Empowering Middle-Stage Students for Climate Action: Building Skills and Resilience Through Environmental Education

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ABSTRACT

Climate change brings forth a growing danger to the environmental, social and mental well-being of the youth, which highlights environmental education as an imperative means to develop the knowledge, skills, and emotional stability required to deal meaningfully with climate. The conceptual paper investigates the ways in which environmental education can enable middle-stage children (somewhere between the ages of 10-15) to be effective actors of climatic action. Based on literature in developmental psychology, critical pedagogy, and environmental education, this paper draws together current research and suggests an integrated conceptual framework that integrates four overlapping dimensions, including ecological literacy, critical consciousness, emotional and psychological resilience, and civic/collective agency. The review notes that there is an existing gap in the literature: although climate change education has started to focus more on cognitive and behavioural outcomes, emotional and resilience-building aspects are systematically inconsistently covered in school-based programmes, and little framework considers the unique need of early adolescents as a specific group. The paper will contend that we cannot consider climate action empowerment a by-product of information transfer but the result of purposefully designed pedagogical experiences combining systems thinking, participatory and place-based learning, emotional processing, and legitimate civic engagement. It contains viable recommendations on curriculum design, teacher training and school-level implementation and discusses equity, political, and resource constraints impeding implementation. The paper concludes that the integrated development of literacy, consciousness, resiliency, and agency reframing of environmental education provides a developmentally responsive and psychologically sustainable pathway to youth empowerment in climate change than knowledge-centric approaches alone.

"Keywords:" Environmental education; climate change; middle-stage students; climate resilience; climate action; sustainability education conceptual framework.

INTRODUCTION

The growing rate of climate change has already made environmental education a marginal issue in the school curriculum, turning it into a more pressing developmental and civic issue. Global evaluations reveal a broader and more severe range of climate effects than has been previously forecasted, and children and young adults are disproportionately vulnerable to the related risks, including heat stress, food insecurity and displacement; one billion children are expected to be at critical risk of climate- and environment-related challenges (IPCC, 2023, as cited in recent climate education reviews). In that framework, school is increasingly considered as more than just a venue for imparting climate science but a place where youth may gain the abilities and psychological resources to react positively to an increasingly unsettled future of environmental destabilisation. Middle-stage

students - young people in the upper-primary to lower-secondary years, around ages 10 to 15 - are situated in a unique developmental niche in this discussion. It is a formative time in the development of more abstract and systemic thought, exploration of identity, and increased independence of social action, and is associated with the development of lifelong environmental responsibility and civic engagement orientations. However, a large part of the available climate education literature identifies children and youth as a homogeneous group, with only minor developmentally specific recommendations on how to apply them to this demographic. Simultaneously, an increasingly expanding literature warns that climate education that is informed by scientific literacy alone might not be comprehensive enough, possibly even counter-responsive, in case it does not seize the emotive aspects of encountering an existential threat on a global scale. Scholars have contended that this age requires a transition out of individual knowledge acquisition and requires building ethical commitments, emotional resilience and community action not as a more or less item to add to an already oversaturated curriculum but as a high-order, highly complex societal issue that necessitates whole-school and community change (Leite, 2024). In this paper, I take the challenge up by responding to that call in a conceptual way by understanding how environmental education can be developed that will specifically empower middle-stage students, ensuring the incorporation of cognitive, critical, emotional, and civic facets in a cohesive structure in developing both climate-relevant proficiencies and psychological resilience.

REVIEW OF LITERATURE

Climate Change Education: From Awareness to Agency

In the past, the focus of environmental and climate change education has been on the impartation of science with the operating assumption that higher levels of awareness would translate into pro-environmental behaviour. Nonetheless, decades of research indicate that this hypothesis is at best only provisionally so: climate education has been largely effective in helping to raise awareness but not always into learner agency (Anderson, 2012; Monroe et al., 2019). This has led to a shift in the area to have such frameworks aiming squarely at agency, self-efficacy, and action competence, but not as automatic implications of knowledge acquisition. The concept of environmental literacy has been redefined as a multi-dimensional concept. Instead of a body of knowledge, environmental literacy has come to be broadly considered to have four elements: knowledge, affect, cognitive skills, and behaviour, as the indicator of a citizenry that comprehends ecological systems, cares about environmental results, can judge risk and can act sustainably (research on predictors of environmental literacy among middle school children, n.d.). The content provided by this multidimensional perspective supports the argument about the need to take empowerment-oriented education much further than content delivery.

Developmental and Psychological Perspectives

The developmental lens is also becoming an accepted necessity for creating a satisfactory climate education. Possibly, the Positive Youth Development (PYD) model in particular has been suggested as a useful prism to interpret and invest in the interaction of adolescents with climate change, and agency as the key dimension to consider the resilience of young generations to environmental challenges. One systematic review using this framework has just discovered that PYD principles have not yet been directly implemented in most of the existing studies on adolescents and climate change, but that several PYD constructs already exist in the literature, signalling the potential of the framework in informing future research, practice, and policy (Pereira and Freire, 2021). In line with this, a WHO-supported adolescent wellbeing framework defines agency and resilience as two dimensions of wellbeing among the dimensions of health and nutrition, connectedness and social contribution, safety, and learning and skill development (Ross et al., 2020). Such framing matters as it situates climate-related agency within the context not of a specialised output but rather as a part of larger adolescent development and wellbeing. Specific data on adolescent agency, specifically towards climate change, have also shown a worrying pattern in developmental change over time: despite the increased cognitive maturity and autonomy typically linked with the later stages of adolescence, students in high school have been found to show reduced agency towards climate change than that shown by younger students, and researchers attribute this to an apparent trend of agency decline in the high-school years, before which there must be further attempts to intervene with the students and establish higher levels of agency towards climate change.

The Emotional Dimension: Eco-Anxiety and Resilience

An extensive and fast-evolving body of literature has been studying the psychological burden of climate change on children and adolescents. Significantly, this literature does not consider emotional distress as a thing to be evaded by keeping off the hard stuff in the curriculum, but rather proposes the idea that the curriculum does not need to shirk the reality of environmental threats but needs rather to help children to deal with the emotional and cognitive aspects of the same deal with sensitivity and care and the developmental stage of their lives. Importantly, engagement in climate action in and of itself has also been found to offer resilience to teenagers, although activism may at the same time introduce emotional load to the issue that should be considered. In this case, resilience is usually perceived as the ability to adjust, recuperate, and act amid bad times. A recent systematic review of school-based climate change literacy programmes targeting children found that although most of the reviewed interventions included factors attributed to resilience-building - including participatory learning, problem-solving in the real world, and community-engagement - only a minor proportion of these studies explicitly yielded space to allow children to dispose of climate-related emotion, which signified a significant gap between the resilience-oriented activity design and the actual provision of emotional coping (Jackson et al., 2025). The corresponding view article also suggests the emotional resilience of young people as a core element directly incorporated into climate action strategies by adopting the models of public health and focusing on youth voice and active involvement as its key components to both developing resilience and effective climate response (Kohli, Igras, & Ramirez, 2025).

Pedagogical Approaches: Place, Participation, and Systems Thinking

Place-based education has become a very popularly endorsed method of middle-stage climate education. Since studying global climate using global frames may result in learners feeling both distant and ineffective, learning through local phenomena (watersheds, urban structures, local biodiversity) has been found to promote knowledge acquisition as well as feelings of pertinence and accountability (Sobel, 2004). A one-year and mixed methods investigation of place-based environmental education with more than 200 middle school learners found that these methods contribute to the emergence of environment stewardship capacity, but the results are influenced by programme-, school-, and community-level variables. In addition to place-based strategies, project-based learning, STEAM integration, and tech-enhanced experiences (e.g., virtual reality-based simulations centred on the UN Sustainable Development Goals) are also reported to be effective delivery methods for creating climatic knowledge, empathy, and problem-solving. Among climate resilience-building tools specifically in lower- and middle-income country settings, education is found to be directly influential, yet climate impacts themselves, e.g. extreme weather destroying school buildings, can have a direct detrimental effect on educational access, thereby establishing a two-way relationship between climate vulnerability and educational opportunity.

Critical and Justice-Oriented Perspectives

A lesser yet powerful body of literature places climate education in the contexts of critical consciousness and justice. This scholarship recommends a redesign of the curriculum, pedagogy, and assessment to enable young people to think, feel, and act together in the problematic systems of unsustainability, instead of viewing climate change as a subject of science in isolation. Pedagogies based on storytelling have also emerged as an advantageous design option for justice-oriented climate education with consistent positive effects on engagement and agency; however, a review of this literature cites a lack of gains in theoretical synthesis, longitudinal data and equity-focused design.

Research Gap

The literature review above indicates that several convergent gaps have been identified by synthesising the reviewed literature, which this conceptual paper attempts to fill:

1. The climate education literature talks of children, youth, or adolescents in broad, undifferentiated terms, and there is relatively little conceptual work to separate the particular developmental affordances and requirements of the middle-stage (early adolescent) years.
2. Although there has been increasing awareness of the existence of eco-anxiety as a real and pervasive issue, there is not systematically presented evidence indicating that most school-based climate programmes focus on participatory and problem-solving activities without referring to emotion processing.
3. Cognitive, critical, emotional and civic fragmentation. Current paradigms tend to focus solely on a single aspect of empowerment, and not many conceptual models have combined these aspects into a single, developmentally grounded framework.
4. Seldom translation of theory to practical pedagogical instructions in the middle-stage classroom. Although place-based, project-based, project based and storytelling pedagogies are promising solutions, a conceptual synthesis of relating these solutions to resilience and agency building in this particular age group is relatively lacking.

The gaps in this paper will be filled by outlining an integrated conceptual framework and converting it into pedagogical and policy-relevant recommendations pertaining to middle-stage environmental education.

Objectives

1. To test the developmental justification of focusing on middle-stage students (ages 10-15) on climate change and environmental education.

2. To synthesise literature available in the three areas: cognitive, critical, and psychological and civic that are pertinent to climate empowerment.

3. To introduce a unified conceptual framework relating ecological literacy, critical consciousness, emotional resilience, and civic agency.

4. To determine pedagogical techniques and specific recommendations that can be utilised in operationalising this framework in middle-stage classrooms.

5. To describe the issues and equity concerns applicable in the realisation of empowerment-based environmental education.

METHODOLOGY

The research design adopted in this paper is conceptual/theoretical, as opposed to an empirical design. These types of conceptual papers seek to synthesise, integrate, and extrapolate existing theoretical and empirical literature into a coherent structure, rather than produce primary data. The methodological approach entailed:

Synthesis of the literature: a focused review of the peer-reviewed literature (2018-2026) in the fields of climate change education, environmental literacy and developmental and positive youth psychology, eco-anxiety and climate-related mental health, and place-based/participatory pedagogy.

Thematic integration: across these domains (literacy, consciousness, resilience, agency), recurring constructs were identified and were put together as one conceptual framework.



Figure 1: Methodology

Framework development: constructs identified were organised in a four-layer conceptual model, considering the logical and developmental relations among layers.

Practice translation: based on the conceptual framework, the translation into practical suggestions was derived, relying on the documented practices that were reported in the literature reviewed.

Since being a conceptual work, there will be no human subjects, primary data gathering, or statistical analysis involved and this contribution consists of a theoretical synthesis and framework-building that is aimed at informing future empirical research and practice in education.

Conceptual Framework: Empowering Middle-Stage Students For Climate Action

Overview: The conceptual framework explains how four interconnected layers contribute to empowering middle-stage students to understand climate change, develop critical thinking, build emotional resilience, and take meaningful climate action. The framework follows an integrated, recursive, and mutually reinforcing approach, rather than a strictly sequential process. Based on the literature reviewed, the present paper hypothesises that climate action empowerment among middle-stage students can be achieved by integrating four layers, which are all dependent on each other:

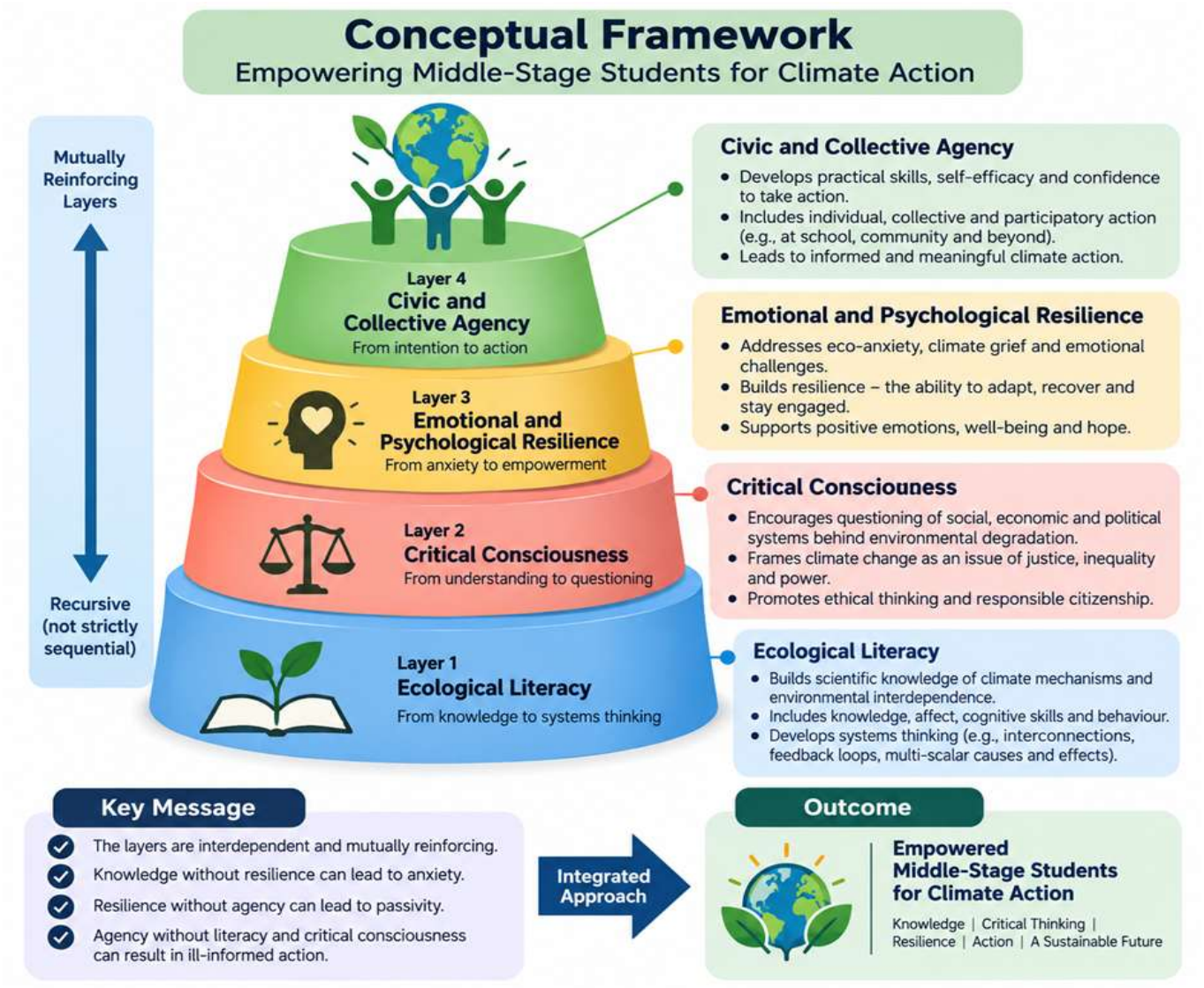

Figure 2: Conceptual Framework

Layer 1-Ecological Literacy (from knowledge to systems thinking): The bottom layer, which comprises the scientific knowledge of climate mechanisms and interdependence of the environment, as it is not conceived as

fixed content knowledge but rather as one part of a larger structure that contains knowledge, affect, cognition, and behaviour. The level of middle-stage incorporates fledgling systems thinking - the capacity to think in terms of feedback loops; of interconnection; of multi-scalar causes and effects.

Key points:

- Develops scientific knowledge of climate change and environmental interdependence.
- Integrates environmental knowledge, affective awareness, cognitive skills, and behaviour.
- Promotes systems thinking, including interconnections, feedback loops, multiple causes, and effects.
- Helps students understand the environmental consequences of human activities.

Expected contribution: Students develop the knowledge and understanding necessary to identify and interpret climate-related challenges.

Layer 2-Critical Consciousness (from understanding to questioning): Expanding upon Layer 1, this layer consists of questioning the social, economic, and political institutions that lie behind the phenomenon of environmental degradation, and repositioning climate change as an object of power and injustice instead of a technical issue.

Key points:

- Encourages questioning and critical examination of environmental problems.
- Explores the social, economic, and political systems influencing climate change.
- Presents climate change as an issue of justice, inequality, power, and responsibility.
- Promotes ethical thinking, reflection, and responsible citizenship.

Expected contribution: Students become critical thinkers who can examine environmental issues, question unsustainable practices, and consider fair and responsible solutions.

Layer 3-Emotional and Psychological Resilience (from anxiety to empowerment): The layer deals with the affective aspect of experiencing climate crisis, including the ability to pursue eco-anxiety and climate grief and continue to efficiently interact. It builds on the concept of resilience as an ability to adapt, recover, and act in times of adversity.

Key points:

- Addresses eco-anxiety, climate grief, fear, and other emotional challenges.
- Develops the ability to adapt, recover, and remain engaged during difficulties.
- Encourages hope, positive emotions, and psychological well-being.
- Supports constructive responses to environmental uncertainty and climate-related concerns.

Expected contribution: Students become more emotionally prepared to respond to climate challenges without becoming overwhelmed or disengaged.

Layer 4-Civic and Collective Agency (from intention to action): The final layer, which includes the practical skills and self-efficacy necessary to do so, either alone, through proxies, or as part of a group, in line with confirmed frameworks that differentiate among various forms of climate agency.

Key points:

- Develops practical skills, self-efficacy, and confidence to take action.
- Encourages individual, collective, and participatory action at school and in the community.
- Promotes collaboration, participation, and shared environmental responsibility.
- Supports informed, purposeful, and meaningful climate action.

Expected contribution: Students become active participants in addressing climate change through individual responsibility, collaborative initiatives, and community engagement.

Key Message of the Framework

The framework highlights three essential principles:

1. Knowledge without resilience can lead to anxiety. Environmental knowledge alone may increase concern if students lack the emotional resources to cope with climate-related challenges.
2. Resilience without agency can lead to passivity. Emotional coping skills must be paired with opportunities to take meaningful action.
3. Agency without literacy and critical consciousness can result in uninformed action. Students need scientific understanding and critical awareness to make responsible and informed decisions.

Therefore, an integrated educational approach is necessary to develop all four layers together.

Expected Outcome: Empowered Middle-Stage Students for Climate Action

Together, ecological literacy, critical consciousness, emotional and psychological resilience, and civic and collective agency are expected to empower middle-stage students to respond constructively to climate change.

The intended outcomes include:

- **Knowledge:** Understanding climate change and environmental interdependence.
- **Critical thinking:** Examining environmental problems and their underlying causes.
- **Resilience:** Managing climate-related emotions and maintaining hope.
- **Action competence:** Developing the skills and confidence to address environmental challenges.
- **Collective responsibility:** Participating in school and community climate initiatives.
- **Sustainable future orientation:** Making informed decisions and adopting responsible environmental practices.

We conceptualise these four layers as recursive and mutually reinforcing, not necessarily sequential: agency-building experiences can compound literacy and consciousness, and resilience can both precede and lead to action. The key idea of the framework is that it is the combination of those layers- knowledge without resilience leads to anxiety; resilience without agency to passivity; agency without literacy and critical consciousness to inadequate or ill-informed action.

FINDINGS (CONCEPTUAL SYNTHESIS)

Being a concept paper, this section contains synthesised theoretical knowledge, but not empirical findings:

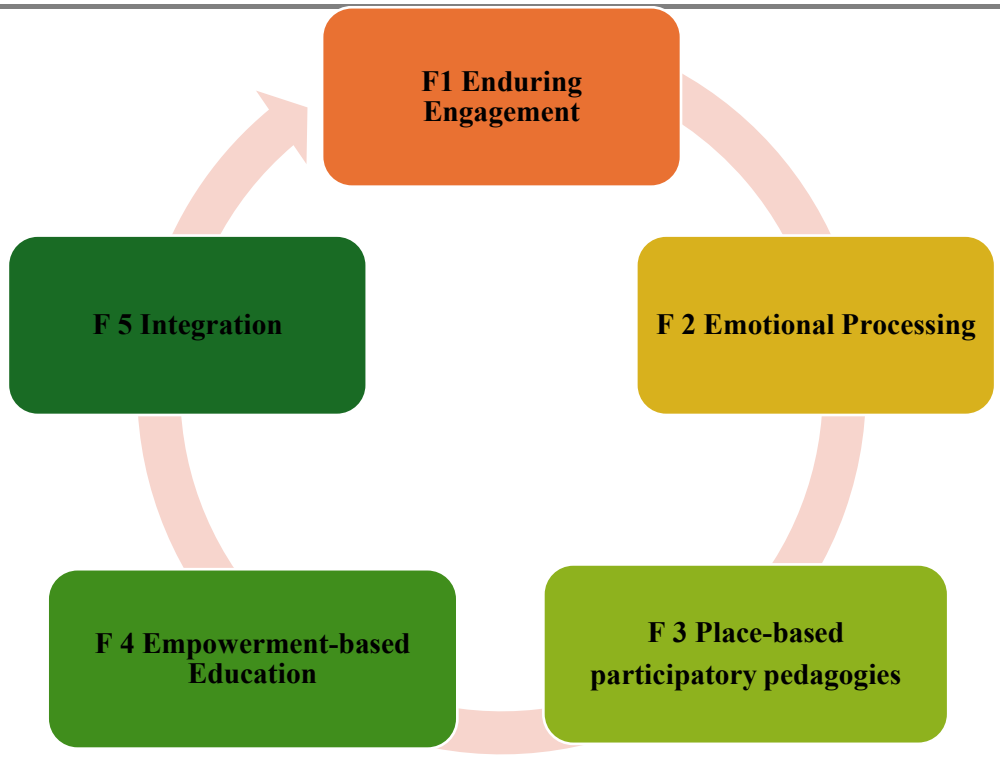

Figure 3: findings of the research

Finding 1 Enduring Engagement: The middle-range is an under-explored, yet strategically developmentally important period. The fact of adolescence dip in agency of climate agencies in the high-school years implies that intervention in middle stage before this drop happens can be developmentally optimal to entrench enduring engagement.

Finding 2 Emotional Processing: The common practice of resilience-building activity is little emotional processing. In taken-in school-based programmes, participatory and problem-solving sessions have been common, though clear space for reflection on climate feelings was only found in a minority of interventions.

Finding 3 Place-based participatory pedagogies: Place-based and participatory pedagogies are always associated with high levels of literacy and agency, especially when linked with local contexts of meaning of global climate phenomena.

Finding 4: Empowerment-based Education: Agency is multidimensional, and it needs to be cultivated explicitly. The difference between individual, proxy and collective modes of agency implies that education that is empowerment-based must be designed to support all of them intentionally.

Finding 5 Integration: Integration across domains is the key design issue. None of the existing frameworks comprehensively covers the empowerment process; all of them deal with the necessary but still incomplete part.

Suggestions

According to the conceptual synthesis, the following recommendations can be made to curriculum designers, educators, and policymakers:

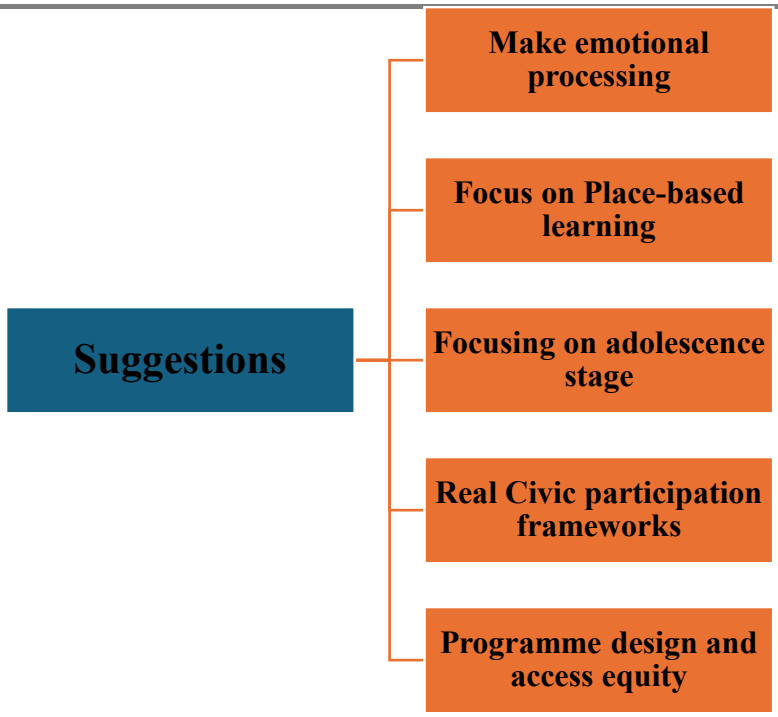

Figure 4: Suggestions for educators and policymakers

1. Make emotional processing a deliberate part of climate education, not an accident.
2. Focus on place-based entry points and then the world ideas.
3. Build on multiple agency modes: individual, proxy and collective.
4. Act during mid-stage years specifically, not necessarily focusing efforts during adolescence.
5. Invest in emotional and content facilitation of teachers.
6. Develop real, not fake civic participation frameworks.
7. Take care of programme design and access equity.

CONCLUSION

This speculative treatise has contended that to empower middle-stage students taking climate action practices, it is necessary to look beyond a model of knowledge transmission of environmental education and adopt a more synthesised approach to develop ecological understanding, critical thinking, emotional strength, and citizenship that actively work together. The literature reviewed concludes that awareness is not a reliable predictor of sustained engagement, that emotional aspects of climate learning are poorly reflected in regard to behavioural and participatory aspects, and that the phase of early adolescence is a relatively under-theorised but developmentally strategic time to act. Integrating developmental psychology and critical pedagogy with positive youth development and climate-specific educational studies into a single four-layered framework, the paper not only makes a theoretical intervention but also provides an orientation to educators and policymakers who would like to develop environment-related education that is as psychologically sustainable as it is pedagogically effective and beneficial. Subsequent empirical studies ought to contrast the elements of the proposed framework with quantifiable phenomena in definite middle-stage classroom scenarios, in different geographic and socioeconomic backgrounds.

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