning. Furthermore, it emphasises how human–nonhuman assemblages influence organisational adaptation, recognising the roles of digital tools, funding structures, and logistical infrastructures in shaping knowledge production.

A central contribution to the thesis framework is the chapter's critical engagement with reflexivity as an essential organisational practice. The COVID-19 pandemic underscored its necessity, as Aksiku staff and facilitators had to critically reassess decision-making, workload distribution, and emotional labour while transitioning to digital platforms. Reflexivity thus emerges as a crucial tool for sustaining collaboration and maintaining the integrity of environmental education assemblages, particularly in contexts of instability and uncertainty.

Additionally, this chapter contributes to critical discussions on failure and organisational adaptation. The challenges faced by Aksiku—including role ambiguities, struggles with digital adaptation, and team burnout—reveal that failure is not simply a breakdown but a productive space for learning and reconfiguration. The emotional and ethical dimensions of sustaining participatory initiatives are often overlooked; yet, they play a crucial role in the long-term viability of organisations. By framing failure as an integral part of organisational assemblages, this chapter challenges success-oriented narratives and calls for a more nuanced, care-oriented, and adaptive approach to sustaining children's participation.

Overall, this chapter contributes to the discourse on transdisciplinary collaboration, by reinforcing the idea that collaboration is not a fixed framework but an evolving assemblage, shaped by practices that ensure project integrity in times of change and uncertainty. By highlighting the importance of reflexivity and care in sustaining children's participation initiatives under challenging conditions, this chapter advances Robinson's (2008) argument on reflexivity in transdisciplinary research. It demonstrates how a posthuman approach integrates human and nonhuman actors into the reflexive process. This chapter expands on Augsburg's (2014) discussion of how individuals learn to be "transdisciplinary" by illustrating how transdisciplinary practice emerges from relational entanglements rather than individual efforts. It shows how Aksiku staff and facilitators learn and adapt, cultivating transdisciplinary attitudes, capacities, and competencies by engaging with the posthuman complexities of cross-sectoral collaboration and changing contexts.

The thesis concludes that the posthuman framework of children's participation conceptualises their engagement as a dynamic, relational, and contextually embedded process of knowledge production. Rather than viewing participation as an individual act of agency, it recognises participation as an emergent assemblage, where children's environmental learning, advocacy, and transformation are co-produced through interactions with socio-material, techno-spatial, political, and organisational forces. In the following chapter, the thesis summarises how children's participation is shaped by entanglements between human and nonhuman actors, including adults, peers, materials, technologies, institutional structures, organisational practices, and spatial contexts.

Chapter 8 Conclusion

8.1 Summary of results and findings

This thesis sets out to answer the question: How can we reimagine the involvement of Indonesian children in environmental issues to recognise the dynamic interaction between human and nonhuman actors in shaping environmental participation? In answering this question, the thesis establishes the foundation for developing a posthuman framework for children's participation—conceptualised as a relational and contextual process of knowledge production, shaped by entanglements with material, technological, and institutional forces. Through a critical review of existing literature, it identifies key gaps in understanding children's transformations, the role of technology, and the influences of adults in shaping children's environmental engagement. To address these gaps, this thesis examines an environmental education initiative in Indonesia from a posthuman perspective, emphasising the dynamic process of assembling and the agency of nonhuman elements in environmental learning and advocacy. By foregrounding this interconnection, this thesis advances theoretical discussions on children's participation and contributes to a more inclusive and transformative approach to environmental education—one that fosters an integrated response to global challenges and environmental crises, specifically in Indonesia.

This thesis sheds light on the different dimensions contributing to the posthuman framework of children’s environmental participation, as illustrated in the following diagram.

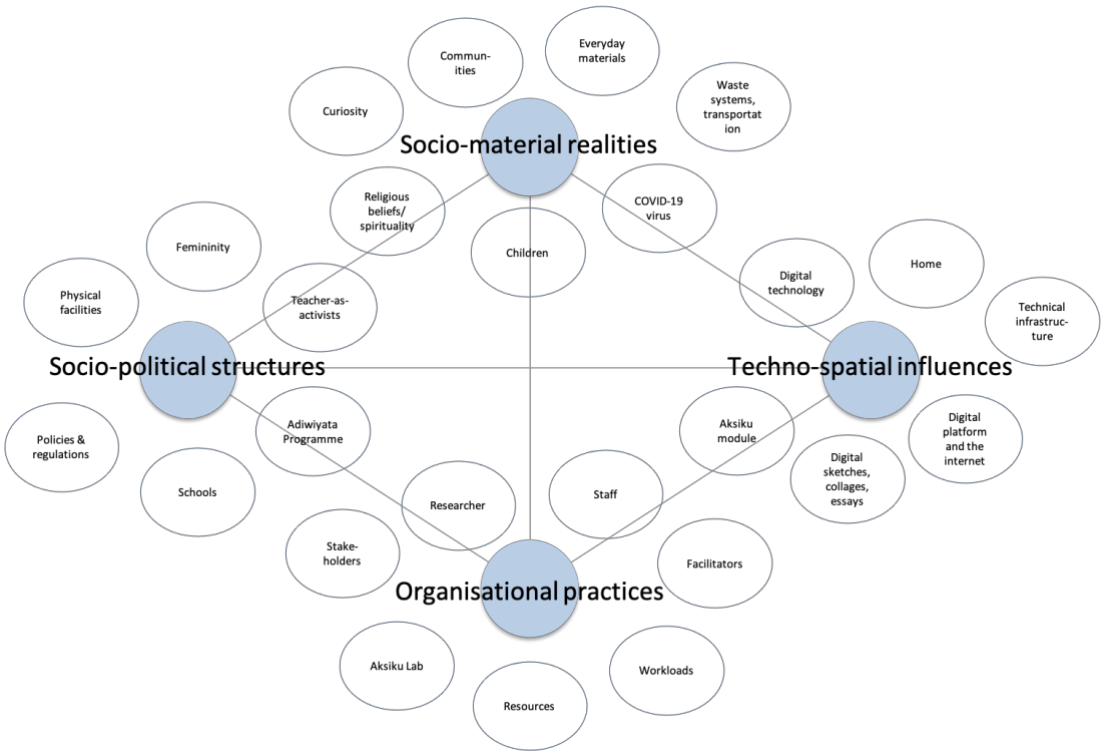

Figure 8-1 The posthuman framework of children's participation within the Indonesian context

This diagram represents a posthuman framework, illustrating the dynamic relationships among four key dimensions: socio-material, techno-spatial interactions, socio-political, and organisational. Each dimension is represented as a central node, with surrounding nodes indicating specific actors, elements, or influences. The interconnected lines between dimensions illustrate the entanglements and interdependencies across these areas, emphasising that participation emerges from a network of human–nonhuman interactions.

In addressing the research question, this thesis adopted a qualitative approach—employing participant observations, interviews, and focus groups. The empirical study focused on the Aksiku project, which involved Aksiku team members, five facilitators, twenty-six children, and five teachers from five high schools during the COVID-19 pandemic that began in early 2020. The project exemplified the practical application of the posthuman framework. It engaged children with everyday materials such as electricity, food, and hygiene products. Aksiku concentrated on

children's immediate surroundings and hands-on activities that highlighted the importance of embodied and situated knowledge. It encouraged children to view environmental issues through a lens that challenges anthropocentric perspectives. Through its critical approach, children reflected on the ethical implications of their daily actions and developed a sense of kinship and respect for the environment. The project's participatory approach is notable for its careful integration of digital tools and interactive modules that maintained engagement despite the transition to remote learning.

Through the Aksiku project, this thesis examines the complexities of an environmental education and participation initiative, focusing on the organisational dynamics, the roles of adults and institutions, and the influence of technology in children's participatory spaces. This thesis also investigates the impact of nonhuman materials and a non-exploitative mindset in fostering children's transformation and empowerment. Ultimately, it analyses posthuman knowledge production and the power dynamics shaping these processes. In each substantive chapter, the thesis demonstrates how socio-material, techno-spatial, socio-political, and organisational dimensions contribute to the posthuman framework of children’s environmental participation.

The first dimension explored in this thesis is the socio-material context. It investigates how human actors (such as facilitators, teachers, experts, and peers) and nonhuman elements (such as consumer goods and ecological materials) within children's daily settings shape their environmental knowledge and actions. Nonhuman actors play crucial roles in creating new learning opportunities. These nonhuman elements connect children to broader ecological issues and shape their environmental behaviours. Ethical engagement with nonhuman actors can be promoted in various ways through everyday interactions. The posthuman perspective's embodied and relational knowledge production process occurs in children's assemblages. Within this context, children's environmental transformation and empowerment is a dynamic and evolving process influenced by various interactions in their assemblages. By emphasising the emergent properties, these networks of

interactions produce new forms of environmental knowledge and action. For example, in Aksiku, children's interactions with their immediate material surroundings and social interactions—conducted using a participatory approach—significantly enhance their understanding of environmental impacts. These tangible engagements and personal experiences help children move beyond basic environmental knowledge towards understanding the complex interconnections between various environmental factors. Children demonstrate the micropolitical process that emerges from their everyday actions and relationships, which challenges and transforms power dynamics regarding consumption and waste. This emphasises the need to recognise the subtle yet impactful changes in power relations that can result from small-scale, daily practical activities and knowledge production. Ultimately, this shows how these practices can potentially influence and reshape larger social and environmental structures.

By integrating the socio-material dynamics of children's spaces, this study expands Lundy's (2007) model of children's participation demonstrating how human and nonhuman interactions shape the production of children's voices. While Lundy focuses on children's rights to participate in decision-making, this study highlights how relational networks influence the knowledge and political capacities to participate, extending participation beyond public action to include micropolitics and situated political actions. It builds on Chawla and Flanders Cushing's (2007) as well as Hayward's (2020) definitions of children's participation, which centre on collective political engagement and action. This thesis extends this perspective by bringing attention to the importance of relationality for children's political engagement, showing how their embeddedness in socio-material networks shapes their understanding of justice and political participation. This thesis expands Cammarota and Fine's (2008) advocacy for Participatory Action Research (PAR) as a means for children to critically understand and transform oppressive systems. It critiques humanist PAR for failing to address the oppressive systems related to anthropocentrism, which simultaneously marginalises children and positions them as agents of oppression against nonhuman entities. Additionally, it contributes to

debates on environmental learning as a transformative process (Hopwood, 2007; Wals & Dillon, 2014), offering empirical insights into how children's lived experiences and socio-material entanglements shape their environmental understanding, emphasising indeterminate learning processes.

Moving on to the techno-spatial context, this thesis has examined how the integration of digital technology impacts the space where environmental education takes place. It explores how digital technology influences participatory space dynamics and, consequently, how environmental education is experienced. Technology co-creates participation settings and creates new forms of participation experience. By exploring this context, we can gain valuable insights into how the cyborg identity affects children's emotional engagement, motivation, and group dynamics. In the case of Aksiku, digital tools co-created new ways for children to engage in environmental education during the pandemic. Online platforms and apps allowed them to participate remotely, expanding the reach of environmental education. Additionally, through affective methodology, these experiences became more emotionally engaging. However, remote participation also brought challenges. Transforming homes into effective participatory environments introduced spatial and emotional challenges, such as managing distractions and their feelings. The digital space became an extension of the children's physical home space, meaning household dynamics significantly impacted children's engagement. To manage their feelings, children engaged in emotion work to maintain motivation and support each other. Also, while digital technology enhanced children's capacities, it also required continuous adjustment and adaptation. These challenges and efforts influenced the extent and manner in which children participated in environmental education.

This study of techno-spatial dynamics extends the affective and emotional dimensions of environmental education and participation. For example, it refines Gurevitz's (2000) concept of affective elements in environmental education by examining the intertwining of digital platforms and emotional experiences in a remote education context. It highlights how digital tools—such as documentaries and interactive modules—create affective and sensory-rich educational experiences. The

study also enriches the discussion on social challenges in online learning (Delahunty et al., 2014) by exploring peer support in online learning and children's adaptability to new digital spaces. Additionally, it contributes to research on emotions in learning by showcasing a broader range of emotions beyond fear and anxiety related to academic failure (e.g., Jackson, 2015). It examines a broader spectrum of emotions—such as excitement, joy, frustration, and relief—linked to self-discovery and environmental awareness. Finally, it expands Bosco and Joassart-Marcelli's (2015) discussion on children's emotion work in participation, showing how they manage frustration and maintain motivation in remote participation.

Thirdly, this thesis examined the socio-political context of environmental education by analysing the interactions between human actors (such as teachers and policymakers) and nonhuman actors (such as educational policies and curricula) within state processes. This context greatly influences the quality and long-term sustainability of environmental education by legitimising and institutionalising it within the educational system. Human actors and institutional aspects collectively influence the sustainability of children's environmental engagement. This context provides a deeper understanding of the fluid and emerging subjectivities of adults within children's environmental participation initiatives. It shows how these factors shape and sustain environmental education efforts. For instance, teachers involved in Aksiku faced significant institutional and administrative hurdles that affected the integration of environmental education into school curricula. These obstacles were influenced by existing policy frameworks and the discretionary power of school principals. In response, teachers employed various strategies to integrate environmental education into existing subjects and secure support from school principals and municipal agencies. Their personal commitment to environmental education became the primary resource on which children depended. Consequently, teachers are key actors in sustaining environmental education and fostering a culture of environmental care within the educational framework. Without dedicated teachers and principals, the existence of environmental education would cease.

By analysing how social, political, and institutional contexts influence the conditions for children's engagement and participation, this study builds on and expands the work of Hart (1997), Thomas (2007), and Barratt Hacking et al. (2007). It highlights how these broader structures shape children's opportunities for meaningful involvement in environmental issues.

Lastly, the thesis focuses on the organisational context of environmental education by specifically exploring the interplay between the human and nonhuman actors involved in environmental education projects. These actors can include individuals from different disciplines, funding sources, and digital technology. Organisational context influences the practices, resources, and efforts employed for successful environmental education initiatives. Both human and nonhuman elements within organisations work together to ensure the ongoing effectiveness of environmental education initiatives in the face of disruptions and changing circumstances. This context emphasises the significance of collaborative strategies in environmental education initiatives that go beyond focusing solely on humans. Aksiku, for example, demonstrates how a social enterprise incorporates various stakeholders, such as educational institutions, local communities, and policymakers, to promote collaborative environmental education projects. Amid changing conditions, such as the COVID-19 pandemic, Aksiku was instrumental in maintaining the organisation of environmental education initiatives by leveraging digital platforms. However, the shift to online collaboration presented challenges for both Aksiku staff and facilitators. Aksiku staff struggled with aligning their thoughts and ideas in a remote working environment, while facilitators faced difficulties in maintaining engagement with children online. In response to these changing conditions, Aksiku emphasised the importance of reflexivity and care work in maintaining the integrity of environmental education projects. It focuses on how collaborations are adjusted to accommodate a wide range of actors during the environmental and societal changes.

This examination of organisational context expands Shier's (2001) model by moving beyond its focus on child–adult power relations to explore the broader organisational processes that shape participation. By introducing a social enterprise framework, it

highlights how child–adult interactions are embedded within wider power structures that also shape adults' capacities to create safe spaces and consolidate resources for participation. Additionally, it extends the work of Defourny and Nyssens (2013), Amin (2009), and Bornstein (2007) on social enterprises as organisations blending social missions with entrepreneurial practices. By analysing a social enterprise at the intersection of education, environment, and children's participation in the Global South, this study reveals the challenges faced during the pandemic and the dynamic nature of their assemblages. It also builds on Kumar's (2021) work on the dynamics of assembling in social enterprises by illustrating how digital technologies and human actors interact to maintain project cohesion during disruptions, showcasing the adaptive strategies required to navigate crises and redefine project meanings. Furthermore, this study expands on Smith-Nonini's (2016) ideas regarding the importance of reflexivity in social enterprise practices to ensure sustainability. It demonstrates how systematic reflexive practices, including post-project reflections, contribute to organisational learning and long-term viability by addressing the complex relational dynamics between human and nonhuman actors.

By adopting this framework, environmental education can move beyond traditional methods to embrace a more integrated and dynamic approach. This shift acknowledges the role of power in shaping environmental education and highlights the systemic nature of environmental challenges, emphasising the need for integrated responses (Droz, 2022). Understanding these complexities allows for the effective design, implementation, and sustainability of environmental education initiatives. Ultimately, this approach strengthens children's participation, empowering them to engage meaningfully and take action on environmental issues.

8.2 Academic contributions

The posthuman framework contributes to the discourse on children's participation by addressing the gap in existing models (e.g., Hart, 1997; Chawla, 2001; Driskell, 2002; Reid et al., 2008), which are predominantly shaped by humanist perspectives that overlook who children are, where they come from, and how they articulate their

voices. These models often neglect the diverse epistemologies of children, leading to assumptions that homogenise the identities and circumstances of participating children, thereby risking the marginalisation of those deemed incapable of participation. Additionally, humanist models frequently view children's participation as a process isolated from its material contexts, thereby failing to account for the contributions of nonhuman actors. This study demonstrates that in Indonesia, environmental participation is not only about children exercising agency but also about how both children and adults navigate and interact with socio-material, techno-spatial, socio-political, and organisational conditions. Existing models fail to account for these realities, limiting their applicability, particularly in the Indonesian context. By applying a posthuman framework to children's participation, this thesis challenges these limitations and rejects the individualistic and disembodied notions of children's environmental agency.

The power and necessity of a posthuman framework for children's participation lie in its ability to situate children's involvement within dynamic assemblages. This framework expands Mannion's (2010) relational, spatial, and intergenerational approach while extending Lundy's (2007) four-dimensional model of children's participation—Space (opportunities to express views), Voice (support in articulating perspectives), Audience (genuine listening), and Influence (ensuring impact on decisions)—by emphasising the entanglements of human and nonhuman actors in shaping children's knowledge and agency. It moves beyond viewing participation as an isolated process by embedding it within broader interactions. This framework acknowledges that children's environmental engagement is shaped not only by their own intentions but also by the material conditions, social processes, digital technologies, organisational practices, and political structures that mediate their learning and actions. By integrating these elements, the posthuman framework reveals how participatory spaces are co-produced, rather than pre-existing, and how ethical engagements with the nonhuman become central to children's transformative learning. Moreover, this framework positions children's participation as both a systemic and micropolitical process. It highlights how adults navigate

institutional constraints while also recognising children's everyday environmental actions as forms of activism and ecological transformation. Lastly, by shifting towards a relational and contextually embedded model, the posthuman framework provides a more inclusive, responsive, and impactful approach to environmental education—one that does not merely invite children to participate but actively reconfigures the conditions that shape their engagement.

This thesis advances empirical research on environmental education by examining children's transformative experiences in the Indonesian context. It also broadens discussions on environmental education by exploring the role of digital technology, as well as the influence of adults and institutions in shaping children's engagement and learning. First, the findings in Chapter 4 build on previous environmental education studies conducted in Indonesia (e.g., Parker & Prabawa-Sear, 2019; Tanu & Parker, 2018; Darmawan & Dagamac, 2021) by examining how children's environmental knowledge is produced, negotiated, and transformed through embodied and relational learning. These findings expand on Parker et al.'s (2018) work concerning Indonesian children's limited environmental stewardship by providing a more nuanced insight into their participation, demonstrating how their small-scale, everyday practices contribute to broader change. Additionally, these findings challenge Parker et al.'s claim that Indonesian high school students have a superficial understanding of environmental issues by unpacking how children's interactions with materials and social networks shape their ability to challenge and alter power dynamics in consumption and sustainability. By highlighting how children's engagement with facilitators, peers, consumer goods, and ecological materials influences their environmental behaviours and ethical awareness, this study suggests that students exhibit greater involvement in environmental stewardship than previously observed.

Second, the findings in Chapters 6 and 7 build on Wyness's (2012) critique of dominant child-centric participation models that marginalise adult involvement. By demonstrating the diverse roles of adults and their interactions with nonhuman elements—such as funding mechanisms, digital technologies, and institutional

frameworks—this study highlights how participation is shaped not only by adult-child relations but also by the agency of nonhuman actors within institutional and organisational contexts. These findings extend Shier's (2001) binary positioning of children and adults, which remains within a human-centred framework, by illustrating how institutionally embedded actors collectively shape children's engagement. The study expands the fixed perspectives of institutional and organisational roles (e.g., Hart, 1997; Thomas, 2007) by revealing that institutions and organisations are fluid and continually reconfigured, shaping and reshaping adults' involvement in children's participation. In relation to institutional limitations, this study builds upon research on the constraints that adults impose on young people's participation (e.g., Freeman et al., 2003; Kudva & Driskell, 2009; Breitbart & Kepes, 2007). These findings illustrate that adults themselves are embedded within complex institutional and organisational assemblages, where human and nonhuman factors shape their roles. Their ability to navigate this dynamic is central to sustaining children's participation. Additionally, the study expands Groundwater-Smith et al.'s (2015) work on institutional barriers to children's participation by examining institutions as assemblages of human and nonhuman elements—such as bureaucratic systems, technological mediation, and socio-material infrastructures—where power is fluid rather than static, constantly evolving in response to societal shifts. Finally, the findings in Chapter 7 build on Malone's (1999) discussion of environmental educators as activist researchers by considering the emotional stakes of activism, particularly in managing the pressures during the global pandemic. By exploring how systematic reflexive practices lead to ongoing adjustments in activism strategies, these findings reinforce Malone's call for environmental education to actively contribute to broader social and environmental change.

Lastly, while Jukes et al. (2023) examine how non-digital technologies—like canoes—shape outdoor environmental education experiences, the findings in Chapter 5 expand the discussion to the role of digital tools in co-creating participatory spaces and mediating children's environmental engagement, particularly in remote learning settings during the pandemic. These findings build on Plowman's (2016)

methodological and conceptual critique of children's digital contexts by demonstrating how digital technology extends environmental education beyond the traditional classroom into digital spaces. Moreover, the study enriches Plowman's work by illustrating how children navigate distractions and manage their emotions to sustain engagement, while also highlighting that, despite its potential to empower participation, digital technology also demands continuous adaptation, exposing the complexities of integrating digital tools into children's educational spaces.

In summary, my thesis makes a significant contribution to the fields of environmental education and children's geography by incorporating a posthuman approach that recognises the intricate interactions between human and nonhuman elements. As the next section discusses, it offers a framework that can be utilised to enhance educational practices and enrich the political, emotional, and participatory aspects of learning in various urban settings.

8.3 Practical implications

This thesis shifts the focus of children's environmental education from preparing future leaders to recognising their active role in ongoing sustainability efforts. It highlights how children are embedded in complex, dynamic, and evolving relationships with their environment, shaping sustainability actions in the present. These insights inform curriculum development, community engagement, teacher training, and educational policies.

The findings of this thesis have direct implications for curriculum development, advocating for an approach that is both participatory and post-anthropocentric. By incorporating experiential and place-based education, this thesis provides a framework for designing educational materials that align with local environmental realities. Furthermore, it acknowledges the essential interconnections needed to drive sustainable action and advocate for planetary ethics that emphasise collaborative survival between human and nonhuman entities, thereby strengthening the role of environmental education in tackling global challenges.

This thesis also presents a framework for fostering community partnerships in environmental education. By encouraging local communities to work alongside schools, children gain exposure to diverse perspectives and power dynamics in environmental care. Promoting these collaborations expands the reach of environmental education and provides children with opportunities to engage with broader environmental challenges beyond the classroom.

The findings contribute to professional practices by offering a framework for teacher training that integrates human and nonhuman relationships into environmental education. It equips educators with practical methods to engage students in critical thinking about their interactions with the environment.

Finally, this thesis argues for policy reform to establish environmental care as a fundamental component of the education system at local, regional, and national levels. Educational policies should address institutional and organisational barriers that hinder the integration of environmental education, ensuring long-term sustainability and institutional support. This thesis provides evidence-based recommendations for policymakers to develop legitimate and well-resourced learning spaces, enabling sustained engagement in environmental education. By incorporating these insights, policymakers could enhance policy frameworks and allocate resources to support locally responsive environmental education initiatives.

8.4 Limitations and recommendations for future research

This thesis makes a meaningful contribution to posthuman scholarship by examining the challenges of integrating nonhuman entities into research conducted under the unique constraints of the COVID-19 pandemic. Restrictions on mobility, the closure of schools, and work-from-home arrangements necessitated a reliance on human-centred methodologies, shaping how posthuman perspectives were applied in online research. However, the thesis lacks an in-depth exploration of nonhuman entities. The methodological constraints imposed by remote participation limited the ability to capture the full range of nonhuman interactions. Online data collection may have

biased findings towards experiences that were more easily documented in digital formats, potentially overlooking subtle yet critical aspects of posthuman entanglements, as outlined in Chapter 2. Additionally, this thesis primarily focuses on children's learning experiences within their homes due to pandemic restrictions. This leaves a gap in understanding how environmental education unfolds in other settings, particularly in outdoor and community spaces where children interact with broader socio-material networks.

Another limitation, from a philosophical posthumanist perspective (Ferrando, 2019), is the continued reliance on human mediation in recognising the agency of nonhuman materialities within the studied assemblage. This risks reinforcing human superiority and weakening post-anthropocentric efforts. To expand the theoretical scope of posthuman participation, future research should engage with broader works on human–nonhuman interactions, particularly those informed by agential realism and intra-actions.

Future research could explore how children engage with environmental education in diverse urban settings beyond the home and school. For instance, a collaborative environmental education project could be designed to connect high school students with surrounding low-income communities in Indonesia to address ecological challenges, particularly those related to water in peri-urban areas (Silver, 2023). Through project-based learning, students and community members could collaboratively investigate local water issues, propose solutions, and develop a community-driven action plan. Digital tools could facilitate documentation, storytelling, and knowledge sharing, enriching the learning process while providing insights into the social dynamics of environmental education. The integration of intergenerational learning, community collaboration, and digital engagement would offer a more comprehensive understanding of the socio-material factors shaping environmental participation.

To address the limitations of this thesis and strengthen the focus on nonhuman aspects of environmental education, future research should adopt a more

interdisciplinary approach. Building on the foundation laid by this study, scholars should integrate insights from environmental science and technology while engaging a broader range of stakeholders, including educators, policymakers, and non-profit organisations. Examining how these actors collaborate could provide deeper insights into the socio-material, techno-spatial, socio-political, and organisational dimensions of environmental education.

Lastly, future research should ensure inclusivity by incorporating diverse populations, particularly learners with disabilities, to broaden the demographic spectrum of participants.

8.5 Final thoughts

I began my doctoral study with a critical examination of children's participation in urban environments, recognising the urgent need to connect children with environmental issues, particularly in urban contexts. I chose the topic of children's participation because I wanted to explore how children could be meaningfully involved in decision-making processes related to local environmental challenges.

At the outset, I was concerned about the limitations of existing frameworks for environmental participation, which often focus on 'children's voices' while overlooking the complexities of adult and organisational processes. The scarcity of studies in the Indonesian context further reinforced the need for this research. Initially, I focused on understanding children's participation projects in Indonesia as intermediaries that link children with municipal governments and schools with communities. I sought to connect the intricacies of adult involvement with children's participatory processes.

As my study progressed, I encountered assemblage thinking and posthuman theories, which expanded my understanding of participation beyond human-centric frameworks. Exploring aspects of posthuman learning frameworks challenged traditional notions of children's learning and engagement with the environment. I

was enlightened by the idea that the relationship between children and their environment is characterised by immediacy and intensity, rather than signification and representation (Burman & Stacey, 2010, p. 233). This perspective sparked my interest in developing my own lens to observe children, their relationships, and their daily emotions through participatory activities. More than just gaining knowledge about children, I aimed to equip them with new skills and create spaces where they could actively shape their own engagement with environmental issues.

Throughout this journey, I grew as a researcher in parallel with the dynamic development of both my PhD research and Aksiku project. Both were particularly influenced by the logistical and practical obstacles faced during the COVID-19 pandemic. I adjusted Aksiku methodologies to maintain a participatory approach, ensuring meaningful involvement with students and teachers. The development of Aksiku and my active collaboration with community stakeholders were crucial in aligning my academic pursuits with practical educational objectives. By the end of the project, I had developed a posthuman participation framework that reimagines children's participation in environmental issues as inseparable from the support, guidance, and relationships involving adults, as well as objects, places, and technologies around them. By providing teachers with training and engaging stakeholders, I aimed to have an impact on both educational practice and policy. As I navigated the intersection of theoretical insights with empirical findings, I also developed my researcher identity, all while managing the emotional and intellectual demands of such challenging projects.

This thesis does not aim to offer grandiose solutions. Instead, it promotes nuanced, place-based, and participatory approaches that empower children and their communities. By reimagining and prefiguring 'still possible worlds' (Osborne, 2019), this thesis contributes to the transformation of environmental education into a crucial tool for civic engagement and urban transformation amidst the uncertainty that occurs not only in Indonesia but also globally. It emphasises the transformative potential of education in facilitating societal change and supports calls for urban transformation through the reintegration of a 'culture of care' (Jarvis et al., 2009). By

embedding this transformation within environmental education, this work challenges individualistic and competitive mindsets, promoting values of care, attentiveness, and collaboration.

As I bring this doctoral journey to a close, I have gained valuable insights that extend beyond academic contributions. This thesis delves into the question of how the involvement of Indonesian children in environmental issues can be reimagined through a posthuman lens. It reflects my personal commitment to creating environments where children are not only learners but also actively engaged in shaping their own worlds. By exploring the dynamic relationships between human and nonhuman actors, it provides evidence of how integrating theoretical knowledge with practical action can effectively address complex real-world problems. Finally, this thesis serves as a call to action for educators, policymakers, and researchers to envision a future of environmental education that goes beyond humans.

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Appendix A: Information Sheet for Child Participants

UCL Research Ethics Committee Approval ID Number: 19205/001

Title of Study: The relational politics of children's participation in urban space in Bandung, Indonesia

Department: Institute for Global Prosperity, University College London
Name and Contact Details of the Researcher: Dewi Shinta Wulan Dini Soebari, Institute for Global Prosperity, University College London (UCL). Floor 7, Maple House, 149 Tottenham Court Road, London W1T 7NF
Email : [redacted]
Phone : [redacted]

Name and Contact Details of the Principal Researcher: Dr Christopher Harker, Institute for Global Prosperity, University College London (UCL). Floor 7, Maple House, 149 Tottenham Court Road, London W1T 7NF
Email : [redacted]
Phone : [redacted]

1. Invitation Paragraph

You are being invited to voluntarily take part in research that is designed to enable the students to influence public views on environmental issues from a children's perspective.

The research is being conducted by independent researchers at University College London. The researcher who will perform the data collection is a PhD student at the Institute for Global Prosperity, UCL.

Before you decide, you need to understand why the research is being done and what participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

2. What is the research's purpose?

This research will examine children's participation in urban environmental processes. The research aims to: (1) understand the role children play in urban environmental actions; (2) assess alternative approaches to promoting children's participation in urban environmental challenges.

3. Why have I been chosen?

You are invited to participate because you agree to engage with Aksiku activities. A researcher will observe your participation in the 5-week program. They will observe how you map your daily connection to the environment, how you reflect on your environmental connection and how you write a story based on your observation. We will ask several questions as part of a Focus Group Discussion and may interview you about your participation experience.

4. Do I have to take part?

Taking part in the research is entirely voluntary, and if you do not wish to participate, there will be no penalty or loss of benefits to which you are otherwise entitled from participating in the Aksiku Program. If you agree to participate initially, you may discontinue participation at any time without penalty or loss of benefits.

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep, and you and your teacher will be asked to sign a consent form. You can withdraw at any time without giving a reason, and without it affecting any benefits that you are entitled to. If you decide to withdraw, you will be asked what you wish to happen to the data you have provided up to that point.

5. What will happen to me if I take part?

If you decide to participate, you will be asked to participate in a 60-minute focus group and a semi-structured interview.

If you are 15 or under 15 years old, you will be asked to assent to the research, and the consent of your legal guardian will also be sought. If you are 16 years old or older, you will be asked to sign a consent form.

In the focus group and interview, you will be asked questions about the impact of your engagement in Aksiku on your skills and knowledge and your general experience throughout the program. The FGD and interview will also discuss the role played by adults (for example, your facilitator, teacher, parents) in your participation activities. The focus group and interview will be held online. You can withdraw from the study at any time and request the removal of your data up to 90 days after the focus group or interview, whichever is later.

6. Will I be recorded, and how will the recorded media be used?

The researcher will record the focus group and interview using a digital audio recorder so they can subsequently analyse the information you provide. The audio

recordings of your interview will be transcribed (i.e., turned into a written version). This transcript will be used for analysis. Something you say may be used in the final report, in conference presentations and lectures and academic publications. However, it will not be attributed to you, so you will remain anonymous. No other use will be made of your data without your written permission, and no one but the researchers listed above will be able to access the original recordings or the transcripts. All recordings will be deleted after transcription.

7. What are the possible disadvantages and risks of taking part?

When discussing issues related to environmental problems and challenges, you may feel discomforted and/or stressed. You do not have to discuss any issues that you find upsetting. The discussion will simply move on to a different topic. There is a very small risk that you could be identified in any subsequent writing about the research, such as the report. Identification may cause problems such as embarrassment and strained personal relationships. To ensure this doesn't happen, data will be anonymised after collection. You can withdraw your data up to 90 days after your focus group and interview, after which it will have been de-identified and incorporated into the research and therefore cannot be removed.

You may contact your school's Counselling Office to discuss any concerns you have.

8. What are the possible benefits of taking part?

There are no immediate benefits to you from participating in the study. But it is hoped that this research will enable a better understanding of how your voice is situated in the contemporary world, and what practices, policies, and regulations allow or inhibit your participation in urban environmental decision-making processes.

9. What if something goes wrong?

If you encounter any problems during the research or wish to make a complaint, you should approach the researcher first to see if it can be sorted out, and if not, then contact the Principal Researcher, Dr Christopher Harker. Dr Harker will investigate the complaint and put in place any appropriate remedial action, which may include reviewing or changing a decision, revising published material, revising procedures, policies or guidance to prevent the same thing happening again, training or supervising staff, or any combination of these. If you feel your complaint has not been handled to your satisfaction by Dr Harker, you can contact the Chair of the UCL Research Ethics Committee – ethics@ucl.ac.uk

10. Will my taking part in this research be kept confidential?

All the information that we collect about you during the research will be kept strictly confidential. It will be secured in password-protected files on the UCL computer system. Only the research team will have access to these files. If we use your data in any publications or presentations about this research, we will remove any personal identifiers (name, place of residence, place of work) and assign you a pseudonym (i.e., a made-up name) so you cannot be identified.

11. Limits to confidentiality

- Please note that assurances on confidentiality will be strictly adhered to unless evidence of wrongdoing or potential harm is uncovered. In such cases, we may be obliged to contact relevant statutory bodies/agencies.
- Please note that confidentiality will be maintained as far as possible unless, during our conversation, I hear anything that makes me worried that someone might be in danger of harm. I might have to inform relevant agencies of this.
- Confidentiality will be respected unless there are compelling and legitimate reasons for this to be breached. If this were the case, we would inform you of any decisions that might limit your confidentiality.
- This research uses Focus Group Discussion as a data collection method. Confidentiality cannot be assured in a focus group setting.

12. What will happen to the results of the research?

After the conclusion of the data collection in December 2021, we will write a report which outlines how practices, policies, and regulations allow or inhibit children's participation in urban environmental decision-making processes. You will be emailed a draft copy of this report. In this report, we will not identify you. However, we will indicate where we have used your data. You will then be allowed to request the removal of any or all of that data. We will then email you a copy of the final report. Your data may also be used for publications in academic journals, presentations at academic conferences and in teaching. The data collected during the research will be kept for 5 years after the conclusion of the research for potential use in follow-up research. After this period, all data will be destroyed.

13. Local Data Protection Privacy Notice

Notice:

The controller for this research will be University College London (UCL). The UCL Data Protection Officer provides oversight of UCL activities involving the processing of personal data, and can be contacted at data-protection@ucl.ac.uk

This 'local' privacy notice sets out the information that applies to this particular study. Further information on how UCL uses participant information can be found in our 'general' privacy notice here.

The information that is required to be provided to participants under data protection legislation (GDPR and DPA 2018) is provided across both the 'local' and 'general' privacy notices.

The categories of personal data used will be as follows:

Name

Email Address

The lawful basis that would be used to process your personal data will be the performance of a task in the public interest.

Your data will be processed so long as it is required for the research. We will anonymise the personal data you provide and will endeavour to minimise the processing of personal data wherever possible.

If you are concerned about how your data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at Alexandra Potts data-protection@ucl.ac.uk.

14. Contact for further information

Dr Christopher Harker
Institute for Global Prosperity, University College London (UCL)
Floor 7, Maple House, 149 Tottenham Court Road, London W1T 7NF
Email : [redacted]
Phone : [redacted]

Thank you for reading this information sheet and for considering to take part in this research study.

Appendix B: Focus Group Protocol for Children

Session Objectives:

The aim of this session is for children to:

1. Share their experiences and feelings during and after the programme.
2. Reflect on their learning process in Aksiku over the past two months.
3. Reflect on the programme's impact on themselves and their relationships with others.
4. Reflect on their environmental actions.

EXPERIENCES (15 minutes)

- Can you share your overall experience during these eight weeks?
  "At first, some of you were selected by your teachers, then…"

FEELINGS

Describe your feelings throughout the programme (15 min)

- During the programme – How did you feel about the intensity, dynamics, and collaboration with peers and facilitators?
- After the programme – How do you feel now when you reflect on your relationship with yourself, your community, and the environment, both locally and globally?

What felt 'different' during the programme? (15 min)

- Was there anything during the programme that made you feel different? For example, something that motivated you, affected your mood, energy, or made you feel less engaged?
- Were there any specific moments, such as discussions, mission tasks, or online meetings, that influenced how you felt? (e.g., like when some of you suddenly became very chatty during the Pillar 3 sharing session).
- What had the most impact on your feelings? For example, was it a specific mission, a session, or something else?

LEARNING PROCESS

How would you describe your learning process? (15 min)

- How does it relate to your daily life at home, the current pandemic situation, your environment, and the global issues shown in the film *Diam dan Dengarkan*?

Objects and resources that supported your learning (15 min)

- What objects or tools helped you the most in learning during Aksiku? (e.g., phone, laptop, paper, etc.).
- How did you use or benefit from the Internet during the programme?

IMPACT (15 minutes)

Do you think this programme has changed:

- Your perception of yourself?
- Your views on the environment?
- Your relationship with the environment?
- Your daily habits?
- Your perspectives on family, friends, and social networks (e.g., your hangout groups, communities, etc.)?

If yes, how? Please share your thoughts.

ENVIRONMENTAL ACTIONS (15 minutes)

- Did the environmental actions you took have any effect on other places or people?
- Did you find it easy or difficult to take environmental action? Please explain.
- Do you think your environmental actions will continue in the future? If yes, how? If not, why not?
- Are there any other environmental actions you wanted to do but faced too many challenges?
- Have you ever felt pressured by teachers, parents, or others to participate in environmental activities? For example, being required to join a programme or project. If so, can you share your experience?

Appendix C: Sample Transcripts from the Teachers' Focus Group

This excerpt has been translated from the original Indonesian.

22 January 2021

00:36:42.4 - 00:36:48.3 (Shinta) So, at SMK Y, the challenge is actually from the non-teaching staff?

00:36:48.3 - 00:38:07.1 (Siti) Yes, the non-teaching staff. From there, it spread. We had to start from scratch again. We got a new headteacher from SMK Z, Bu Dini. She's excellent—she understands Adiwiyata well. Regarding *Caraka* (school staff handling cleanliness), a meeting was held, and we were all invited: the head of administration (TU), us in charge of facilities, the environmental division, and the *Caraka* team. It was decided, "*Caraka* is now under Bu Siti." Structurally, they are still under the head of administration, but functionally, they report to me and the facilities division. However, there were still effects from the hierarchy… fear of repercussions. But I continued to guide them. Still, the challenges were extraordinary.

00:38:07.1 - 00:38:07.2 (Esti) But fortunately, SMK Y has PLH. Do all SMKs have PLH?

00:38:07.1 - 00:38:35.0 (Siti) Only SMK Z, SMK Y, and SMK Q. It doesn't depend on teacher certification because, at SMK Q, the teacher is an honorary teacher. But Pak Agung, (the headteacher) who was originally from SMK Y, didn't eliminate PLH.

00:38:35.0 - 00:38:35.1 (Esti) What's the basis for this? I heard there's no PLH for local content subjects.

00:38:39.7 - 00:38:46.1 (Siti) It's based on a governor's regulation (Pergub). It's mentioned in Pergub No. 37.

00:38:46.1 - 00:38:56.8 (Esti) I heard for SMAs, the local content is Sundanese. But oddly, SMA X still has PLH.

00:38:56.8 - 00:39:03.9 (Siti) Because the regulation doesn't specify SMA or SMK, Bu. So, it applies through Pergub No. 37.

00:39:03.9 - 00:39:04.0 (Esti) So, the headteacher deceived us by saying there's no legal basis for PLH. It's because the headteacher didn't want PLH.

00:39:06.4 - 00:39:26.2 (Siti) When Bu Rini was the headteacher, the inspector questioned the legal basis for PLH. I showed them the Pergub.

00:39:26.2 - 00:40:37.7 (Esti) At my place, PLH was removed immediately in 2017. Even the three of us—me, Bu Yanti, and Bu Mira—didn't get certified. Imagine there were 30 classes divided among three teachers. PLH had one hour per week, so it accounted for 13 hours. Biology, how many hours was that again… Anyway, it wasn't recognised because Biology hours were under 34 hours, so we didn't get certification for that period. Since then, the headteacher said, "What's the point of having PLH? We have PKWU (Entrepreneurship Education)." I could just teach Biology and that would be enough, but I couldn't bear to see the subject taught by someone unqualified. It wouldn't be fair to the students. So, I took on PKWU because at least there's a textbook for it. If I were asked to teach Physics or Mathematics, I'd refuse. PKWU has some calculations, but not too much.

00:40:37.7 - 00:40:43.3 (Shinta) So, theoretically, PLH could still exist?

00:40:43.3 - 00:41:30.5 (Siti) Yes, but there were threats that allowance and certifications wouldn't be granted. I coordinated with SMK X, with Pak Ahmad, a PLH teacher from Cimahi. We reported and resolved it through the appropriate channels—I forget the exact name. It was all cleared up.

00:41:30.5 - 00:41:39.1 (Elina) But for SMAs, the allowance never came through. Only for SMKs.

00:41:39.1 - 00:42:04.3 (Esti) But the issue isn't just about allowance. As agents of environmental education, someone has to take responsibility. As teachers, we are responsible. Voluntary work isn't something everyone is willing to do, but if it's allocated teaching hours with clear responsibilities, people will take it on. Even if it's just one hour and only for Year 10, not Year 11 or 12, that's okay. Didn't SMA Y only have PLH for Year 10 students before?

00:42:04.3 - 00:42:04.4 (Siti) Even now, SMK Y only has PLH for Year 10. There are 18 classes, and it provides valuable knowledge for the students.

00:42:24.5 - 00:42:24.6 (Shinta) Bu Elina, your turn, please.

00:42:24.5 - 00:45:32.2 (Elina) It's the same as what Bu Esti and Bu Siti said. But I think Bu Siti's situation is slightly better. For me, if we look at the school's vision, it's great—research-based, environmentally aware, and leading in character education. But why isn't the environment included in the curriculum? Almost none of it is environmentally focused. "It's all integrated, Bu Elina," they say. Where's the environmental aspect? "It's integrated." Then someone says, "We'll fix it later," but honestly, I've lost motivation.

Appendix D: Extracts from Journals

This excerpt has been translated from the original Indonesian.

24 November 2020.

Online Observation of Biology Class on Respiration Integrated with Aksiku Module

Teacher: Bu Elina

Shinta received the Microsoft Teams meeting link from Elina a week prior. Elina also reminded her about the session the day before. The scheduled time in Teams was 08:00–10:00. Shinta joined at 07:57 but encountered a 'no permission' error with the shared link. Eventually, at 08:15, the meeting was switched to Google Meet. A new link was sent to Shinta. Elina also requested the PowerPoint presentation from the ideation session completed by the Aksiku extracurricular group the previous week. Shinta edited the slides, copied the link, and changed the sharing settings so students could access them. The session officially started at 08:45 after waiting for students to enter the Google Meet room. A total of around 55 students attended, along with three others: Shinta, Elina, and Pak Zainal, a supervisor. The session ended at 09:40.

Extract from the session's dialogue:

(The primary speaker is Elina. Student responses or comments are in parentheses.)

"We have discussed the respiratory system's organs, processes, and disorders. Today, I would like to invite you to take action."

"This is a biology lesson integrated with Aksiku. We will see how the topic of respiration applies to Aksiku's framework."

"Previously, we discussed:

- Pillar 1: Awareness of self and the environment.
- Pillar 2: Identifying environmental problems around us.
- Pillar 3: Finding solutions.
- Pillar 4: Taking action.

Now, we will implement the solutions that have been developed."

Reviewing the previous session.

"Smoking is dangerous. Why is it harmful? What does it contain?"

(Nicotine.)

"And why is that dangerous for respiration?"

(It affects breathing, especially when inhaled excessively.)

"But cigarettes contain more than just nicotine, right? Many other harmful substances are present too."

"I will now play a video."

Video plays.

"Now, share your thoughts on the video. Oops, my battery is low. Someone else just joined. Oh dear!"

"Now, connect the video with what we discussed last time. What new insights did you get?"

(The video explained how vehicle emissions contribute to pollution.)

"So, what should we do?"

(We should use bicycles instead.)

"Which is more harmful, smoking or vehicle emissions, or are they equally harmful?"

(If we compare it to smoking, both are dangerous as they both affect respiration.)

"I am showing you this to..."

Elina disappears from the screen.

"Oh no, my charger wasn’t plugged in properly. Apologies for the interruption."

"Yuma just shared their thoughts. Does anyone else have an opinion?"

(The video mentioned both smoking and vehicle pollution, but using motor vehicles doesn't justify smoking. Vehicles are essential, and eliminating them would be difficult. We need machines. However, smoking is not essential, and it does not have an immediate purpose.)

"So, what should we do?"

(We can try to reduce motor vehicle use by switching to public transport. If public transport were better, lower-income groups wouldn't rely as much on ride-hailing services.)

"In **Pillar 1**, we learned about only fulfilling human needs wisely. Now, we are looking for solutions." (Note: Anthropocene discussion.)

"Regarding smoking and vehicle pollution, we can refer to Surah *Al-A'raf*. Smoking is considered part of *Al-Khabaith* or harmful substances. Some scholars even prohibit motorcycles due to their harm."

"What should be done about motor vehicles? As Trisya mentioned, ideally, we should use public transport instead of ride-hailing services."

"Now, I want each group to discuss possible actions to address this issue. What can you do? For example, making policies—oh, but that's the government's responsibility. Focus on what you can do. Discuss in your groups. I will share a link for you to fill in. I also have some hibiscus and snake plants for you to observe. **Shinta, could you please share the link in the chat?** Pak Zainal will also be able to see your work."

Students complete the ideation session using shared Google Slides.

"Alright, let's present. This is your chance to earn performance marks. Who is ready?"

"Or are you still working? Since this is an online activity, you can continue filling in your responses later. But for now, if one group is ready, please present."

"David, Zidan—go ahead and share your PowerPoint."

(We can switch to public transport since vehicle pollution is a bigger issue… Our innovation is electric vehicles and increasing petrol prices. We also propose forming a 'Go Green' community and planting more trees to reduce pollution.)

"Let me give some feedback. The actions we can take include: Reducing CO emissions by cutting petrol use. Encouraging community involvement by setting an example. Forming a 'Go Green' community that promotes reducing CO emissions and planting trees to absorb carbon emissions. Next, you will move to Pillar 5, where you can propose your ideas to local authorities such as your neighbourhood (RW). This means that students from SMA Y will contribute to real environmental action." (Note: Multi-scalar space discussion.)

"Now, who would like to summarise today's session?"

(Today's lesson covered smoking and vehicle pollution. We also worked on ideation to reduce vehicle and cigarette use.)

"So, what's the conclusion?"

(We should reduce them.)

"This lesson goes beyond theory; it's about real contributions to environmental issues. It's a form of worship." (Note: Modalities of engagement.)

Appendix E: Preliminary Themes for Children

29 July 2022

Themes

A. UNDERSTANDING AND TRANSFORMING RELATIONSHIPS

EVERYDAY ASSEMBLAGES

- Actants
- Processes of Daily Assemblages
- Positioning the Self
- Developing a Critical Perspective

CHILDREN SEEKING INFORMATION

- Internet Usage
- Social Media Platforms
- Family Interactions
- Peer Influence
- Organisational Knowledge
- Teachers' Guidance

IMAGINING MORE COMPLEX RELATIONSHIPS

- Media's Role
    - Support Networks
    - Identifying Challenges
- Contributions of Human Actors
    - Engaging with the Public
    - Access to Education
- Environmental/Ecological Innovation

INITIATING CHANGES

- Routines at Home
- Dialogues with Family Members
- Expanding Social Networks
- Reflecting on Transformation

B. MOTIVATION AND EMOTION

MOTIVATION

- Motivation to Participate in Aksiku
- Drive to Complete the Project
    - Role of Friends
    - Aksiku's Methods and Techniques
    - Fulfilling Student Obligations
    - Media’s Influence

DEMOTIVATION

- Lack of Motivation During the Project
    - Staying Indoors
    - Awkward Online Interactions
    - Disappointment with Previous Projects
- Feeling Demotivated After the Project
    - Experiencing Fear
    - Low Confidence

FEELING EMPOWERED

- Storytelling and Expression
- Opening Up to Facilitators
- Engaging in Missions

NEGATIVE EXPERIENCES

- Feeling Constrained
- Additional Workload
- Experiencing Guilt
- Challenges of Remote Work
- Pressure from Acquiring New Knowledge

NAVIGATING EMOTIONS

- Balancing In-Between Spaces
- Using Feelings as Indicators
- Emotional Regulation
- Media's Role in Emotional Experiences

C. LOCATION AND SPATIALITY

DAILY FLOW AT HOME

- Routine Activities
- Changes in Daily Activities

- Shared Spaces
- Private Spaces

HOME, CYBERSPACE AND DIGITAL TECHNOLOGY

- Spatial and Material Dynamics
- Use of Digital Devices
- Engagement in Cyberspace

SPECIAL SPOTS AND OBJECTS

- Relieving Stress and Pressure

SENSE OF LOSS

- Objects, Materials, and Events
- Disruption to Routines and Orientation

SCHOOL-FROM-HOME EXPERIENCES

- Learning Challenges
- Extended Screen Time
- Working on Aksiku
- Aksiku Meetings

D. MEANING AND EMERGING SPACES

EXPANDING UNDERSTANDINGS

- Recognising Environmental Issues as Global
- Finding New Alternatives
- Gaining New Perspectives
- Embracing New Roles

LONG-TERM IMPACTS

- Identifying Future Benefits
- Ethical Relationships with Others
- Embodying Values as a Muslim