

# Curriculum As Assemblage: Responding To Climate Change Through Education

Samantha Govender<sup>1\*</sup>

<sup>1</sup> *Department of Curriculum and Instructional Studies, Faculty of Education, University of Zululand, KwaDlangezwa, South Africa; govenderSA@unizulu.ac.za, <https://orcid.org/0000-0002-4754-5361>*

\*Corresponding Author: [govenderSA@unizulu.ac.za](mailto:govenderSA@unizulu.ac.za)

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## ABSTRACT

The accelerating impacts of climate change present profound challenges for education systems, exposing limitations in dominant curriculum models that prioritise stability, standardisation, and linear progression. While education is widely positioned as a critical response to the climate crisis, prevailing curricula often struggle to engage the complexity, uncertainty, and ethical dimensions that climate change demands. This paper examines curriculum as assemblage as a conceptual response to climate change through education, arguing that meaningful engagement requires a fundamental reconceptualisation of curriculum itself rather than the addition of new content within existing structures. Drawing on assemblage theory and contemporary curriculum scholarship, the study employs a systematic literature review to synthesise research across curriculum studies, climate change education, and sustainability-oriented design. The analysis is structured around three objectives: critically interrogating traditional curriculum approaches through an assemblage lens; examining how conceptualising curriculum as assemblage enables flexibility and responsiveness in school-based climate change education; and exploring the implications of an assemblage approach for sustainability-oriented curriculum design. The findings indicate that traditional curriculum frameworks are poorly aligned with the relational, affective, and socio-ecological nature of climate change, often constraining teachers' professional judgement and limiting context-sensitive learning. In contrast, assemblage theory reframes curriculum as a dynamic, relational process emerging through interactions among human and more-than-human actors, institutional conditions, and material environments. This perspective supports flexible, transdisciplinary and ethically grounded approaches to climate change education, while also revealing tensions related to policy constraints, teacher capacity, and curriculum coherence. The paper contributes to curriculum theory by advancing curriculum as assemblage as a generative framework for reimagining education in an era of climate uncertainty, offering conceptual insights for curriculum design, policy, and future research oriented toward sustainable educational futures.

**Keywords:** Curriculum as assemblage; Climate change education; Sustainability-oriented curriculum; Assemblage theory; Curriculum flexibility; Socio-ecological learning.

## INTRODUCTION

The accelerating impacts of climate change pose profound challenges for education systems, calling into question established ways of organising curriculum, knowledge, and learning. Education is widely positioned as a key lever in societal responses to the climate crisis, not only through developing scientific understanding, but by nurturing learners' capacities to engage complexity, uncertainty, and responsibility in sustainability-oriented ways (Fitzpatrick, Amenya & McAleavy, 2024; Monroe, Riley & White, 2025). Climate change, however, is not a discrete issue that can be addressed through the addition of new content alone. Rather, it represents a condition that cuts across social, ecological, political, and ethical domains, disrupting linear assumptions about progress and control that underpin many contemporary curricula (Verlie, 2017; Jordan & Jónsson, 2025). Despite this, school curricula

in many contexts remain largely structured around predetermined outcomes, compartmentalised disciplines, and stable sequences of learning, limiting their capacity to respond meaningfully to the dynamic and relational nature of the climate crisis (Du Preez & Reddy, 2025; Eilam, 2025).

This misalignment between the characteristics of climate change and dominant curriculum frameworks constitutes a central problem for climate change education. Traditional curriculum approaches often emphasise coherence, alignment, and standardisation, positioning climate change as isolated knowledge within specific subjects rather than as a cross-cutting concern that reshapes educational purpose (Matsepe & Maluleke, 2024; Rushton & Walshe, 2025). As a result, opportunities for context-sensitive learning, ethical engagement, and affective responses to environmental change are frequently constrained, while teachers' professional judgement and responsiveness are limited by rigid curricular structures (Ben Zvi Assaraf et al., 2025). In response to these constraints, scholars in curriculum studies have increasingly drawn on assemblage theory to rethink curriculum beyond fixed plans and hierarchical models (Deleuze & Guattari, 1987; DeLanda, 2016; Buchanan, 2020). From this perspective, curriculum is understood as a continuously forming constellation of relations among people, materials, discourses, spaces, and institutional arrangements, rather than a stable object to be delivered. Curriculum as assemblage foregrounds relationality, emergence, and distributed agency, emphasising that learning is produced through interactions among human and non-human actors and remains open to reconfiguration in response to changing conditions (Caraballo, 2023; Du Preez & Reddy, 2025).

Against this conceptual background, this paper examines curriculum as assemblage as a response to climate change through education. The paper pursues three interrelated objectives: to interrogate traditional curriculum approaches through the lens of assemblage theory; to explore how conceptualising curriculum as an assemblage can enable flexibility and responsiveness in climate change education within school contexts; and to investigate the implications of adopting an assemblage approach for sustainability-oriented curriculum design. By synthesising insights from curriculum theory, climate change education research, and assemblage thinking, the paper contributes to ongoing debates about how curriculum might be reimagined to engage the complexities of the climate crisis. Thus, this paper argues that responding to climate change through education requires more than curricular adjustment or content integration, it suggests a fundamental reconceptualisation of curriculum itself. In doing so, it advances curriculum as assemblage not as a universal solution, but as a generative framework that supports adaptive, transdisciplinary, and ethically grounded educational responses to an uncertain environmental future.

## LITERATURE REVIEW

### Traditional Curriculum Approaches Through Assemblage Theory

Curriculum studies have long been influenced by modernist traditions that conceptualise curriculum as a stable and controllable structure. Within these traditions, curriculum is commonly understood as a carefully designed product, organised through predetermined objectives, sequenced content, and standardised assessment practices intended to ensure coherence and accountability (Du Preez & Reddy, 2025). Approaches grounded in alignment thinking exemplify this orientation, seeking to engineer consistency between outcomes, pedagogy and assessment to produce measurable and predictable learning results (Foust, Brannon, & Bexell, 2025). While such models have played a central role in shaping schooling systems, they rest on assumptions of stability, linear progression, and epistemic certainty that are increasingly questioned within contemporary curriculum scholarship.

Critics argue that traditional curriculum approaches tend to fragment knowledge into discrete disciplinary units and reduce learning to a largely technical process of delivery and evaluation (le Grange, 2018). These reductionist tendencies presume relatively stable social and environmental conditions, rendering curriculum less capable of responding to rapid change and uncertainty. In the context of climate change, such assumptions become particularly problematic. Climate change is characterised by nonlinearity, interdependence and complex interactions across ecological, social, political and ethical domains, qualities that resist containment within conventional curricular boundaries. As a result, traditional curriculum frameworks often struggle to engage climate change as a systemic and transformative concern rather than as an isolated topic.

Research in climate change education consistently highlights the limitations of outcomes-driven and discipline-bound curricula. Climate change is frequently positioned as supplementary content within subjects such as science or geography, rather than as a cross-cutting condition that reshapes educational purpose and practice (Matsepe & Maluleke, 2024). Fitzpatrick, Amey, and McAleavy (2024) point to a persistent disconnect between robust evidence on climate change and meaningful educational responses, arguing that existing curriculum structures often inhibit action-oriented and transformative learning. Empirical studies across diverse contexts further reveal that policy-led curriculum reforms rarely translate into coherent classroom practices, as teachers grapple with tensions between prescribed curricula and the need to respond to learners' lived experiences, emotional responses, and local environmental realities (Ben Zvi Assaraf et al., 2025; Rushton & Walshe, 2025; Monroe et al., 2025). These findings

suggest that traditional curriculum models, with their emphasis on control and predictability, are ill-equipped to address the affective, ethical, and relational dimensions that are central to climate change education (Eilam, 2025; Finnegan & d'Abreu, 2024).

From a Global South perspective, the limitations of traditional curriculum approaches are further intensified by their entanglement with colonial epistemologies. le Grange (2018) argues that dominant curriculum frameworks frequently marginalise indigenous and local knowledges, reinforcing hierarchies that privilege Eurocentric forms of knowing and undermine contextually grounded environmental education. In contexts such as South Africa, the curriculum policy, specifically the Curriculum and Assessment Policy Statement (CAPS) continue to frame climate change in narrow and compartmentalised ways, constraining opportunities for systemic and locally responsive engagement (Matsepe & Maluleke, 2024). These critiques highlight how traditional curricula not only limit pedagogical flexibility but also reproduce epistemic exclusions that are incompatible with sustainability-oriented education. Assemblage theory offers a critical lens through which these limitations can be interrogated. Originating in the work of Deleuze and Guattari (1987) and further developed by DeLanda (2016) and Buchanan (2020), assemblage theory conceptualises social phenomena as provisional formations composed of heterogeneous human and non-human elements that interact, stabilise and transform over time. When applied to curriculum studies, this perspective unsettles the notion of curriculum as a fixed entity and instead frames it as an emergent process continually produced through relationships among people, materials, discourses, institutions, and socio-ecological conditions (Du Preez & Reddy, 2025). Curriculum, from this viewpoint, is not simply implemented but enacted and negotiated through everyday practices and contextual forces.

Caraballo's (2023) work on curriculum as assemblage demonstrates how this theoretical orientation enables alternative and transgressive ways of imagining curriculum that exceed normative boundaries and dominant epistemologies. Assemblage thinking foregrounds becoming rather than being, drawing attention to how curriculum takes shape through encounters with uncertainty, material conditions, affective responses, and more-than-human actors' dimensions that are largely obscured within traditional curriculum models. Viewed through this lens, alignment-based and outcomes-driven approaches appear to prioritise closure and stability at the expense of openness and responsiveness (DeLanda, 2016). Foust et al. (2025) similarly note that rigid alignment structures in environmental education often constrain complementary and adaptive curriculum practices. Assemblage theory also resonates with posthuman critiques of anthropocentric curriculum frameworks. Jordan and Jónsson (2025) argue that effective climate change education requires recognising the agency of more-than-human actors and acknowledging ethical entanglements between humans and ecological systems. Traditional curriculum approaches, when examined through assemblage theory, are revealed as epistemologically narrow, privileging human mastery and control rather than relational responsibility and ethical responsiveness.

Taken together, the literature indicates that traditional curriculum approaches are fundamentally misaligned with the demands of climate change education. Their emphasis on predictability, disciplinary containment, and standardised outcomes limits their capacity to engage complexity, uncertainty, and relationality. Assemblage theory provides a powerful critical framework for exposing these limitations and for rethinking curriculum as a dynamic, relational, and emergent phenomenon. By critically examining traditional curriculum approaches through the lens of assemblage theory, this review advances the argument that responding to climate change through education requires a conceptual shift from curriculum as a controlled plan to curriculum as an assemblage of evolving relations. This reframing directly supports the paper's central claim and lays the theoretical foundation for reimagining curriculum in ways that are contextually responsive, ethically grounded, and capable of engaging the complexities of the climate crisis.

### **Curriculum as Assemblage and Flexible Climate Change Education in Schools**

Climate change education increasingly calls for curricular flexibility that can accommodate uncertainty, rapid environmental change, and diverse local realities. Unlike stable subject knowledge, climate change is continually reshaped by scientific developments, socio-political debates, ecological disruptions, and learners' everyday experiences, making it resistant to rigid curricular framing (Verlie, 2017; Eilam, 2022). In school contexts, this instability is often accompanied by strong emotional responses, including anxiety, grief, and hope, as well as growing demands for action-oriented learning (Finnegan & d'Abreu, 2024). These characteristics place pressure on curriculum structures that are designed around fixed outcomes and predictable learning trajectories, highlighting the need for conceptual approaches that can support responsiveness without sacrificing educational coherence. Empirical research consistently demonstrates that effective climate change education in schools depends on adaptability across subjects, pedagogies, and institutional arrangements (Fitzpatrick, Amenya, & McAleavy, 2024; Monroe, Riley, & White, 2025). However, traditional curriculum frameworks, organised through disciplinary silos and standardised assessment regimes, often restrict teachers' capacity to respond to emergent learning opportunities linked to local environmental events or student concerns (Rushton & Walshe, 2025; Ben Zvi Assaraf

et al., 2025). This disjuncture suggests that flexibility cannot simply be added onto existing curriculum models but instead requires a reconceptualisation of curriculum itself.

Assemblage theory provides a productive way of understanding flexibility as an emergent quality of curriculum rather than a planned modification. Developed from the work of Deleuze and Guattari (1987) and further elaborated by DeLanda (2016) and Buchanan (2020), assemblage theory conceptualises social practices as dynamic formations composed of heterogeneous human and non-human elements, including material conditions, discourses, affects, and institutional structures. Within curriculum studies, this perspective reframes curriculum as something that comes into being through relations and interactions, rather than as a static plan to be implemented (Strom, 2015; Du Preez & Reddy, 2025). From an assemblage standpoint, flexibility is not the absence of structure but the capacity of curriculum configurations to shift, stabilise and reconfigure in response to changing conditions.

Research in school-based climate change education illustrates how assemblage thinking enables such flexibility in practice. Everth and Bright (2023) show that school leadership functions as an assemblage of policies, relationships, material resources, and environmental discourses, shaping how climate change education is enacted across institutional contexts. Their findings indicate that curriculum flexibility emerges through the interaction of multiple forces rather than through individual initiative alone. Similarly, Everth, Gurney, and Eames (2023) demonstrate how climate-activist teachers operate within assemblages that include emotions, professional identities, visual artefacts, and more-than-human relations. These assemblages allow teachers to adapt curriculum responsively, negotiating between formal requirements and emergent student interests or environmental events. Such practices resonate with Strom's (2015) conceptualisation of teaching as assemblage, in which professional practice is continuously negotiated rather than scripted in advance. Whole-school approaches further highlight the relevance of assemblage theory for flexible climate change education. Hargis (2022) illustrates how climate action in K–12 schools emerge through interconnected curricular, organisational, and community relations, rather than through isolated classroom interventions. In these contexts, climate change education becomes distributed across subjects, spaces, and practices, enabling curriculum to remain responsive to local socio-ecological conditions. Assemblage thinking helps explain how such flexibility is sustained through the interaction of institutional structures, community partnerships, and material environments.

Flexibility in climate change education is also closely linked to transdisciplinary and socio-material orientations, both of which align strongly with assemblage theory. Riley and White (2019) describe pedagogical practices of “attuning-with” that foreground affect, relationality, and responsiveness in environmental education. From an assemblage perspective, affective dimensions such as care, fear, and hope are not peripheral but integral components of curriculum-making that shape how learning unfolds. Dovey and Fisher's (2014) conceptualisation of schools as socio-spatial assemblages further extends this argument by recognising the active role of physical spaces, technologies, and ecological features in shaping curriculum enactment. Such understandings support flexible climate change education by acknowledging that learning occurs across classrooms, outdoor environments, and community settings. At the same time, scholars caution against interpreting flexibility as the abandonment of disciplinary knowledge. Eilam (2022) argues that disciplinary expertise remains essential for meaningful climate change education, even as transdisciplinary approaches are required to address complexity. Assemblage theory accommodates this tension by recognising disciplines as stabilising elements within otherwise fluid curriculum configurations, allowing structure and flexibility to coexist. Research on teacher professionalism further outlines how assemblage thinking enables flexible curriculum enactment. Strom, Margolis and Polat (2019) conceptualise teacher dispositions as assemblages shaped by beliefs, experiences, institutional norms, and material conditions, highlighting how flexibility emerges through ongoing negotiation rather than individual autonomy. Similarly, Colston and Ivey (2015) demonstrate how climate change education is shaped by networks of political, policy, and community actors, revealing how curriculum flexibility is constrained and enabled by broader socio-political assemblages.

In Global South contexts, this relational understanding is particularly important. Studies on curriculum responsiveness in South Africa emphasise the need to adapt curriculum to local environmental challenges, socio-economic realities, and indigenous knowledge systems (Khoza, Tlali, & Legodu, 2025; Lwandle, 2024). Assemblage theory legitimises such responsiveness by framing curriculum as situated, relational, and open to multiple ways of knowing. Research evidence suggests that flexibility in climate change education is best understood not as a technical adjustment to curriculum frameworks, but as an emergent outcome of relational curriculum-making. Conceptualising curriculum as assemblage enables schools to respond to climate change in ways that are adaptive, context-sensitive, and ethically engaged, while still remaining grounded in meaningful knowledge practices. In addressing Objective 2, this review demonstrates that curriculum-as-assemblage supports flexible climate change education by foregrounding relationality, socio-material responsiveness, and affective engagement, reinforcing the paper's broader argument that responding to climate change through education requires a fundamental rethinking of curriculum itself.

## Implications of Adopting an Assemblage Approach for Sustainability-Oriented Curriculum Design

### Reframing Sustainability-Oriented Curriculum Design

Sustainability-oriented curriculum design has become an increasingly prominent response to the accelerating climate crisis, yet existing research consistently reveals tensions between sustainability aspirations and dominant curriculum logics. Education for sustainability calls for long-term, ethically grounded, and systems-oriented forms of learning that can respond to complex socio-ecological realities (Fitzpatrick et al., 2024; Monroe et al., 2025). Despite this, many curriculum frameworks continue to privilege predefined outcomes, disciplinary compartmentalisation, and standardised assessment practices. These structural features often limit the capacity of curricula to engage sustainability as an evolving and context-sensitive educational orientation rather than a discrete body of content (Du Preez & Reddy, 2025).

Studies across diverse schooling contexts suggest that sustainability initiatives are frequently constrained by policy imperatives, accountability pressures, and rigid subject boundaries, resulting in fragmented or superficial engagement with sustainability concerns (Rushton & Walshe, 2025; Ben Zvi Assaraf et al., 2025). In such settings, sustainability is often reduced to technical skills or awareness-raising activities, rather than being positioned as a transformative lens through which curriculum design itself is reconsidered. These persistent tensions point to the need for alternative conceptual approaches capable of accommodating complexity, uncertainty, and ethical responsibility within curriculum design processes.

### Assemblage Theory as a Design Orientation

Assemblage theory offers a significant departure from conventional views of curriculum design as a linear and controllable process. Drawing on the work of Deleuze and Guattari (1987) and subsequent elaborations by DeLanda (2016) and Buchanan (2020), assemblage theory conceptualises design as the provisional coming together of diverse elements, including human actors, material conditions, discourses, affects, institutional structures, and ecological forces. From this perspective, curriculum design is understood not as the production of a stable plan but as an ongoing practice of composition and recomposition. Within curriculum studies, this shift reframes design as a form of curriculum-making that unfolds through relationships and interactions over time (Du Preez & Reddy, 2025; Tsao et al., 2025). Applied to sustainability education, an assemblage approach foregrounds the relational and adaptive nature of curriculum design, recognising that sustainability challenges are inherently uncertain, place-specific, and entangled with broader social and political dynamics (Verlie, 2017; Jordan & Jónsson, 2025). Rather than seeking to control complexity, assemblage-informed design works with it, allowing curriculum configurations to evolve in response to changing socio-ecological conditions.

### Potential Contributions of an Assemblage Approach

One of the most significant contributions of an assemblage approach to sustainability-oriented curriculum design lies in its capacity to support contextual responsiveness. Assemblage thinking enables curricula to be shaped by local environmental conditions, community knowledge systems, and emergent climate-related events, rather than being constrained by uniform prescriptions (Khoza et al., 2025; Lwandle, 2024). This responsiveness is particularly important in contexts where sustainability challenges are unevenly distributed and deeply shaped by historical, cultural, and socio-economic factors. By legitimising locally situated knowledge and practices, assemblage approaches align with decolonial and place-based perspectives that emphasise the importance of context in sustainability education (le Grange, 2018; Zhang, 2025).

Assemblage theory also broadens sustainability-oriented curriculum design beyond exclusively human-centred frameworks. Posthuman and ecological scholarship highlights the importance of recognising more-than-human agency in sustainability education, including the roles of ecosystems, technologies, infrastructures, and material environments (Jordan & Jónsson, 2025; Heidari et al., 2025). Designing curriculum as assemblage allows sustainability learning to emerge through learners' engagements with these non-human actors, fostering ethical and relational forms of understanding that extend beyond abstract knowledge acquisition. In addition, assemblage approaches support transdisciplinary curriculum design by loosening rigid disciplinary boundaries without abandoning disciplinary knowledge altogether. Sustainability challenges cut across scientific, social, ethical, and cultural domains and assemblage-informed design allows these domains to interact productively within curriculum configurations (Clarke & Ashhurst, 2018; Tsao et al., 2025). Disciplines function as stabilising elements within a dynamic system, enabling systems thinking and integrative learning while avoiding fragmentation. This capacity for relational coherence is particularly valuable in sustainability education, where learners must engage with interconnected systems rather than isolated concepts (Eilam, 2022).

Assemblage approaches further recognise the centrality of affect in sustainability learning. Emotions such as concern, grief, responsibility and hope are not peripheral to sustainability education but shape how learners make sense of environmental issues and their own capacity for action. By treating affect as a constitutive component of curriculum assemblages, sustainability-oriented design can support pedagogies that cultivate agency, resilience, and ethical engagement (Riley & White, 2019; Finnegan & d'Abreu, 2024). In this way, curriculum design attends not only to cognitive outcomes but also to the emotional and moral dimensions of sustainability learning.

### **Challenges and Limitations of Assemblage-Informed Design**

Despite its conceptual strengths, adopting an assemblage approach also presents significant challenges for sustainability-oriented curriculum design. One recurring concern relates to the conceptual openness of assemblage theory itself. Critics note that the absence of clear boundaries and predefined structures can make it difficult for teachers to translate assemblage thinking into concrete design decisions, particularly in systems that demand clarity around learning goals and assessment criteria (Beighton, 2013). In sustainability contexts, this ambiguity may generate uncertainty regarding progression, coherence, and evaluative practices.

Assemblage-based curriculum design also often conflicts with policy-driven education systems characterised by standardisation and accountability. Research on climate change education indicates that the relational and emergent qualities of assemblage approaches are frequently constrained by prescriptive curricula and performance measures (Colston & Ivey, 2015; Ben Zvi Assaraf et al., 2025). Teachers and school leaders must therefore navigate ongoing tensions between the flexibility required for sustainability-oriented curriculum-making and the institutional demands for alignment, predictability, and measurability (Everth & Bright, 2023).

Furthermore, the enactment of assemblage-informed sustainability curricula places considerable demands on teachers' professional capacities. Studies conceptualising teaching and professional dispositions as assemblages demonstrate that teachers' ability to work adaptively is shaped by multiple factors, including experience, institutional cultures, access to resources, and professional learning opportunities (Strom, 2015; Strom et al., 2019). Without sustained systemic support, assemblage approaches risk becoming unevenly enacted or reliant on individual initiative, potentially exacerbating inequities across schools. Finally, while assemblage theory resists rigid coherence, there is a risk that sustainability-oriented curricula may become fragmented if relationships among curriculum elements are insufficiently supported. Scholars caution that fluidity must be balanced with stabilising practices such as shared values, disciplinary knowledge, and institutional structures to ensure that sustainability learning remains meaningful and cumulative rather than episodic (Eilam, 2022).

### **Synthesis and Implications for Sustainability-Oriented Curriculum Design**

Therefore, the literature suggests that adopting an assemblage approach has profound implications for sustainability-oriented curriculum design. Assemblage thinking shifts curriculum design from a closed, outcomes-driven process toward an open, relational practice that evolves in response to socio-ecological conditions. This reconceptualisation offers important benefits, including heightened responsiveness to context, ethical engagement with more-than-human worlds, support for transdisciplinary learning, and recognition of affect as central to sustainability education.

At the same time, the challenges identified conceptual ambiguity, tensions with policy structures, demands on teacher capacity, and risks of fragmentation highlight the need for careful and context-sensitive application of assemblage theory. Rather than functioning as a prescriptive model, an assemblage approach provides a conceptual framework through which teachers can navigate complexity, uncertainty, and ethical responsibility in curriculum design. In relation to Research Question 3, this review argues that the value of an assemblage approach lies in its capacity to reorient sustainability-oriented curriculum design toward relationality, adaptability, and responsibility. By enabling teachers to work with, rather than against, the complexity of sustainability challenges, curriculum as assemblage offers a powerful lens for rethinking how education can respond meaningfully to climate change.

## **THEORETICAL FRAMEWORK**

This study is theoretically anchored in assemblage theory as developed by Deleuze and Guattari (1987) and further elaborated by DeLanda (2016) and Buchanan (2020), alongside its contemporary application within curriculum studies (Caraballo, 2023; Du Preez & Reddy, 2025). Assemblage theory rejects views of social phenomena as fixed, unified, or linear, instead conceptualising them as provisional formations composed of heterogeneous elements that interact, stabilise, and reconfigure over time. Drawing on this perspective, curriculum is understood not as a predetermined body of knowledge or a technical plan to be implemented, but as a dynamic process of curriculum-making that emerges through relations among teachers, learners, knowledge systems,

policies, technologies, learning spaces, emotions and socio-ecological conditions. Such a conceptualisation foregrounds relationality, emergence, and distributed agency, shifting attention away from linear control towards responsiveness and becoming an orientation that is particularly suited to climate change education, where learning unfolds amid uncertainty, complexity, and more-than-human entanglements (Verlie, 2017; Jordan & Jónsson, 2025).

Within this framework, curriculum assemblages are shaped by stabilising forces, such as policy mandates, assessment regimes, and disciplinary traditions, alongside destabilising or generative forces, including climate events, local knowledges, activism, affective responses, and ethical concerns. These interacting forces help explain how traditional curriculum approaches privilege stability and alignment in ways that constrain responsiveness to climate complexity, addressing the first objective of the study. At the same time, the concepts of emergence and deterritorialisation illuminate how flexibility arises within curriculum enactments, not as an optional adjustment but as an inherent property of curriculum responding to climate change in school contexts, thereby aligning with the second objective. Furthermore, by recognising curriculum assemblages as heterogeneous and affective, this framework enables a sustainability-oriented understanding of curriculum design that moves beyond content delivery to include ethical engagement, relational responsibility, and socio-material awareness, while also acknowledging challenges such as policy rigidity and fragmentation. In this way, curriculum as assemblage provides a coherent and generative theoretical lens through which the study investigates the benefits and tensions of reimagining curriculum for sustainability.

## RESEARCH METHODOLOGY

This study adopts a systematic literature review as a suitable methodological strategy for examining curriculum as assemblage within the field of climate change education. Given the paper's theoretical orientation, the review was not intended to produce a quantitative synthesis of findings, but rather to engage in a critical and interpretive examination of existing scholarship. The purpose of the review was to bring together, interrogate, and reconceptualise literature from curriculum studies, sustainability education, and assemblage theory to generate new theoretical insights. The literature search was conducted across a range of well-established academic databases, including Scopus, Web of Science, ERIC, and Google Scholar. Search terms were carefully developed to capture key concepts related to curriculum theory, assemblage thinking, climate change education, and sustainability-focused curriculum design. Source selection was guided by explicit inclusion criteria that prioritised peer-reviewed journal articles, scholarly monographs, and doctoral theses with a clear focus on curriculum design, enactment, or theoretical analysis. Non-academic sources and studies that did not engage substantively with curriculum-related questions were excluded from the review.

In addition to contemporary empirical and theoretical studies, foundational texts in assemblage theory and curriculum studies were intentionally incorporated to provide a strong conceptual grounding for the analysis. The screening process followed multiple stages, beginning with the review of titles and abstracts, followed by full-text examination to confirm relevance and alignment with the study's aims. This iterative process ensured that only literature directly contributing to the research objectives was retained. Analysis of the selected literature involved a thematic and interpretive synthesis informed by key principles of assemblage theory, including relationality, emergence, heterogeneity, and the involvement of more-than-human actors in curriculum processes. Rather than conceptualising curriculum as a fixed or linear entity, the analysis explored how curricular practices take shape through shifting relationships among teachers, learners, materials, institutional structures, and socio-material environments. This approach enabled thorough examination of curriculum-making as a dynamic and context-sensitive process.

The synthesised literature was then organised in relation to the three objectives of the study: first, to critically interrogate dominant curriculum models; second, to explore how curriculum understood as assemblage supports flexibility in climate change education; and third, to examine the opportunities and limitations associated with applying an assemblage perspective to sustainability-oriented curriculum design. Methodological rigour was supported through transparent documentation of the search process, engagement with interdisciplinary sources, and reflexive consideration of contrasting theoretical positions. As the paper drew exclusively on publicly accessible scholarly literature, formal ethical approval was not required. Nonetheless, academic integrity was upheld through careful attribution and faithful representation of existing work. Overall, this systematic and theoretically informed review provides a robust methodological foundation for advancing curriculum as assemblage as a conceptual response to the complexities of climate change education.

## FINDINGS AND DISCUSSION

This study set out to explore how reconceptualising curriculum as assemblage can support more meaningful educational responses to climate change. When considered across the three objectives, the findings point to a clear and coherent argument: dominant curriculum models are poorly equipped to engage the complexity, uncertainty, and ethical demands of the climate crisis, whereas assemblage theory offers a productive way of reimagining curriculum as relational, adaptive, and sustainability-oriented (Deleuze & Guattari, 1987; DeLanda, 2016; Du Preez & Reddy, 2025). The discussion that follows integrates insights from each objective to demonstrate how curriculum-as-assemblage reshapes understandings of curriculum purpose, enactment, and design in the context of climate change education.

### Reconsidering Dominant Curriculum Models Through an Assemblage Lens

In relation to the first objective, the analysis indicates that prevailing curriculum approaches are underpinned by assumptions of order, predictability, and linear progression. Curriculum is typically framed as a planned and controllable artefact, structured through predefined outcomes and tightly aligned assessment regimes (Du Preez & Reddy, 2025; Foust, Brannon, & Bexell, 2025). While these approaches offer a sense of coherence and manageability, the findings suggest that they are increasingly misaligned with the realities of climate change education, which is characterised by uncertainty, complexity, and rapid change (Fitzpatrick, Amenya, & McAleavy, 2024). Viewed through assemblage theory, such curriculum models appear limiting in both epistemological and pedagogical terms. They tend to privilege disciplinary knowledge over relational understanding, marginalise emotional and ethical dimensions of learning, and position humans as the primary agents of knowledge production (Jordan & Jónsson, 2025; Verlie, 2017). Climate change, however, unfolds through interconnected ecological, social, political, and material processes that exceed disciplinary boundaries and resist linear representation (Eilam, 2025). As a result, traditional curricula not only constrain how climate change is taught, but also shape what forms of knowing, feeling, and acting are legitimised within schooling (le Grange, 2018; Matsepe & Maluleke, 2024).

Assemblage theory brings these limitations into focus by reframing curriculum as something that is continuously produced through interactions among people, materials, environments, discourses, and institutional arrangements (Deleuze & Guattari, 1987; Buchanan, 2020). From this perspective, curriculum is not simply delivered or implemented; it emerges through practice (Caraballo, 2023; Du Preez & Reddy, 2025). This finding challenges the assumption that curriculum reform can be achieved solely through policy revision or content inclusion, pointing instead to the need for conceptual frameworks capable of accommodating complexity, contingency, and relationality.

### Curriculum as Assemblage and the Emergence of Flexibility

Addressing the second objective, the findings suggest that flexibility in climate change education is best understood as an emergent quality of curriculum assemblages rather than as a planned adjustment or optional feature. Across the literature, teachers' engagement with climate change is shown to be shaped by shifting relationships among professional judgement, student concerns, institutional constraints, community contexts, and material conditions (Everth & Bright, 2023; Rushton & Walshe, 2025).

Assemblage theory provides a vocabulary for understanding how such flexibility comes into being. Rather than positioning teachers as implementers of fixed curricular intentions, assemblage thinking recognises curriculum-making as a negotiated and situated practice shaped by multiple interacting forces (Strom, 2015; Strom, Margolis, & Polat, 2019). This reconceptualisation is particularly significant in climate change education, where learning often develops unpredictably in response to environmental events, public discourse, or affective responses such as anxiety, grief, and hope (Verlie, 2017; Finnegan & d'Abreu, 2024).

Importantly, the findings indicate that assemblage-informed flexibility does not entail the removal of structure or coherence. Instead, flexibility emerges through the ongoing interaction between stabilising elements such as disciplinary knowledge, school routines, and policy expectations and destabilising forces, including emergent climate issues and learner experiences (Eilam, 2022; Colston & Ivey, 2015). Assemblage theory thus offers a way of holding together responsiveness and continuity, addressing a key concern in the literature about maintaining educational coherence while enabling meaningful engagement with complex global challenges (Ben Zvi Assaraf et al., 2025).

## Implications for Sustainability-Oriented Curriculum Design

In relation to the third objective, the findings reveal that adopting an assemblage approach has far-reaching implications for sustainability-oriented curriculum design. One significant implication is the capacity to design curricula that are responsive to local socio-ecological contexts. Assemblage-informed design recognises place, culture, and lived experience as integral components of curriculum, thereby supporting approaches that value indigenous knowledge, community expertise, and context-specific sustainability concerns (le Grange, 2018; Lwandle, 2024; Khoza, Tlali, & Legodu, 2025). A further implication lies in the expansion of curriculum beyond anthropocentric orientations. By acknowledging the agency of more-than-human actors, assemblage theory enables sustainability curricula to engage learners in ethical relationships with ecosystems, infrastructures, and technologies (Jordan & Jónsson, 2025; Heidari, Mahat & Saghafi, 2025). This relational orientation shifts sustainability education away from abstract awareness towards practices of responsibility, care, and interdependence (Riley & White, 2019).

At the same time, the findings point to significant challenges associated with applying assemblage theory in curriculum design. The conceptual openness of assemblage thinking can make it difficult to translate into concrete curricular decisions, particularly within education systems shaped by accountability measures, standardised assessment, and alignment-driven policy frameworks (Beighton, 2013; Ben Zvi Assaraf et al., 2025). Moreover, enacting assemblage-informed curricula places considerable demands on teachers' professional capacity, requiring sustained support, collaborative cultures, and opportunities for professional learning (Hargis, 2022; Monroe, Riley & White, 2025). These tensions suggest that assemblage theory should not be interpreted as a rejection of curriculum structure, but rather as a reconfiguration of how structure operates. Sustainability-oriented curriculum design, from this perspective, involves ongoing negotiation between openness and stability, responsiveness and accountability, emergence and coherence (Tsao, Kochhar-Lindgren & Lam, 2025).

Overall, the findings across the three objectives support a central claim that meaningful educational responses to climate change require a fundamental rethinking of curriculum itself. Treating climate change as an additional topic within existing curriculum frameworks is insufficient and risks reinforcing the very limitations that constrain transformative learning (Fitzpatrick et al., 2024; Eilam, 2025). Instead, curriculum must be understood as an assemblage, dynamic, relational, and continually shaped by socio-ecological conditions (DeLanda, 2016; Caraballo, 2023). This reconceptualisation positions curriculum as an ethical and political practice in which knowledge, affect, and action are assembled in context (Verlie, 2017; Jordan & Jónsson, 2025). It foregrounds the co-constitutive roles of teachers, learners, environments, and institutions in curriculum-making, and reframes flexibility and sustainability as core qualities rather than peripheral enhancements. In doing so, curriculum-as-assemblage offers a way of engaging with climate change that prioritises responsiveness, relationality, and responsibility over control and prediction. This discussion demonstrates how assemblage theory functions both as a critical lens for interrogating existing curriculum models and as a generative framework for reimagining curriculum design and practice. By embracing curriculum as assemblage, education systems are better positioned to respond to the uncertainties of the climate crisis and to contribute meaningfully to the pursuit of sustainable futures.

## CONCLUSION

This paper has examined curriculum as assemblage as a conceptual response to the educational challenges posed by climate change. By interrogating conventional curriculum models, exploring how assemblage thinking enables curricular flexibility and analysing the implications for sustainability-oriented curriculum design, the paper advances a central claim that meaningful engagement with climate change through education demands a reconceptualisation of curriculum itself. Climate change cannot be adequately addressed by inserting new content into established curricular structures; rather, curriculum must be understood as a dynamic and relational assemblage that can respond to uncertainty, complexity, and ethical responsibility as they unfold in context.

At a theoretical level, this paper contributes to curriculum scholarship by positioning assemblage theory as a productive lens for rethinking curriculum in an era of socio-ecological disruption. It problematises dominant linear, outcomes-driven models by showing how such frameworks limit curricular responsiveness and narrow what counts as legitimate knowledge and learning. Conceptualising curriculum as assemblage redirects attention away from curriculum as a stable artefact towards curriculum as an ongoing process shaped through interactions among people, materials, environments, discourses, and institutional arrangements. In doing so, it reframes flexibility, emergence, and relationality as foundational characteristics of curriculum rather than as departures from established norms.

In terms of practice, the findings suggest that an assemblage approach can enable forms of climate change education that are more responsive to learners, places, and emerging socio-environmental conditions. Curriculum-as-assemblage recognises teacher professional judgement, learner emotions, community knowledge, and local ecologies as integral to curriculum-making. This perspective supports teachers in responding to unfolding climate-

related issues while remaining connected to disciplinary knowledge and school structures. At the same time, the analysis highlights that such practices require sustained institutional commitment, including professional learning opportunities and collaborative cultures that support teachers in working with complexity and uncertainty. For curriculum designers and policymakers, the study draws attention to the limitations of highly standardised and alignment-oriented policy frameworks in addressing sustainability challenges. An assemblage perspective calls for policy environments that allow curriculum to be responsive, context-sensitive, and transdisciplinary. Rather than prescribing uniform sustainability outcomes, curriculum policy should enable conditions in which diverse curriculum assemblages can emerge in relation to local socio-ecological realities. This shift also necessitates a reconsideration of accountability practices, so that relational, affective, and process-oriented dimensions of learning are recognised alongside conventional measures of achievement.

## RECOMMENDATIONS

Building on these implications, the study suggests several interrelated directions for advancing curriculum and practice in climate change education. For curriculum development, sustainability-oriented curricula should be conceived as adaptable frameworks rather than fixed prescriptions, enabling curriculum to be assembled in diverse ways across contexts while remaining grounded in shared ecological and ethical commitments. At the policy level, there is a need for enabling conditions that support curricular flexibility, move beyond excessive standardisation, and explicitly recognise the legitimacy of indigenous, local, and place-based knowledge as central to meaningful climate change education. These shifts place renewed emphasis on teacher education and professional learning, where assemblage thinking can support teachers in working productively with uncertainty, socio-material relations, and the ethical complexities that characterise climate-related learning. At the level of schools and educational leadership, sustainability efforts are most effective when approached holistically, recognising schools as socio-material assemblages in which learning emerges across classrooms, outdoor spaces, community partnerships, and organisational practices.

In closing, this paper argues that curriculum as assemblage provides a compelling conceptual response to climate change through education. By understanding curriculum as relational, emergent, and ethically engaged, education systems can move beyond narrow, content-based interventions towards more meaningful and sustainable forms of learning. Responding to climate change through education, therefore, is not solely a question of *what* is taught, but fundamentally of *how* curriculum is imagined, designed, and lived within complex socio-ecological worlds.

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