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Young and realistic? A transnational case for critical language awareness in climate and energy education

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This study examines how to help university students translate climate concern into support for energy transition policies, with specific anchoring to Affordable and Clean Energy (SDG 7) and Climate Action (SDG 13). Using survey data from Argentina, Denmark, Italy, Spain, and the United States (n = 404), we find near-universal agreement among young people that climate change is human-driven, yet markedly weaker and differentiated support for specific decarbonization policies. Our multivariate regression analyses show that policy support is shaped less by personal beliefs than by how energy and climate policies are framed: perceived health co-benefits consistently raise support, while economic harm narratives suppress it. Together, the findings suggest that the gap between climate concern and action is partly due to a lack of energy literacy, which, we argue, might be ameliorated with critical language awareness (CLA). We present a three-part energy literacy intervention that is grounded in CLA and designed to build students' capacity to interrogate the construals, trade-offs, and distributional claims embedded in climate and energy discourse, and to connect these to credible, agency-oriented everyday practices bridging SDG 7 and SDG 13.

KEYWORDS
climate action, critical language awareness, energy literacy, energy transitions, sustainability pedagogies, sustainable development goals, university teaching and learning

1 Introduction

Among the 17 interlinked global targets that make up the United Nation's Sustainable Development Goals (SDGs), SDG 13 "Climate action," may be the most urgent and also most elusive. Climate action is an urgent as cascading ecological disruptions threaten progress across the other SDGs (IPCC, 2023). However, climate action is also elusive, as global greenhouse gas emissions reached a record high in 2024 (Deng et al., 2025), and, by 2026, a decade after the Paris Agreement, the planet is still on course for roughly 2 °C of warming by 2050 (Nordling et al., 2026). Globally, cascading ecological disruptions as well as intensifying heat, floods, hurricanes, and wild fires have not been enough to spur collective change.

The effectiveness of current and near-term climate action depends not only on the technical design of mitigation and adaptation policies, but on how such policies are interpreted, metabolized, and legitimized in public life. Citizens increasingly endorse bold climate action (Latkin et al., 2025), and technical solutions for decarbonized energy systems are becoming more efficient and cost-competitive (Liñeiro and Müsgens, 2025). However, the language through which energy transitions and climate actions are operationalized ("sustainable development," "net zero," "climate neutral," "clean energy," etc.) provide distinct and sometimes competing frames for problems, responsibilities, and acceptable futures in different ways. The majority of citizens come to understand climate change and energy systems, and what they perceive as the stakes, tradeoffs, and responsibilities involved, based on their climate and energy literacies. We define these interconnected, discusively constructed literacies as the ability to comprehend, evaluate, and act on information about climate impacts and actions and energy production and consumption.

Critical language awareness (CLA) serves as a means of surfacing ideological pressures and social change (Fairclough, 1999, 2010). Shapiro (2022), writing three decades later, argues that a CLA-oriented approach "requires that we teach — explicitly — the tools, strategies, and habits of mind students need to attend closely and critically to language" (p. 377). This study adopts CLA to examine how distinct perspectives and positions of power shape attitudes for climate and/or energy policies. However, we seek to push beyond awareness of how words shape our thoughts, which inform our individual habits and actions to show how individual habits and actions sow the seeds for collective activism and "the deliberate effort to transform discourse and reality" (Darics et al., 2025, p. 10). In short, CLA as a means for uncovering the discursive constructs of climate and energy literacies, cultivating said literacies, and letting literacies bloom into full grown agency.

University students occupy a particularly consequential position within the discursive climate-energy landscapes. They must navigate conflicting narratives about responsibility, sacrifice, realism, and justice (Beach, 2025; Karthika, 2025). Research consistently documents high climate concern among this cohort (Timmons et al., 2024), yet concern is not always converted into policy support, especially when policies entail economic trade-offs or demand lifestyle adjustments (Choi and Hart, 2021). Some studies suggest policy support is more shaped by political ideology (e.g conservative or liberal leanings) than by age or nationality, which is somewhat surprising considering most of the students in university today were born and raised in age when climate impacts seem ubiquitous (Janik et al., 2021; Milfont et al., 2021). A persistent "pluralistic ignorance" illustrates this dynamic well: in the United States, both conservatives and liberals systematically underestimate public support for climate policies in part because media representations make disagreement appear more common, while the reality is that most Americans support climate action (Sparkman et al., 2022). Higher education institutions are therefore especially important spaces where students can be equipped with the metalinguistic and critical interpretive tools needed to read policy discourse more carefully, assess competing claims, and recognize how language shapes what appears possible, necessary, or fair.

Attempts to share bipartisan and "realistic" solutions also address a problem with prioritization. Many young people consistently rank SDG 13 below related goals such as poverty (SDG 1), health (SDG 3), education (SDG 4), and peace, justice and strong institutions (SDG 16) (Klees, 2024; Kleespies et al., 2023). Therefore, rather than approaching all the SDGs as an integrated "net" and hoping students appreciate the connections, Wuebben et al. (2025) suggest a "wedge" approach: beginning with more immediate, visible priorities and then drawing explicit pathways from more salient SDGs toward climate action. The "wedge" approach clarifies established links between health or affordability and climate impacts. This reframes climate action as an extension of more widely valued and recognizable commitments rather than an issue that directly competes for attention or resources. SDG 7 offers a particularly promising wedge. Energy is tangible, has direct economic costs and benefits, and present in students' daily lives through heating, cooling, and transportation choices. Here, we argue that energy literacy, when treated not simply as factual knowledge but as the capacity to interpret policy language, evaluate trade-offs, and identify embedded assumptions, can be understood as a form of critical language awareness. This view aligns with recent scholarship in CLA and eco-critical language education, which argues that sustainability teaching should help learners examine how discourse links environmental, linguistic, and social justice, rather than treating environmental issues as content added onto otherwise unchanged pedagogies (Micalay-Hurtado and Poole, 2022).

To identify the discursive levers most strongly associated with policy support and to use these levers to inform the design of a CLA-based energy literacy intervention, we conducted a transnational survey ($n = 404$) of university students from Argentina, Denmark, Italy, Spain, and the United States. The survey meant to address two guiding research questions: What are youth attitudes toward the relationships between climate change and energy transition policies, such as fossil fuel taxation and support for large-scale renewable energy projects? Do these policy preferences align with students' views of the SDGs or with sustainable behaviors such as reducing energy use?

Previous research on efficacy beliefs finds that energy conservation intentions and climate policy support are shaped by confidence in collective, community-level action and this appeal may function as a distinct lever for support separate from personal costs and benefits (Choi and Hart, 2021; Timmons et al., 2024). From these preliminary findings, we sought to test four distinct hypotheses:

(H1) Perceived health co-benefits will raise support across policies

(H2) Anticipated economic strains will weaken support for climate policy

(H3) Socio-economic position and gender will condition support behavior change with lifestyle implications (e.g., taxes, diets)

(H4) Beliefs in community-level efficacy will positively correlate with support for climate and energy policies (taxes, utility-scale renewables, etc.).

We used the results of these hypotheses and insight into potential policy levers to develop an energy literacy module that synthesizes three existing perspectives. First, the sociocultural

framework (Gladwin et al., 2022) connects local energy habits to questions of global justice (e.g., historical and current per capita emissions). Second, systems-oriented approaches (Adams et al., 2022) situate energy literacy within "energy ecologies," emphasizing the intersection of infrastructures, economies, and daily practices (e.g., how readily can one install home solar or an EV charging bank). Third, the psychological-behavioral lens of Dwyer (2011) argues that energy literacy must overcome "denial" and "anxiety" (e.g., range anxiety for EV purchases) to focus "on the pragmatic necessity and concrete benefits had a more positive impact on promoting pro-environmental behavior" (p. 133). Together, these perspectives underpin an energy literacy curriculum that develops students' capacity to evaluate trade-offs, interrogate policy claims, and connect everyday practice to the structural demands of energy transition.

The article proceeds by outlining the theoretical framework linking energy literacy to policy evaluation, describing the methodology for administering the survey across five countries, analyzing patterns of policy support and behavioral alignment, and concluding with implications for designing youth-focused literacy that connects SDG 7 and SDG 13.

2 Theoretical background

Communication scholarship on the "energy of rhetoric" suggests a kind of human-generated force is central to all rhetorical discourse; as the powerful impact of communicating ideas (about energy and other subjects) exhibits an interlocking web of effect, sensation, resource, and vitality (Ingraham, 2018). The overall art of dialogue and persuasion are infused with energetic elements. Indeed, for many who have devoted our lives to the classroom, our practice is an attempt to cultivate and spread the "energy" that stems from a shocking realization, buzzing class discussions, or the spark of insight.

The discursive density surrounding energy may explain why current undergraduates report broad concern about climate change (Leal Filho et al., 2023) and still they lack uniform domains, contexts, and engagement with energy policy. Young people are often more likely to adopt accessible practices such as recycling or reducing single-use plastics than more demanding actions involving transport, diet, housing, or political participation (Hu et al., 2021). Even when students understand the basic drivers of climate change, they may still report uneven understanding of mitigation pathways and uncertainty about socio-environmental solutions (Jordan et al., 2023). The relevant question, then, is not simply whether students care, but how they interpret possible responses and whether they see themselves as capable of evaluating and supporting them.

Energy literacy provides an important starting point for addressing the gaps in critical thinking and language awareness. DeWaters and Powers (2011) conceptualize energy literacy as a multidimensional construct spanning knowledge, affect, and behavior. Their framework shifts attention away from factual recall about electricity or electric technologies and toward the relationship between understanding, valuation, and practice. This practice both includes and is driven by discursive and evaluative capacity. Just as CLA asks readers to interrogate how language constructs responsibility and legitimacy (Fairclough, 2010), an energy-literate reader must interrogate how language construes the realities attached to energy transition technologies and policies. Issues of fossil fuel taxation, renewable energy siting, or reduced consumption can be framed as burdensome, pragmatic, unrealistic or morally necessary.

Energy literacy that blends technical knowledge with discursive awareness demands a different kind of classroom practice. This means asking students to analyze policy language, compare competing discourses, and debate tensions and trade-offs. At the same time, our framework does not assume that CLA will be uniformly embraced or that concern about policy language will translate linearly into support. Del Puy Ciriza and Marrin (2026) show that students' responses to CLA pedagogy can vary according to social class, identity, and prior educational experience, and that resistance itself can be a meaningful part of the learning process. This insight is especially important for our study, which hypothesizes that socio-economic position and gender shape attitudes toward policies with visible lifestyle implications. Students' interpretations of climate and energy discourse are not detached from their lived positions; claims about affordability, fairness, and feasibility are mediated by experience, perceived risk, and social location.

Even when CLA "succeeds" by transforming awareness into agency, that agency must also be understood as discursively and materially situated. Undergraduate students often have limited direct control over housing energy systems, transport infrastructures, or household bills, yet universities can still shape what appears feasible and legitimate by making transitions visible and participatory. Campus initiatives in energy, buildings, transport, and governance create "policy-in-miniature" contexts in which students observe how sustainability is framed and enacted (Amaral et al., 2019). Beyond operations, collaborative learning on energy justice can expand students' understanding of transition futures and connect everyday practices to wider systems of inequality and responsibility (Gladwin et al., 2022).

Our framework therefore does not assume a simple progression from CLA to action. Instead, it focuses on situations in which high climate concern may fail to translate into support for specific policies, or where ambivalence reflects uncertainty about trade-offs, fairness, and efficacy. Overall, the intersection of SDG 7 and SDG 13 for undergraduate education can build on students' broad concern for climate goals, but it must also strengthen their ability to read policy language critically, assess competing claims, and identify credible roles for themselves within transition politics. The survey that follows is designed to locate exactly which of these discursive claims most shape policy support, and to use those findings to inform the energy-literacy intervention.

3 Methodology

3.1 Study design and sample

This study draws on data from a cross-national online survey designed to examine how young adults evaluate energy policies under conditions of climate impacts, perceived efficacy, and distributed responsibility. The survey was administered between

October 2024 and January 2025 to undergraduate students enrolled at four-year universities in Argentina, Denmark, Italy, Spain, and the United States. University students were selected as a policy-relevant group positioned at the intersection of future citizenship, consumption, and labor market participation within ongoing energy transitions. Survey recruitment was conducted through in-class announcements and email lists. A total of 404 students completed the survey, which members of the research team (native speakers) translated into English, Spanish, and Italian; specifically, 197 surveys were completed in English, 170 in Spanish, and 37 in Italian. The English-language version of the questionnaire is provided in the Supplementary Materials. All participants provided informed consent, and the study protocol was reviewed and approved by the ethics committee at the first author's institution in accordance with the Helsinki Declaration and applicable data protection standards.

3.2 Measures and analysis

The survey instrument was developed based on established measures used in climate opinion and energy policy research (Leiserowitz et al., 2021; Vaznonienė, 2023; Verschoor et al., 2020) and refined through expert review and pilot testing. Independent variables included socio-demographic characteristics (gender, self-reported social class, and residential context), beliefs about climate change and its impacts, and perceptions of responsibility attributed to governments, corporations, wealthy nations, NGOs, and individuals. Policy preference variables assessed support for a range of energy-related interventions, including fossil fuel taxation, renewable energy subsidies (home solar, large-scale wind and solar), electric vehicle incentives, green hydrogen infrastructure, energy efficiency retrofits, and policies promoting plant-based diets. Respondents rated each policy proposal on a Likert scale that explicitly included "I don't know" to capture uncertainty or ambivalence. The inclusion of "I don't know" responses and other forms of neutrality was a deliberate methodological choice: these responses may indicate informational gaps, interpretive hesitation, or reasoned skepticism (Latkin et al., 2023; Waters et al., 2022). This distinction is particularly relevant in the context of climate and energy transitions, where respondents are often asked to evaluate technically complex or emerging policy proposals. Forcing respondents to provide substantive answers when they are uncertain may introduce measurement error and reduce the validity of survey findings (Elkjær and Wlezien, 2025; Krosnick et al., 2002).

The analysis followed a two-stage approach using Stata 17. First, descriptive analyses were conducted to examine distributions, central tendencies, and patterns of neutrality or uncertainty. Second, multivariate Ordinary Least Squares (OLS) regression models were applied to examine factors associated with support for six policy items: fossil fuel taxes, solar parks, wind farms, home solar, EV subsidies, and plant-based diet policies. Predictors included demographics (age, gender, class), climate beliefs, perceived efficacy of energy reduction, and expected health and economic impacts of climate policy. Sample size varied by model due to item nonresponse in attitudinal questions rather than survey abandonment. Regression analyses were estimated using listwise deletion, resulting in model sample sizes ranging from $n = 329$ to $n = 380$, and model fit ranged from modest to moderate ($R^2 \approx 0.12$–0.24). Comparisons between full-sample descriptive statistics and regression subsamples revealed no substantive differences in the distribution of key demographic characteristics, suggesting that missingness was unlikely to substantially bias model estimates. Full data sets, models and results are available in the Supplementary Materials. For consistency, descriptive statistics throughout the results are reported as percentages followed by absolute frequencies [% (n=)] to provide a better understanding of the weight, whereas regression models report the valid sample size used in each analysis.

4 Results

4.1 Univariable analysis

The survey was completed by 404 respondents, mainly female, urban & suburban, middle and upper middle class (Table 1). Argentina is the country that provided more respondents.

Our first domain of questions "climate consciousness" regarded perceptions of climate change. Respondents expressed near consensus that climate change is anthropogenic, as: 89,6% ($n = 362$) agreed that human activities are the major cause of climate change (Figure 1).

Students showed belief in climate change and have seen its impacts: over one third (36.63%, $n = 148$) indicated their community has already been harmed or is currently experiencing harm from climate change. The majority (54.46%,

TABLE 1 Descriptive data of the respondents $n = 404$.

Variable	Category	n	%
Gender identity	Female	252	62.3
	Male	145	35.9
	Gender queer/Gender fluid	4	1.0
	Non-binary	3	0.7
Country of study	Argentina	119	29.5
	USA	91	22.5
	Spain	79	19.6
	Denmark	63	15.6
	Italy	39	9.7
	Other countries	13	3.2
Residential background	Urban	230	56.9
	Suburban	132	32.7
	Rural	42	10.4
Socioeconomic self-placement	Lower middle class	65	16.1
	Middle class	164	40.6
	Upper middle class	157	38.9
	Upper upper class/Wealthy	18	4.5

Own elaboration.

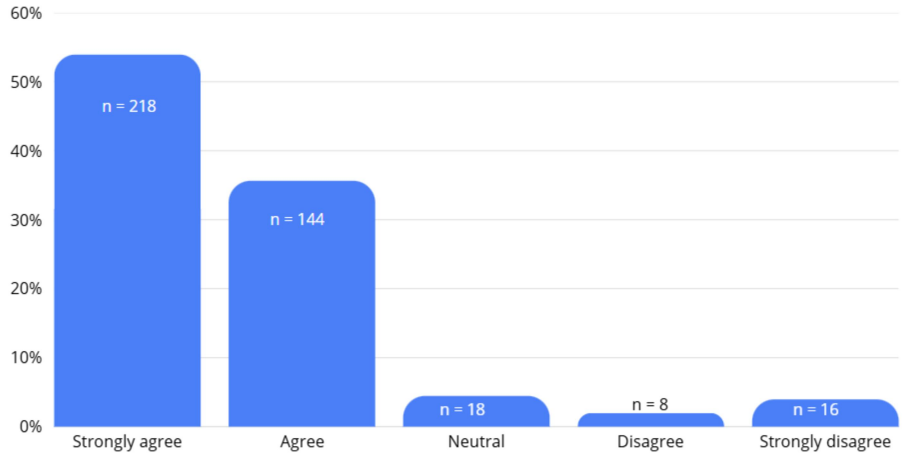

FIGURE 1
Comparison percentages between responses to questions Climate change is caused by human activities? (1 = Strongly Agree, 5 = Strongly Disagree) $n = 404$. Own elaboration.

$n = 220$) reported believing their community will be harmed in the next 15–25 years. Only a small minority (5.44%, $n = 22$) did not believe their community will suffer harm from climate change. Respondents also reported frequent thinking about climate change: 12.38% ($n = 50$) think about climate change daily, 29.95% ($n = 121$) weekly, and 30.94% ($n = 125$) monthly, while 26.73% ($n = 108$) reported never or almost never thinking about it.

Our second domain related to the SDGs. Respondents first indicated their level of familiarity with the SDGs on a five-point scale, with the majority reporting limited prior exposure: 42.3% ($n = 171$) selected "I have never heard of the SDGs", 23.5% ($n = 95$) had heard of them but were not familiar, 17.8% ($n = 72$) held a basic understanding, 14.6% ($n = 59$) had directly engaged with the SDGs in coursework or projects, and just 1.7% ($n = 7$) reported advanced monthly engagement. In total, roughly two-thirds of respondents (65.8%) fall into the two lowest awareness categories. Students were then asked to rank eight SDGs in order of personal importance. Weighted-average rankings showed a consistent preference for social and humanitarian goals, with SDG 2: Zero Hunger ranked highest overall ranking (mean = 3.60, SD = 2.13), followed by SDG 6: Clean Water and Sanitation (3.72 ± 2.06), SDG 3: Good Health and Well-being (3.95 ± 2.07), and SDG 16: Peace, Justice, and Strong Institutions (4.27 ± 2.45). SDG 4: Quality Education (4.65 ± 1.96) and SDG 1: No Poverty (4.68 ± 2.23) ranked in the middle tier, while SDG 13: Climate Action ranked seventh (5.30 ± 2.39) and SDG 8: Decent Work and Economic Growth ranked last (5.83 ± 2.06). To understand if SDG awareness level corresponded with rankings, we compared lower awareness groups (levels 1–2, $n = 266$) with higher awareness (levels 3–5, $n = 138$) and found that reporting "I have never heard" of the SDGs did not have a significant impact across all priorities; however, respondents who had never heard of the SDGs were more than twice as likely to rank SDG 13: Climate Action first (11.3%) compared to those with higher awareness (5.1%) and higher-awareness respondents more frequently prioritized SDG 16: Peace, Justice, and Strong Institutions first (23.9% vs. 14.7%). Overall, the "basic needs" SDGs such as food, water, and health were prioritized and familiarity with the SDG framework appears to shift attention toward institutional and governance goals.

Our third domain examined attitudes toward climate and energy policies. Perceived efficacy was notably higher for collective than individual action (Figure 2). Respondents rated the likelihood that community-wide energy reduction would help reduce climate change at 6.79/10 (SD = 2.24, median = 7), compared to 5.45/10 (SD = 2.26, median = 6) for personal energy reduction alone — a gap consistent with the diffusion of individual responsibility documented elsewhere. Regarding anticipated policy effects on a 1–10 scale, respondents expected moderate health benefits from stronger climate policies (mean = 6.44, SD = 2.09), with 8.2% rating this outcome as extremely likely. Economic harm was anticipated at a lower but non-negligible level (mean = 5.05, SD = 2.19), with 3.5% selecting the highest concern rating, suggesting that economic anxiety coexists alongside broadly supportive attitudes.

Support for public subsidies tracked closely with how visible and familiar the technology was perceived to be (Figure 3). Wind farms and home solar installations drew the highest combined support — 86.4% ($n = 349$) and 84.7% ($n = 342$) somewhat or strongly in favor, respectively — while opposition remained below 11% for both. The next level of support was shown for large-scale solar parks (75.7% in favor) and building remodeling such as insulation and heat pumps (76.7% in favor). Green hydrogen infrastructure attracted a similarly strong level of support (78.5%), but also the highest proportion of uncertainty among the subsidy items (15.1% "I don't know"), reflecting its less familiar nature of hydrogen infrastructure. Electric vehicle subsidies were more contested: 57.9% were in favor but 31.2% were against and 10.6% were uncertain, suggesting that EV policies may raise distributional or infrastructure-readiness concerns.

The most polarized responses related to fossil fuels and vegetarianism. Fossil fuel taxes generated meaningful resistance — 46.3% in favor but 35.6% against, with 18.1% selecting "I don't know" — the highest uncertainty share across all policy items, consistent with the mixed signals respondents may

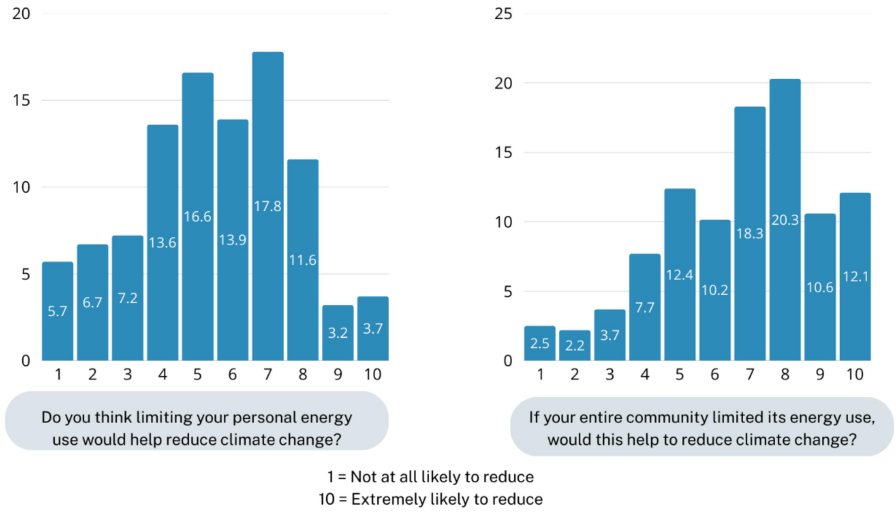

FIGURE 2
Comparison percentages between responses to questions Would limiting your personal energy use reduce climate change? and Would reducing community energy use reduce climate change? (1 = not at all likely, 10 = Extremely likely) *n* = 404. Own elaboration.

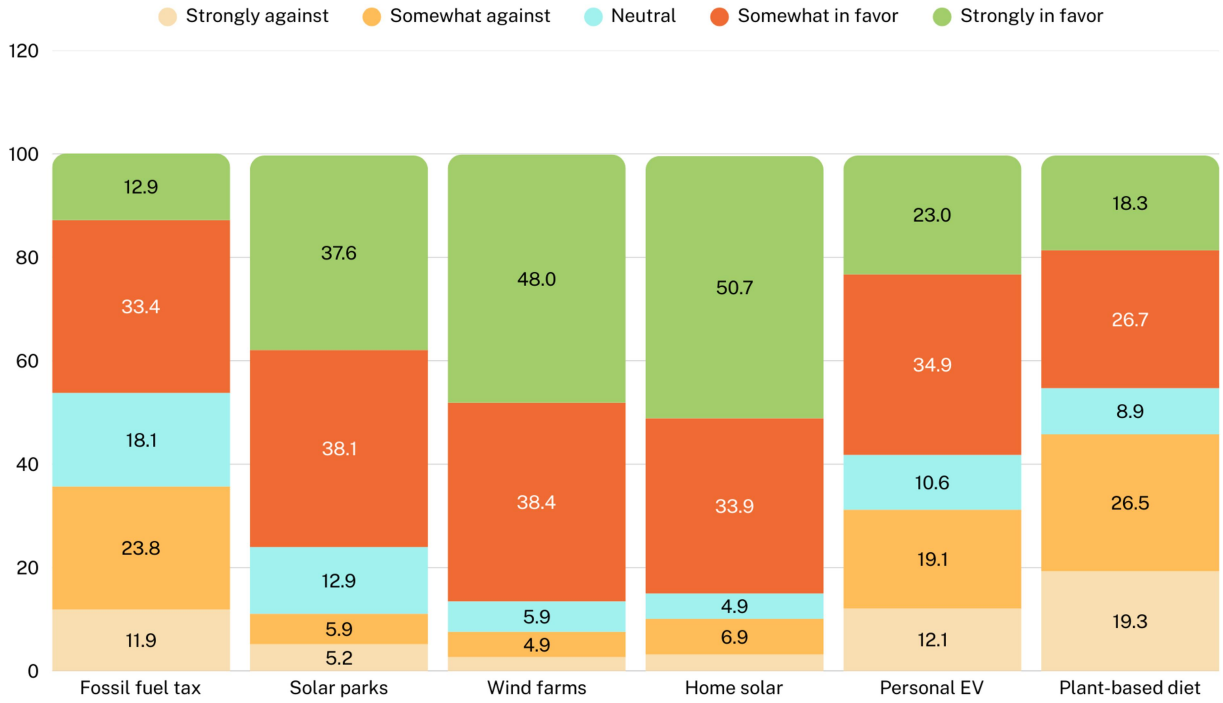

FIGURE 3
Percentage of people answering the question to what extent are you in favour or against using public money to subsidize (or further subsidize) the following climate actions? Own elaboration.

receive about the fairness and macroeconomic consequences of taxation. Meanwhile, for the promotion of plant-based diets, support (45.0%) and opposition (45.8%) were nearly equal. Overall, these univariable results show students were supportive of visible, direct decarbonization investments and more divided on instruments with salient or immediate cost implications.

Finally, to assess whether aggregate findings were disproportionately influenced by countries with larger sample sizes, descriptive statistics were examined separately for each national subsample (Table 2). Although some variation was observed across policy domains, the overall pattern was broadly consistent across countries. Strong agreement regarding anthropogenic climate change was evident in all national groups, whereas greater variation emerged for policies involving more immediate economic or lifestyle implications, particularly fossil fuel taxation and plant-based diet promotion.

10.3389/fcomm.2026.1876994

4.2 Multivariate analysis

To identify the intensity and potential predictors of policy support, we estimated a series of OLS regression models, each regressing the relevant policy support outcome on a common set of eleven predictors: age, gender (woman), two class dummies (lower class and upper class, with middle class as the reference category), climate change belief, personal energy efficacy, community energy efficacy, perceived health benefits of climate policies, perceived economic harm from climate policies, electricity minimization behavior, and SDG awareness (Figure 4). Models were estimated on listwise-complete cases, with sample sizes ranging from 329 (fossil fuel tax) to 380 (home solar). All models were statistically significant (all F-tests $p < .001$), with R^2 values ranging from 0.12 (home solar; EV subsidies) to 0.24 (plant-based diets), indicating that the included belief and demographic predictors explained a modest but consistent share of variance across policy domains.

Across all eight models, a clear pattern emerged in how participants evaluated climate policies. Respondents who expected that stronger climate policies would improve public health were more likely to support measures, including solar parks (b = 0.114, $p < .001$), wind farms (b = 0.088, $p < .001$), plant-based diets (b = 0.107, $p < .001$), EV subsidies (b = 0.094, $p = .001$), and home solar (b = 0.085, $p < .001$). The pattern was equally consistent on the cost side: those who were concerned that climate policies will harm employment and the economy tended to be less supportive of these initiatives, most strongly for solar parks (b = −0.078, $p < .001$) and wind farms (b = −0.054, $p = .001$).

The findings also suggest that support for fossil fuel taxes is primarily shaped by class. Upper class students reported significantly higher support for fossil fuel taxation (b = 0.258, $p = .013$), consistent with distributive justice and affordability, meaning those with greater financial security may be less averse to bearing higher costs of decarbonization. In addition, students who thought reducing energy consumption across the

TABLE 2 Policy support by country (% in favour).

Policy	Argentina	Denmark	Italy	Spain	USA
Fossil fuel tax	44.6%	88.5%	50.0%	45.8%	60.6%
Solar parks	81.2%	94.5%	94.3%	84.2%	85.7%
Wind farms	92.5%	96.7%	94.3%	90.7%	87.0%
Home solar	86.6%	89.3%	100.0%	87.0%	90.2%
EV subsidies	64.3%	68.1%	67.6%	63.2%	64.9%
Plant-based diet	43.9%	65.4%	68.6%	46.7%	41.8%

Own elaboration.
Values represent the percentage of respondents reporting that they were somewhat or strongly in favour of each policy proposal.

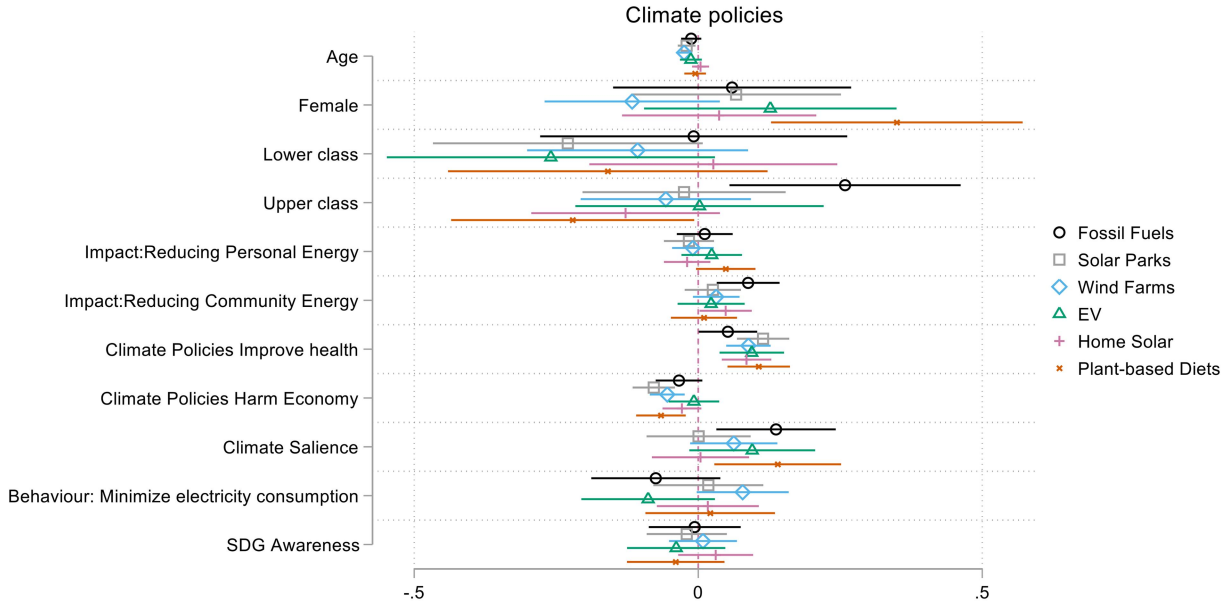

FIGURE 4
Comparative analysis of factors affecting climate policies. Own elaboration. Coefficient plot from linear regression models estimated using OLS. Points represent estimated coefficients and horizontal lines indicate 95% confidence intervals.

community would reduce climate change were more supportive of fossil fuel taxes (b = 0.088, $p = .002$). Climate change belief also independently predicts higher support (b = 0.137, $p = .011$), and expecting health improvements adds further explanatory power (b = 0.052, $p = .047$). Taken together with the descriptive split and the high "I don't know" responses (18.1%).

The age of participants emerged as a consistent predictor in some industrial-infrastructure models, with older students reporting lower support for both solar parks (b = −0.020, $p = .011$) and wind farms (b = −0.025, $p < .001$). While the effect sizes are small, their direction is consistent across both high-support items. Support for EV subsidies was weakest and most sparsely predicted model ($R^2 = 0.127$, adj. $R^2 = 0.099$), with only perceived health benefits reaching significance (b = 0.094, $p = .001$). The absence of significant effects for class, efficacy, climate belief, or economic concern suggests that EV subsidy attitudes are likely influenced by beliefs or perspectives not captured in the current predictor set — such as students who cannot or do not drive, familiarity with and availability of charging infrastructure, or views about the equity of subsidizing pricey private purchases. These results aligned with the univariable finding that EVs generated more mixed and uncertain responses than other subsidy items.

Support for policies promoting plant-based diets showed the strongest overall fit ($R^2 = 0.242$) and the most distinctive predictor structure. Gender was the most powerful predictor, with women reporting substantially higher support (b = 0.350, $p = .002$). Interestingly, class operated in the opposite direction from the fossil tax model: students from upper-class reported lower support for plant-based diet promotion (b = −0.221, $p = .043$), possibly reflecting greater attachment to existing dietary norms or resistance to perceived lifestyle regulation. Support was also higher among those with health expectations (b = 0.107, $p < .001$), as those who hold climate belief (b = 0.140, $p = .014$) while concerns about economic harm reduce support (b = −0.066, $p = .003$).

5 Discussion

This study set out to understand how to help transform climate concern among university students into understanding of and support for specific energy transition policies. We argue that educators might strengthen the conceptual links between SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action) by applying CLA to discussions of energy transitions and various climate mitigation policies. Our survey findings help to confirm a familiar paradox: respondents overwhelmingly accept anthropogenic climate change (89.6% combined agreement) and anticipate local harm, yet SDG 13 is deprioritized when placed alongside more immediate social goals. This ranking supports the "wedge" logic introduced earlier: SDG 13 ranked seventh out of eight goals overall (mean = 5.30, SD = 2.39), and even among higher-awareness respondents, climate action was not the most frequently top-ranked priority. For many students, climate concern coexists with a stronger felt urgency around hunger, health, and water security. In this context, SDG 7 offers a "realistic" entry point because energy is visible, economically tangible, and already linked to everyday life through transportation, housing, and prices. Therefore, presenting climate interventions alongside or as enablers of food, water, health, and energy may be more persuasive than leading with climate action directly.

Generally, results suggest that college students' support for energy transition policies is driven less by abstract climate beliefs and more by evaluative judgments about potential benefits, costs, and fairness. Health benefits increase support; conversely, foreseeable economic harms reduce support, especially for policies that affect individual costs (e.g., fuel taxes). Even within a relatively small and undergraduate sample, those who have had prior exposure to energy debates (e.g., critiques of wind and solar energy as intermittent and therefore unreliable) or varying levels of trust in infrastructure development processes may increase resistance to specific policies.

The regression results clarify what might move students from general concern to policy support. The single most consistent predictor across policy domains was the belief that stronger climate policies will improve public health. This pattern offers strong support for *H1: perceived health co-benefits raise support across policies*. The positive correlation was seen across the energy policy proposals, suggesting that students are more likely to endorse transition measures when they are framed not only as environmentally advantageous but also as immediately beneficial for collective health and well-being. Emphasizing health co-benefits of climate action may therefore offer a politically and pedagogically effective "wedge" to connect decarbonization to the well-being outcomes that students already prioritize. Previous research shows that health co-benefits move support because they reframe costs vs. benefits and increase perceived fairness (Klenert et al., 2018). In most policy debates, perceived co-benefits frequently compete with perceived (individual) costs, yet in a group setting such as a classroom, it may be beneficial to focus how increased renewable capacity could have positive spill over benefits (in this case health benefits) for an entire community group and that savings in health care may outweigh the individual economic risks of higher energy costs.

The fossil fuel tax results offer another insight. As the most polarized item and the one with the highest uncertainty share (18.1% "I don't know"), tax support was shaped by a distinct predictor, such as class. These findings provide some support for H2, which posited that anticipated economic strain would depress support for climate policy, and H3, which proposed that socio-economic position and gender would condition support for policies with clear lifestyle or cost implications. As expected, students who expected stronger climate policies to harm the economy were less supportive of fossil fuel taxation, while upper-class respondents were significantly more supportive than others. Support for carbon pricing may be linked to how respondents evaluate affordability, distributive fairness, and the legitimacy of imposing near-term costs in pursuit of longer-term sustainability goals. This pattern aligns closely with the energy trilemma framework, in which affordability remains a central condition of policy legitimacy. Therefore, CLA applied to fossil fuel taxes or even "carbon pricing" may be an effective entry point for discussing distributive costs, system efficacy, and perceived co-benefits, especially if they suggest that fossil fuel

taxes are understood as a collective, system-oriented lever rather than a purely individual moral commitment.

Support for plant-based diet policies adds a further dimension to the interpretation of H3, which proposed that socio-economic position and gender would condition support for behavior-oriented climate policies with visible lifestyle implications. In this model, gender emerged as the strongest predictor, with women reporting significantly higher support, while upper-class respondents were significantly less supportive. These findings suggest that policies aimed at everyday consumption practices are not evaluated solely through general climate concern or environmental knowledge, but also through social position, identity, and normative understandings of lifestyle and choice. Even among respondents who overwhelmingly accepted anthropogenic climate change, support for dietary change remained socially differentiated. This reinforces the broader argument that behavior-oriented climate policies are interpreted through lived experience and perceived social meaning, not only through abstract endorsement of sustainability goals. That gender and class position predict dietary policy support independently of belief-based predictors suggests that plant-based diets are understood as lifestyle choices and not necessarily for their co-benefits for communities. Therefore, the connection between plant-based diets and SDG 2: Zero Hunger, which was the goal ranked highest in personal importance by this sample, may be a productive entry point for SDG 13. Compared to energy use and transportation, animal-based diets are not the *primary* driver of carbon emissions, but it is significant. Agriculture, forestry, and land use accounts for approximately 21% of global GHG emissions, with livestock causing about 25% of that sector total (Lamb et al., 2021). Meanwhile, livestock products remain a disproportionate source of food-system emissions, providing only 18% of global calories while generating 56%–58% of food-related greenhouse gases (Poore and Nemecek, 2018). Framing reduced meat consumption as a food security and hunger-reduction strategy instead of a direct "climate action" might engage students through a goal they already recognize as important — and the connection is substantively defensible, as SDGs 2 and 13 have been identified as linked across all stages of the food supply chain (Filho et al., 2022).

The results also provide partial support for H4, which concerned beliefs in community-level efficacy. Stronger beliefs in community-wide energy reduction meaningfully reducing climate change predicted support for fossil fuel taxation and home solar subsidies, suggesting that students are more supportive of policies when mitigation is understood as achievable through coordinated action. At the same time, the weak association between nationality indicates that exposure to a particular energy system or policy environment does not automatically generate coherent policy reasoning. Instead, students' evaluations appear to be shaped more consistently by class, gender, perceived co-benefits and costs, and collective efficacy. For transnational student populations, this implies that energy literacy interventions may be most effective when they begin with concrete and familiar points of contact—such as energy bills, mobility, campus infrastructure, and health—before scaling up to broader questions of SDG integration and transition governance.

In relation to the descriptive cross-national comparisons, we have found greater similarity than difference across participating countries. As shown in Table 2, support for infrastructure-oriented policies such as wind farms and home solar installations exceeded 80% in most national samples, whereas support for fossil fuel taxes varied substantially. The largest difference was observed between Denmark (88.5% favorable) and Argentina (44.6% favorable). By contrast, support for wind farms varied by less than 12 percentage points across countries. These findings suggest that national context may influence attitudes toward policies involving direct economic costs, while support for visible renewable-energy investments appears more consistent across countries. Consequently, the principal patterns reported in this study do not appear to be driven exclusively by the largest national subsamples.

Finally, it should be noted that the modest sample ($n = 404$), while multinational, was predominately female (62.3%) and captured attitudes at a single point in time. The imbalance of male/female likely reflects recruitment through university courses and the gender composition of several participating programs rather than intentional oversampling. Because previous research has identified gender differences in environmental concern and support for sustainability-oriented policies, some attitudinal patterns reported here may be somewhat amplified relative to a more gender-balanced population. Although gender was included as a control variable in the regression analyses, the findings should be interpreted with caution when generalizing to broader student populations or even anchor sustained pedagogical intervention at specific universities.

6 Conclusion

6.1 A CLA wedge-based pedagogical design linking SDG 7 to SDG 13

These patterns are, in our view, evidence of a discursive challenge rather than lack of awareness or concern: students already believe in climate action, but they appear to lack the language and tools for evaluating how policies allocate costs, benefits, and legitimacy. This is a challenge or gap that CLA is designed to address. Clark et al. (1990) draw a sharp line between language awareness that treats the sociolinguistic order as natural — "a given and common sense reality whose social origins are out of sight" (p. 249) — and a *critical* language awareness grounded in "coming to see the existing practices of a given 'sociolinguistic order' as socially created within particular social relationships, and therefore socially changeable" (p. 250). Ordinary awareness work, on their account, isolates knowledge about language from the practice of using it, "insulating learning from the learner's social past and future" (p. 257); the materials they critique elsewhere in the same paper "naively attempt to be neutral" (p. 258), which is exactly how they end up reproducing the inequalities they claim to describe. Critical language awareness closes that gap instead: it should be "built from the existing language capabilities and experience of the learner" and "tied to purposeful discourse" (Clark et al., 1991, pp. 47–48), so that

seeing how language works becomes a tool for acting differently. The three teaching modules below operationalize this orientation as a sequence, each targeting one stage of energy literacy. They are attempts to enhance students' *evaluative capacity*, defined here as the ability to assess competing claims, weigh distributional trade-offs, and reason under conditions of uncertainty rather than simply retrieve information.

6.2 Module 1: "energy in everyday life" (SDG 7 as the entry wedge)

Students begin with household- and campus-scale energy. They map where energy is used (heating/cooling, appliances, mobility), how it is priced, and who has control over key decisions (landlords, utilities, governments). The goal is to build systems awareness without technical overload: basic distinctions (electricity vs. fuels; grid vs. household; fixed vs. variable costs) and the social distribution of energy burdens. Students then situate these observations within SDG 7's targets on affordability and access, developing the core premise that energy transitions cannot be judged on emissions numbers alone — they have to be weighed against cost burden, health and lifestyle benefits, infrastructure access, and distributional equity. This is where CLA enters: students examine the language of energy policy — what "affordable," "clean," and "accessible" mean in specific contexts, and for whom. Throughout, students keep a running log — following Clark et al.'s "Think Book" technique (1991) — recording why they classified a given cost as fixed or variable, or why one policy term felt more loaded than another. Recognizing that these terms carry embedded assumptions is the first step toward reading policy discourse critically rather than passively.

6.3 Module 2: "policy mechanisms and the energy trilemma"

Students then examine three policies that correspond to the survey's contested domains: (a) pricing (fossil fuel taxes), (b) subsidies (home solar, EVs, large-scale renewables), and (c) demand-side change (plant-based diet policies). The activity is a structured policy simulation: students are assigned roles (low-income renter, rural commuter, urban student, small business owner, policymaker) and asked to design a policy package that meets three constraints: maintain reliability (security), protect vulnerable groups (affordability/justice), and reduce emissions on a specified timeline (sustainability). This intervention directly addresses the "I don't know" pattern and, from a CLA perspective, gives students practice in understanding their own situation while simultaneously evaluating claims about policy design: What is "energy poverty" and how does it relate to comfort? What is affordable? Who is most likely to receive rebates or subsidies? What infrastructure needs to be built and who will pay for it? What are potential co-benefits? This module also uses health as a bridge to explicitly trace how decarbonization affects air quality and heat exposure, turning "health improvement" from a general benefit of climate action to a collective change that can be perceived. The discussions of these three policies put students into roles with competing interests. As they may be adopting roles that could be contrary to their own beliefs or reality, we use short metacognitive writing for them to "share risk-taking moments and problematic moments" (Clark et al., 1991, p. 52). These can help draw out student's individual friction (for example, a student who commutes in her privately owned vehicle who is opposed to fuel taxes being forced to adopt the role of a climate refugee). These can be moments where individual conflicts become a broader class discussion that shows how we individually respond to these power dynamics.

6.4 Module 3: "From SDG 7 to SDG 13: agency pathways and credible practice"

By the final module, CLA helps to convert evaluative literacy into agency-oriented future practice without assuming the authoritarian role of the instructor or "green lifestyle" moralizing from peers. Students identify one personal practice, one collective practice, and one institutional lever that align with a specific energy policy or practice (e.g., reducing peak electricity use; participating in campus energy governance; advocating for a local renewable procurement policy). Following Clark et al.'s "Readership" principle (1991), each of these isn't just submitted to the instructor — students identify a real reader (a campus energy office, a local council member) and, where feasible, send it. The emphasis stays on credible roles and collective efficacy: these actions complement policy; they don't substitute for it. We assess the quality of students' evaluative arguments, not whether they land on a particular attitude or promise a particular behavior — both are poor proxies for durable, context-sensitive climate literacy.

Finally, the intervention can be evaluated using pre/post measures aligned with the survey outcomes: perceived efficacy of personal vs. community energy reduction, policy support for contested instruments, and reductions in "I don't know" responses—especially for fossil fuel taxation and emerging technologies like hydrogen or even carbon capture and storage (CCS). The normative goal of this intervention is to increase support for energy transition policies and future actions, particularly on contested proposals like fossil fuel taxes. This increased energy literacy would constitute meaningful evidence of growth in critical language awareness. In other words: the goal of teaching SDG 7 as a wedge for SDG 13 is not to manufacture alignment or agreement, *per se*, but to cultivate informed, realistic young citizens and future policy makers. Future research stemming from these interventions should track whether these energy literacy gains translate into durable shifts in policy support across different national contexts.

Overall, the wedge approach treats SDG 7 as a practical entry point and uses health co-benefits, fairness reasoning, and collective efficacy as the connecting tissue to SDG 13. The empirical results suggest that such an intervention is well matched to the current awareness and contexts of undergraduates, who seem open to being persuaded by concrete co-benefits, cautious about economic harms, and more confident in collective than purely individual mitigation. CLA can help

equipping students to recognize the power dynamics underpinning hold climate concern and the tools to change them.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Comité de Ética de la Universidad Pontificia Comillas. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

DW: Conceptualization, Data curation, Investigation, Methodology, Project administration, Supervision, Visualization, Writing – original draft, Writing – review & editing. S-AF-G: Conceptualization, Formal analysis, Investigation, Methodology, Validation, Writing – original draft, Visualization. DC: Investigation, Methodology, Validation, Writing – review & editing, Conceptualization. MP: Conceptualization, Data curation, Formal analysis, Writing – review & editing, Validation, Visualization. AG: Investigation, Validation, Writing – review & editing.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2026.1876994/full#supplementary-material

References

Adams, J., Kenner, A., Leone, B., Rosenthal, A., Sarao, M., and Boi-Doku, T. (2022). What is energy literacy? Responding to vulnerability in Philadelphia's energy ecologies. *Energy Res. Soc. Sci.* 91, 102718. doi: 10.1016/J.ERSS.2022.102718

Amaral, A. R., Enio Rodrigues, E., Gaspar, R., and Gomes, A. (2019). A review of empirical data of sustainability initiatives in university campus operations. doi: 10.1016/j.jclepro.2019.119558

Beach, R. (2025). Adopting a languaging approach for teaching about the climate crisis in English language arts. *Engl. Teach. Pract. Crit.* 24, 1–16. doi: 10.1108/ETPC-05-2024-0067

Choi, S., and Hart, P. S. (2021). The influence of different efficacy constructs on energy conservation intentions and climate change policy support. *J. Environ. Psychol.* 75, 101618. doi: 10.1016/J.JENVP.2021.101618

Clark, R., Fairclough, N., Ivanič, R., and Martin-Jones, M. (1990). Critical language awareness part I: a critical review of three current approaches to language awareness. *Lang. Educ.* 4, 249–260. doi: 10.1080/09500789009541291

Clark, R., Fairclough, N., Ivanič, R., and Martin-Jones, M. (1991). Critical language awareness part II: towards critical alternatives. *Lang. Educ.* 5, 41–54. doi: 10.1080/09500789109541298

Darics, E., Staschen, O., Drury, M., Chojnicka, J., Mazzoli, M., Olthof, J., et al. (2025). Critical language awareness as a future imperative: seeing the 'water'. *Front. Commun. (Lausanne)* 10, 1–16. doi: 10.3389/fcomm.2025.1623193

Del Puy Ciriza, M., and Marrin, I. A. (2026). Resistances to critical language awareness: understanding the role of social class and double consciousness. *Crit. Inquiry Lang. Stud.* 23, 1–23. doi: 10.1080/15427587.2024.2420081

Deng, Z., Zhu, B., Davis, S. J., Ciais, P., Guan, D., Gong, P., et al. (2025). Global carbon emissions and decarbonization in 2024: climate chronicles. *Nat. Rev. Earth Environ.* 6, 231–233. doi: 10.1038/s43017-025-00658-x

Dewaters, J. E., and Powers, S. E. (2011). Energy literacy of secondary students in New York State (USA): A measure of knowledge, affect, and behavior. doi: 10.1016/j.enpol.2010.12.049

Dwyer, C. (2011). The relationship between energy literacy and environmental sustainability. *Low Carbon Econ.* 02, 123–137. doi: 10.4236/LCE.2011.23016

Elkjær, M. A., and Wlezien, C. (2025). Estimating public opinion from surveys: the impact of including a "don't know" response option in policy preference questions. *Political Sci. Res. Methods* 13, 663–679. doi: 10.1017/PSRM.2024.42

Fairclough, N. (1999). Global capitalism and critical awareness of language. *Language Awareness* 8, 71–83. doi: 10.1080/09658419908667119

Fairclough, N. (2010). *Critical Discourse Analysis: The Critical Study of Language*. 2nd Edn. London: Longman.

Filho, W. L., Setti, A. F. F., Azeiteiro, U. M., Lokupitiya, E., Donkor, F. K., Etim, N. A. N. A., et al. (2022). An overview of the interactions between food

production and climate change. *Sci. Total Environ.* 838, 156438. doi: 10.1016/J.SCITOTENV.2022.156438

Gladwin, D., Karsgaard, C., and Shultz, L. (2022). Collaborative learning on energy justice: international youth perspectives on energy literacy and climate justice. *J. Environ. Educ.* 53, 251–260. doi: 10.1080/00958964.2022.2113019

Hu, X., Wu, N., and Chen, N. (2021). Young people's behavioral intentions towards low-carbon travel: extending the theory of planned behavior. *Int. J. Environ. Res. Public Health* 18, 1–16. doi: 10.3390/IJERPH18052327

Ingraham, C. (2018). Energy: rhetoric's vitality. *Rhetor. Soc. Q.* 48, 260–268. doi: 10.1080/02773945.2018.1454188

IPCC. (2023). Climate Change 2023 Synthesis Report: Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland. doi: 10.59327/IPCC/AR6-9789291691647

Janik, A., Ryszko, A., and Szafraniec, M. (2021). Determinants of the EU citizens' attitudes towards the European energy union priorities. *Energies* 14, 5237. doi: 10.3390/EN14175237

Jordan, R. C., Sorensen, A. E., and Gray, S. A. (2023). What undergraduate students know and what they want to learn about in climate change education. *PLoS Sustain. Transform.* 2, e0000055. doi: 10.1371/JOURNAL.PSTR.0000055

Karthika, V. K. (2025). Climate action in a language classroom: addressing questions of sustainability using borderless pedagogy. *Int. J. Sustain. High. Educ.* doi: 10.1108/IJSHE-07-2024-0515

Klees, S. J. (2024). Why SDG 4 and the other SDGs are failing and what needs to be done. *Int. J. Educ. Dev.* 104, 102946. doi: 10.1016/J.IJEDUDEV.2023.102946

Kleespies, M. W., Hahn-Klimroth, M., and Dierkes, P. W. (2023). How university students assess the planetary boundaries: a global empirical study. *Environ. Chall.* 11, 100712. doi: 10.1016/J.ENVC.2023.100712

Klenert, D., Mattauch, L., Combet, E., Edenhofer, O., Hepburn, C., Rafaty, R., et al. (2018). Making carbon pricing work for citizens. *Nat. Clim. Change* 8 (8), 669–677. doi: 10.1038/s41558-018-0201-2

Krosnick, J. A., Holbrook, A. L., Berent, M. K., Carson, R. T., Michael Hanemann, W., Kopp, R. J., et al. (2002). The impact of "No opinion" response options on data quality non-attitude reduction or an invitation to satisfice? *Public Opin. Q.* 66, 371–403. doi: 10.1086/341394

Lamb, W. F., Wiedmann, T., Pongratz, J., Andrew, R., Crippa, M., Olivier, J. G. J., et al. (2021). A review of trends and drivers of greenhouse gas emissions by sector from 1990 to 2018. *Environ. Res. Lett.* 16, 73005. doi: 10.1088/1748-9326/ABEE4E

Latkin, C., Dayton, L., Bonneau, H., Bhaktaram, A., Ross, J., Pugel, J., et al. (2023). Perceived barriers to climate change activism behaviors in the United States among individuals highly concerned about climate change. *J. Prevent.* 44, 389–407. doi: 10.1007/s10935-022-00704-0

Latkin, C., Dayton, L., Ross, J., Bhaktaram, A., Kennedy, R., and Vidal, C. (2025). An examination of extreme weather events and their health and well-being impacts on climate change activism behaviors in the United States. *Clim. Change* 178, 228. doi: 10.1007/s10584-025-04065-5

Leal Filho, W. L., Yayeh Ayal, D., Wall, T., Shiel, C., Paco, A., Pace, P., et al. (2023). An assessment of attitudes and perceptions of international university students on climate change. *Clim. Risk Manag.* 39, 100486. doi: 10.1016/j.crm.2023.100486

Leiserowitz, A., Roser-Renouf, C., Marlon, J., and Maibach, E. (2021). Global warming's six americas: a review and recommendations for climate change communication. *Curr. Opin. Behav. Sci.* 42, 97–103. doi: 10.1016/J.COBEHA.2021.04.007

Liñeiro, T. B., and Müsgens, F. (2025). Pay-back time: increasing electricity prices and decreasing costs make renewable energy competitive. *Energy. Policy.* 199, 114523. doi: 10.1016/j.enpol.2025.114523

Micalay-Hurtado, M. A., and Poole, R. (2022). Eco-critical language awareness for English language teaching (ELT): promoting justice, wellbeing, and sustainability in the classroom. *J. World Lang.* 8, 371–390. doi: 10.1515/jwl-2022-0023

Milfont, T. L., Zubielevitch, E., Milojev, P., and Sibley, C. G. (2021). Ten-year panel data confirm generation gap but climate beliefs increase at similar rates across ages. *Nat. Commun.* 12 (1), 1–8. doi: 10.1038/s41467-021-24245-y

Nordling, K., Fahrenbach, N. L. S., Lipponen, A., and Merikanto, J. (2026). First crossings of global warming levels in CMIP6 in light of observed 1.5°C exceedance. *NPJ Clim. Atmos. Sci.* 9, 1–10. doi: 10.1038/s41612-026-01401-z

Poore, J., and Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science (1979)* 360, 987–992. doi: 10.1126/science.aaq0216

Shapiro, S. (2022). Interchanges a kairotic moment for CLA? Response to Anne Ruggles Gere et al. 's "communal justicing: writing assessment, disciplinary infrastructure, and the case for critical language awareness". *Coll. Compos. Commun.* 74, 373–387. doi: 10.58680/ccc202232280

Sparkman, G., Geiger, N., and Weber, E. U. (2022). Americans Experience a false social reality by underestimating popular climate policy support by nearly half. *Nat. Commun.* 13, 4779. doi: 10.1038/s41467-022-32412-y

Timmons, S., Andersson, Y., and Lunn, P. D. (2024). Communicating climate change as a generational issue: experimental effects on youth worry, motivation and belief in collective action. *Clim. Policy* 24, 1457–1473. doi: 10.1080/14693062.2024.2341080

Vaznonienė, G. (2023). Youth attitudes to nature and climate change: evidence from European social survey. *Manag. Theory Stud. Rural Bus. Infrastruct. Dev.* 44, 397–405. doi: 10.15544/mts.2022.40

Verschoor, M., Albers, C., Poortinga, W., Böhm, G., and Steg, L. (2020). Exploring relationships between climate change beliefs and energy preferences: a network analysis of the European social survey. *J. Environ. Psychol.* 70, 1–11. doi: 10.1016/j.jenvp.2020.101435

Waters, E. A., Kiviniemi, M. T., Hay, J. L., and Orom, H. (2022). Dismissing "don't know" responses to perceived risk survey items threatens the validity of theoretical and empirical behavior-change research. *Perspect. Psychol. Sci.* 17, 841–851. doi: 10.1177/17456916211017860

Wuebben, D., Ferruz-González, S. A., and Roslyng, M. M. (2025). SDGs as a net or wedge for climate action? An international study of students' climate consciousness and awareness of SDGs. *Int. J. Sustain. High. Educ.* 1–16. doi: 10.1108/IJSHE-07-2025-0728