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RESEARCH ARTICLE

Social psychological pathways to climate action: Reframing education for SDG 13

Syeda Rabia Tahir*

Faculty of Education and Humanities, UNITAR International University Malaysia, Jalan SS 6/3, Ss 6, 47301 Petaling Jaya, Selangor, Malaysia

*** Corresponding author:** Syeda Rabia Tahir, Syeda.tahir@Unitar.my

ABSTRACT

Climate change poses an existential challenge whose resolution depends not only on technological ingenuity but also on the transformation of human psychology. Despite decades of awareness and policy commitments, behavioral inertia continues to undermine global mitigation efforts. This paper proposes an integrative theoretical framework that explains how education can mobilize climate action by leveraging core constructs from social psychology. Drawing on recent empirical work (2019–2025), it argues that climate behavior is governed by the interplay of five processes: social identity formation, normative influence, collective efficacy, temporal discounting, and risk perception. These processes constitute the Integrative Socio-Psychological Model of Climate Engagement (ISPMCE), a conceptual structure that illuminates how education can shift cognition, motivation, and group dynamics toward sustainability. The model demonstrates that effective climate education must go beyond information delivery to cultivate shared identity, normative alignment, and perceived agency. It also highlights the necessity of reducing psychological distance to counteract temporal discounting and amplify risk salience. The paper concludes that embedding this framework within curricula and communication strategies can accelerate behavioral transitions essential for achieving Sustainable Development Goal 13 (SDG 13).

Keywords: climate psychology; SDG 13; social identity; collective efficacy; temporal discounting; risk perception; climate literacy; behavioral change; education; sustainability

1. Introduction

Few scientific issues have achieved the global salience of climate change, yet few have generated such profound behavioral inertia. The Intergovernmental Panel on Climate Change[1] warns that the window for limiting warming to 1.5°C is rapidly closing, but collective responses remain slow and fragmented. Despite international frameworks such as the Paris Agreement and the United Nations' 2030 Agenda for Sustainable Development, human behavior continues to lag behind scientific consensus. This gap between knowledge and action is now recognized as a psychological, not merely technical, challenge[2].

SDG 13, "Climate Action," calls for strengthening resilience, enhancing awareness, and integrating climate change into national policies[3]. Yet global progress has largely centered on technological innovation,

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market instruments, and governance mechanisms, while neglecting the social-psychological foundations of behavior. Climate mitigation and adaptation require shifts in attitudes, values, and norms that cannot be achieved through policy instruments alone[4]. Education, therefore, becomes the bridge between cognition and collective mobilization.

Traditional climate education emphasizes factual literacy: understanding carbon cycles, greenhouse gases, and policy targets. However, behavioral evidence indicates that information rarely suffices to change conduct. People act in line with identity, emotion, and perceived social approval, not purely rational cost–benefit analysis[5]. Consequently, educational strategies must integrate insights from social psychology to cultivate the motivational architecture necessary for large-scale behavioral change.

This paper advances the Integrative Socio-Psychological Model of Climate Engagement (ISPMCE), a theoretical contribution synthesizing current psychological literature into a unified explanation of climate behavior. The model posits that five interacting processes, like social identity, normative influence, collective efficacy, temporal discounting, and risk perception, govern how individuals and groups interpret and respond to climate threats. These constructs are not discrete variables but mutually reinforcing mechanisms embedded within cultural and institutional contexts. Education, in this view, functions as both transmitter and transformer: it disseminates knowledge while shaping collective meaning.

1.1. From awareness to engagement

Recent behavioral data show that awareness of climate change is at a historical high, yet emissions continue to rise[1]. This paradox exposes the limits of cognitive approaches that assume information automatically leads to action. Psychological distance, motivated reasoning, and temporal discounting dilute perceived urgency[6]. Furthermore, social identity and political affiliation often filter interpretation of climate facts, producing polarization even in the face of overwhelming evidence[7].

To move from awareness to engagement, education must target the affective and social dimensions of cognition, how individuals feel about, identify with, and act upon climate knowledge. This shift parallels broader movements in environmental psychology that emphasize experiential and community-based learning[8]. When students perceive climate action as consistent with their group identity and moral values, behavioral intentions increase substantially[4]. Hence, the key question is not what people know, but who they think they are in relation to the planet.

1.2. Why social psychology matters for SDG 13

Social psychology investigates how social contexts influence thought and behavior. Its relevance to climate change lies in understanding collective patterns like how group norms, perceived efficacy, and social narratives shape decisions about resource use, consumption, and activism. The field provides empirical tools to decode the psychological infrastructure of sustainability[9].

For SDG 13, this perspective is critical because global climate goals depend on decentralized behavioral shifts: millions of households altering consumption patterns, communities supporting adaptation projects, and voters backing low-carbon policies. Without social-psychological engagement, even the most robust technological solutions falter in implementation.

1.3. Toward a new integrative framework

While existing models explain isolated aspects of environmental behavior, the Theory of Planned Behavior, Value-Belief-Norm theory, and Social Identity Model of Collective Action, none fully capture the interdependence of cognitive, emotional, and collective drivers in the context of education. The ISPMCE

proposed here unifies these strands by positioning education as a psychological catalyst operating across three domains:

1. Cognitive domain (Transmitting factual understanding and systems thinking).
2. Social domain (Shaping identity, norms, and collective efficacy).
3. Temporal–affective domain (Managing perceptions of risk, distance, and intergenerational responsibility).

These domains correspond to the five constructs synthesized in this paper. The model argues that educational interventions can reconfigure them simultaneously creating alignment between what people know, feel, and do.

1.4. Scope and structure of the paper

The purpose of this theoretical contribution is not merely to review prior work but to generate a cohesive conceptual architecture that explains how education can trigger climate engagement. Section 2 develops each psychological construct, integrating empirical findings from 2019–2025. Section 3 articulates the ISPMCE, illustrating the dynamic interconnections among constructs. Section 4 discusses implications for policy and educational design, while Section 5 concludes with recommendations for operationalizing SDG 13 through psychologically informed strategies.

2. Literature review and theoretical framework

2.1. Social identity and climate engagement

Social identity theory argues that individuals define themselves through their group affiliations[10]. These identities influence beliefs, behaviors, and emotional investment in collective causes. In the context of climate change, identification with environmental or civic communities strongly predicts engagement[7]. Yet identity also explains resistance: individuals whose political or cultural identities conflict with climate narratives often reject scientific consensus[4].

Recent work demonstrates that framing climate action in ways congruent with salient identities can dissolve ideological resistance. When climate mitigation is linked to patriotism, community pride, or religious stewardship, support rises significantly across political lines[11]. Educational spaces therefore become arenas for identity construction: classrooms can cultivate shared moral purpose and global citizenship. Programs that foster collaborative problem-solving, rather than moralizing instruction, build social identities centered on efficacy rather than guilt[12]. This aligns with findings that motivational factors such as relatedness and growth significantly influence learner engagement[13].

Identity-based education also mitigates the phenomenon of "identity threat," where climate messaging challenges core self-conceptions, triggering defensive disengagement. Studies show that inclusive narratives, emphasizing unity and competence, reduce polarisation[14]. Thus, social identity functions as the gateway variable for climate engagement, shaping how information is received and enacted.

2.2. Normative influence and behavioral diffusion

Norms define behavioral expectations within groups. Descriptive norms communicate what others do; injunctive norms convey what others approve of[9]. Climate education that leverages both creates social proof and moral endorsement for sustainable behavior. For instance, energy-conservation studies reveal that households informed that neighbors are reducing consumption decrease their own use by 2–5%[15].

Emerging research highlights the power of dynamic norms, signals that change is underway. When individuals perceive a trend toward sustainability, even if minor, they infer momentum and conform to the direction of change[16]. In educational contexts, showcasing peer initiatives, such as student-led recycling or campus carbon pledges, turns sustainability into a self-reinforcing cultural expectation.

However, norms can also sustain inaction when unsustainable behaviors remain visible. Hence, climate education must not only transmit pro-environmental norms but also render counterproductive behaviors socially conspicuous. The communicative environment, the cues students see modelled by peers and institutions, determines whether climate-friendly choices appear normative or deviant.

2.3. Collective efficacy and mobilization

Collective efficacy, defined as the belief in a group's capacity to effect change, is among the strongest predictors of collective action[17]. Without perceived agency, even concerned individuals experience "learned helplessness" in the face of global problems. Recent data reveal that perceived collective efficacy mediates the link between moral conviction and activism[18]. Youth movements like Fridays for Future demonstrate this mechanism in real time: participants act not because they believe their individual contribution suffices, but because they perceive themselves as part of an effective collective.

Education that foregrounds cooperative projects, community gardens, policy simulations, citizen science instills this shared sense of potency. When learners observe their actions aggregated into measurable impact, efficacy beliefs strengthen[8]. Moreover, the contagion of efficacy, seeing peers act effectively, multiplies motivation across social networks[24]. Thus, fostering collective efficacy transforms abstract concern into mobilization.

2.4. Temporal discounting and intergenerational responsibility

Humans tend to discount delayed rewards, prioritizing immediate gains even when long-term benefits are larger[19]. Climate change epitomizes this dilemma: mitigation costs are immediate; benefits diffuse and deferred. Educational interventions must therefore counteract temporal discounting by making the future psychologically proximate.

Studies indicate that intergenerational framing, linking present actions to the welfare of children and grandchildren, reduces discounting effects[20]. When climate education highlights moral continuity across generations, willingness to sacrifice short-term comfort rises[21]. Visual tools such as scenario mapping and immersive simulations help learners experience the consequences of inaction, collapsing temporal distance[22].

Temporal perception is not merely cognitive but moral: people act for the future when they feel accountable to it. Thus, integrating narratives of stewardship and legacy into education builds ethical time horizons that transcend immediate gratification.

2.5. Risk perception and psychological distance

Risk perception influences whether individuals consider climate change personally relevant. Weber's (2006) notion of "psychological distance" captures how abstract framing reduces urgency. Recent work confirms that people engage more when climate risks are localized, experiential, and affective[23].

Education can narrow this distance by emphasizing tangible, near-term consequences, health impacts, food security, or community resilience, over distant global statistics. Emotional engagement, when paired with efficacy messages, sustains motivation without inducing paralysis[12]. Moreover, participatory risk

communication, where learners collect data on local weather or pollution, transforms abstract risk into lived experience.

Together, these five constructs reveal that climate engagement is an emergent property of social systems, not individual cognition alone. They set the stage for the Integrative Socio-Psychological Model of Climate Engagement.

3. The integrative socio-psychological model of climate engagement (ISPMCE)

The ISPMCE proposes that climate action arises from the reciprocal activation of five mechanisms across three domains: identity alignment (social domain), efficacy and norms (collective domain), and risk-temporal cognition (affective domain). Education acts as the coordinating system that synchronizes these processes.

1. Identity alignment ensures that climate concern is integrated into self-definition, transforming external advocacy into internalized value.
2. Efficacy and norms establish behavioral momentum through shared belief and social modelling.
3. Risk-temporal cognition anchors future-oriented motivation by collapsing psychological distance and moralising long-term responsibility.

These domains interact cyclically. Identity alignment increases receptivity to norms; norms enhance collective efficacy; efficacy strengthens motivation to overcome temporal discounting; and temporal proximity heightens risk salience, reinforcing identity commitment. The model thus reframes education as a feedback system for social-psychological alignment rather than a conduit for information.

Empirically, ISPMCE aligns with recent integrative findings in behavioral climate science showing that interventions combining identity-based messaging with collective framing produce the highest sustained engagement[24]. Conceptually, it extends beyond previous models by embedding temporal and affective cognition within the same social feedback loop.

3.1. Model validation and operationalization of ISPMCE

While the Integrative Socio-Psychological Model of Climate Engagement (ISPMCE) is conceptual in nature, it lends itself to systematic empirical testing. Each of the five core constructs corresponds to well-established psychological measures that can be operationalized within educational research designs.

Social identity alignment may be measured using adapted versions of environmental identity scales and social identification indices that assess the extent to which learners incorporate climate stewardship into self-concept. Normative influence can be operationalized through perceived descriptive and injunctive norm scales, including dynamic norm perception items that capture beliefs about behavioral change over time. Collective efficacy is measurable via group efficacy and participatory agency instruments commonly employed in collective action research. Temporal discounting can be assessed through delay-discounting paradigms adapted for environmental outcomes, while climate risk perception may be evaluated using multidimensional risk salience and psychological distance scales.

Methodologically, ISPMCE is particularly amenable to mixed-methods and longitudinal designs. Quasi-experimental studies comparing psychologically informed curricula with information-based instruction could examine changes in engagement, efficacy beliefs, and sustained behavioral intentions over time. Longitudinal panel studies in educational institutions would allow for the observation of identity consolidation and norm internalization across academic years. Structural equation modeling offers a

promising analytic strategy for testing the reciprocal pathways proposed by ISPMCE, particularly the mediating role of collective efficacy between identity and sustained engagement.

Such empirical operationalization would not only validate the model but also provide evidence-based guidance for scalable educational interventions aligned with SDG 13.

3.2. Cultural and contextual variability in climate engagement

Although ISPMCE is presented as an integrative framework, its operation is necessarily embedded within cultural and contextual conditions. Social identity, norms, and risk perception are not universal in content, even if the underlying psychological mechanisms are widely shared. Cultural orientations toward collectivism or individualism, for example, shape whether climate engagement is more effectively mobilized through communal obligation or personal responsibility. Similarly, societies with strong intergenerational norms may respond more readily to temporal framing than those oriented toward present-centered economic security.

Risk perception is also culturally mediated. Communities with frequent exposure to environmental hazards tend to perceive climate risks as more immediate and tangible, whereas populations in relatively insulated contexts may experience greater psychological distance. Educational applications of ISPMCE must therefore be culturally adaptive, translating its core mechanisms into locally resonant narratives, values, and institutional practices.

Rather than undermining generalizability, this variability reinforces the flexibility of ISPMCE. The model does not prescribe uniform content but specifies psychological pathways that can be activated through culturally appropriate means. This adaptability enhances its relevance across diverse educational systems and geopolitical contexts.

3.3. Case examples and educational applications across contexts

The practical applicability of ISPMCE is evident across multiple educational settings.

In K–12 education, project-based learning initiatives such as school-wide energy monitoring or climate storytelling projects operationalize identity formation and normative influence simultaneously. Students develop a shared identity as environmental stewards while observing peers engage in visible pro-climate behaviors. These interventions reinforce collective efficacy by linking classroom activity to measurable school-level outcomes.

In higher education, simulation-based policy labs and interdisciplinary climate studios exemplify ISPMCE principles. By engaging students in collaborative decision-making scenarios that model real-world trade-offs, these programs enhance efficacy beliefs and reduce temporal discounting through future-oriented scenario planning. Evidence suggests that such experiential formats produce higher levels of sustained civic engagement than lecture-based approaches.

In informal and community education, initiatives such as community gardens, citizen science projects, and participatory adaptation planning embed climate learning within lived social contexts. These settings are particularly effective at collapsing psychological distance by localizing risk perception and rendering climate impacts experientially salient.

Across all contexts, the defining feature of ISPMCE-aligned interventions is their capacity to make climate action socially visible, morally meaningful, and collectively achievable.

3.4. Engagement with critiques of psychological approaches

A common critique of psychologically oriented climate frameworks is that they risk "psychologizing" climate change by overemphasizing individual cognition at the expense of structural, economic, and political determinants. ISPMCE explicitly acknowledges this concern and does not position psychological change as a substitute for systemic reform.

Rather, the model conceptualizes psychology as a complementary layer that enables structural solutions to function effectively. Policies, technologies, and economic incentives require public legitimacy, norm compliance, and collective support to achieve impact. ISPMCE addresses the psychological conditions under which systemic interventions gain traction, such as trust, perceived fairness, and shared efficacy.

By linking individual motivation to collective structures, the model bridges micro-level psychological processes and macro-level institutional change. In this sense, ISPMCE does not individualize responsibility but situates agency within coordinated social systems.

4. Discussion

The Integrative Socio-Psychological Model of Climate Engagement (ISPMCE) reframes climate action as a collective psychological endeavor rather than a sequence of individual choices. The model argues that education serves as a social technology that reorganizes cognition, emotion, and identity to promote pro-environmental behavior. This perspective challenges traditional paradigms that separate information from motivation or knowledge from action. By embedding psychological mechanisms into climate pedagogy, education becomes a site of transformation rather than transmission.

The concept of education as a "social technology" refers to its function as an organized mechanism for shaping social practices, norms, and identities rather than merely transmitting information. Drawing implicitly on social practice theory and social learning traditions, this framing emphasizes that education structures how knowledge is enacted, shared, and stabilized within groups.

As a social technology, education configures habitual action by normalizing certain behaviors, legitimizing particular values, and coordinating collective expectations. Climate education, when informed by ISPMCE, operates as a technology of alignment. It synchronizes cognition, emotion, and identity toward sustainability-oriented practices. This perspective clarifies why purely informational interventions underperform and why socially embedded pedagogies yield durable behavioral outcomes.

4.1. Education as a mechanism of social alignment

Education systems have long been tasked with producing informed citizens, but in the Anthropocene, the mission expands to cultivating engaged planetary actors. ISPMCE positions education as a synchronizing mechanism between cognitive awareness and collective will. Rather than treating climate literacy as an end, it treats it as a platform for generating coordinated norms and efficacy beliefs. Similar to how OSH training fosters sustainability culture in workplaces, climate education can embed pro-environmental norms within institutional practices[23]. This reconceptualization aligns with social learning theories that describe knowledge acquisition as inherently participatory and identity-forming[12].

Contemporary studies support this shift. Programs that integrate climate projects into collaborative group work show higher retention of pro-environmental behavior than lecture-based instruction[8]. Similarly, experiential learning, where students conduct community risk assessments or climate audits, builds both skill and efficacy. These interventions activate the ISPMCE cycle: they produce shared identity ("we are

changemakers"), visible norms ("this is what our community does"), and perceived agency ("our efforts matter").

4.2. Overcoming polarization and motivated reasoning

A major barrier to SDG 13 implementation is ideological polarization. Climate change has become a symbolic battleground for competing identities, particularly in politically divided societies[4]. ISPMCE suggests that the route around this obstacle is identity integration: designing messages and curricula that connect climate action with multiple value systems. For instance, framing sustainability as patriotic responsibility or economic prudence appeals across partisan divides[7].

Motivated reasoning, the tendency to interpret evidence through the lens of group allegiance, can thus be redirected rather than suppressed. By embedding pro-environmental goals within broader cultural narratives, education transforms climate action from a partisan stance into a shared moral project. This is consistent with the principle of value congruence, which predicts greater message acceptance when communications affirm rather than threaten identity[14].

4.3. Psychological distance and the experience of urgency

Traditional climate communication often emphasizes abstract metric degrees Celsius, parts per million, global mean sea level. While scientifically valid, such abstraction fosters psychological distance and disengagement[6]. ISPMCE posits that risk perception must be emotional and local to be actionable. Education provides the context to personalize these risks safely through simulations, scenario planning, and storytelling that connect climate impacts to learners' lived experiences.

When students observe the local manifestations of global change, urban heat, water scarcity, agricultural loss, the sense of urgency shifts from intellectual acknowledgment to personal relevance. Importantly, this must be balanced with efficacy cues; fear without agency breeds paralysis. The most effective interventions combine local realism with collective hope, creating a cognitive balance between threat and empowerment[12].

4.4. Collective efficacy as policy leverage

From a policy standpoint, collective efficacy represents the psychological infrastructure of social movements. Governments and NGOs can amplify this through participatory governance, citizen assemblies, youth climate councils, and local adaptation planning. Such involvement generates visible social feedback loops where individuals witness the aggregation of their actions into institutional outcomes.

Research shows that even symbolic participation, such as signing petitions or attending community forums, increases subsequent activism through a process known as commitment reinforcement[18]. Thus, policy frameworks that institutionalize collective efficacy, through educational programs, public reporting, or recognition of community initiatives, can multiply civic engagement exponentially.

4.5. Integrating temporal and moral education

Temporal discounting, though often discussed as cognitive bias, is deeply moral in character. People act for the future when they feel ethically bound to it. Education is uniquely positioned to cultivate such temporal ethics by integrating intergenerational perspectives into curricula. Exercises that invite learners to write letters to future generations, or to imagine their descendants' retrospective judgments, elicit moral emotions, guilt, pride, empathy that sustain long-term motivation[20].

When combined with factual understanding, these emotional cues create a "moral timeline" where the future becomes part of one's social identity. ISPMCE thus transforms time perception into an ethical relationship, reinforcing the loop between identity, efficacy, and moral duty.

5. Policy implications

5.1. Embedding psychology into climate education policy

SDG 13 implementation requires a paradigmatic shift in how education ministries and institutions conceptualize climate literacy. The ISPMCE framework suggests that national strategies should move beyond curricular content toward cultivating the *psychological competencies* of engagement: empathy, efficacy, collective reasoning, and foresight. Teacher training programs must incorporate behavioral science, equipping educators to recognize cognitive biases, manage emotional responses, and foster group cohesion around sustainability goals.

5.2. Communication strategies for cultural transformation

Public communication campaigns should apply the same psychological principles. Rather than emphasizing catastrophe, they should highlight collective progress and identity-consistent narratives. For example, emphasizing community resilience or national innovation reframes mitigation as empowerment rather than sacrifice. Governments can use dynamic normative messaging, "more people each year are switching to clean energy," to amplify perceived momentum[16].

5.3. Global equity and collective identity

ISPMCE also carries implications for global climate equity. Collective efficacy depends on shared identity at the planetary scale. When climate action is framed as a cooperative enterprise between nations rather than a competition for resources, engagement rises even among populations with limited economic capacity. Educational diplomacy, international student collaborations and digital climate classrooms can foster this sense of global belonging[22].

6. Conclusion

The present paper has argued that technological innovation and policy reform alone cannot achieve SDG 13. Climate change is as much a psychological and cultural challenge as an environmental one. The **Integrative Socio-Psychological Model of Climate Engagement (ISPMCE)** advances a new theoretical synthesis linking five constructs, social identity, normative influence, collective efficacy, temporal discounting, and risk perception, into a single explanatory framework.

Education, when reimagined through this lens, becomes a transformative instrument that harmonizes cognition, emotion, and social dynamics. It enables individuals to see themselves not as isolated agents but as participants in a collective moral narrative that spans generations. By aligning identity, efficacy, and temporal consciousness, ISPMCE provides the conceptual foundation for designing interventions that translate awareness into sustained action.

Future research should operationalize this model through longitudinal studies testing how educational interventions alter identity salience, perceived efficacy, and temporal orientation. Only through such integration can humanity bridge the cognitive–behavioural gap that has long impeded climate progress. In short, achieving SDG 13 will depend not solely on what societies know, but on who they believe themselves to be.

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Conflict of interest

The authors declare no conflict of interest.

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