From Climate Literacy to Climate Information Integrity: How School Information Specialists in Oman Support Adolescents to Evaluate and Communicate Climate Knowledge

Faten Hamad, Sultan Qaboos University, Oman
Nabhan Al Harrasi, Sultan Qaboos University, Oman
Naifa Bait Ben Saleem, Sultan Qaboos University, Oman
Abdulla Al Hinaai, Sultan Qaboos University, Oman

The Washington DC Conference on the Social Sciences 2026
Official Conference Proceedings

Abstract

Climate change literacy in schools increasingly depends not only on scientific understanding but also on learners' ability to navigate a complex information environment shaped by social media, persuasive climate narratives, and mis/disinformation. Learning Resource Centres (LRCs) and school information specialists are strategically positioned to strengthen climate information integrity by curating credible resources, teaching verification practices, and enabling student communication outputs. This paper reports a secondary analysis of structured questionnaire responses from 22 school information specialists in Oman (11 girls' schools; 11 boys' schools). Using directed coding aligned to Media and Information Literacy (MIL) competencies—access, evaluate, create, and engage responsibly—the analysis examines how integrity is conceptualised and enacted in school LRC settings. Descriptive results highlight major capacity gaps: only 2/22 respondents reported prior training in climate/environment education, while 15/22 reported training in IT/media production. Thematic findings show that integrity work is enacted primarily through resource provision and selective curation, awareness activities, and emerging youth media projects, but remains constrained by training deficits, uneven access to updated resources, intermittent teacher collaboration, and limited institutional support. Drawing on international frameworks including UNFCCC Action for Climate Empowerment, UN Global Principles for Information Integrity, OECD policy guidance, and the COP30 Declaration on Information Integrity on Climate Change, the paper proposes actionable, evidence-anchored practice recommendations for LRC-based climate information integrity work. The contribution is a descriptive practice model for strengthening climate literacy through evidence-based information behaviours and responsible civic engagement in vulnerable contexts.

Keywords: climate literacy, information integrity, media and information literacy, school libraries, Oman

iafor
The International Academic Forum
www.iafor.org

Introduction

Climate change education is unfolding amid a digital information environment in which adolescents encounter climate claims through social media feeds, short-form videos, peer networks, and online influencers, often before they encounter formal scientific explanations. This environment is shaped by attention incentives and algorithmic curation, which can amplify persuasive narratives and misleading content. As a result, climate literacy increasingly depends on two intertwined capacities: (i) understanding core scientific and socio-economic dimensions of climate change, and (ii) maintaining information integrity—being able to locate credible information, evaluate claims and evidence, and communicate responsibly without amplifying false or misleading content.

Recent research shows that climate mis/disinformation is not limited to outright denial; it includes obstructionist strategies such as sowing doubt, attacking scientists, and shifting misinformation toward climate solutions and policy instruments (Lewandowsky, 2021). Empirical studies of social platforms illustrate how climate discourse can become polarized and how the term "fake news" can be weaponized to discredit climate science (Al-Rawi et al., 2021). For adolescents, who consume high volumes of short-form media, the integrity challenge is intensified by multimodal content (images, memes, edited clips), which is harder to verify than text-only claims (Neylan et al., 2023).

International policy discourse has recently intensified around "information integrity" as a condition for collective problem-solving and sustainable development. The United Nations Global Principles for Information Integrity outline five principles—societal trust and resilience; public empowerment; transparency and research; independent, free and pluralistic media; and healthy incentives—and explicitly note that climate disinformation can delay action and disproportionately affect the Global South (United Nations, 2024b). Parallel guidance emphasizes multi-stakeholder responsibilities and transparency in platform design and curation processes (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2023) and proposes policy architectures that combine transparency, societal resilience, and governance measures (Organisation for Economic Co-operation and Development [OECD], 2024).

Within climate governance, the United Nations Framework Convention on Climate Change (UNFCCC) Action for Climate Empowerment (ACE) operationalizes education, public awareness, training, participation, access to information, and international cooperation (UNFCCC, n.d.). At COP30 (Belém, 2025), the Declaration on Information Integrity on Climate Change explicitly linked information integrity to ACE and emphasized equitable access to accurate, evidence-based climate information and the role of literacy initiatives to counter mis/disinformation (UNESCO, 2025a). These developments provide strong policy legitimacy for school-based integrity interventions.

In school settings, Learning Resource Centres (LRCs) and information specialists can function as integrity intermediaries: they curate resources, scaffold information literacy, and support student learning projects. However, this role is under-researched in Global South contexts and in climate-vulnerable regions. This paper addresses that gap by asking:

(RQ1) How do school information specialists in Oman conceptualize and prioritize climate information integrity within climate literacy work?

(RQ2) What integrity-relevant practices are currently used (or desired) to support adolescent evaluation of climate claims and responsible communication?

(RQ3) What enabling conditions and constraints shape integrity-oriented work in LRCs?

Using a secondary analysis of responses from 22 Omani school information specialists, we provide descriptive practice mapping and a directed thematic analysis aligned to Media and Information Literacy (MIL) competencies, identifying integrity-relevant assets, gaps, and actionable recommendations for school-based climate information integrity work.

Literature and International Policy Context

Information Disorder and Climate Misinformation

Threats to trustworthy knowledge are commonly conceptualized through the lens of "information disorder," which distinguishes misinformation (false content shared without harmful intent), disinformation (false content shared with intent to mislead), and mal-information (genuine information shared to cause harm) (Wardle & Derakhshan, 2017). Climate change is especially vulnerable because it intersects with political ideology, economic interests, and identity-based narratives. Lewandowsky (2021) synthesizes evidence that climate disinformation has evolved from denial of the phenomenon to targeted attacks on mitigation policies, institutions, and solutions.

Adolescents, Platforms, and Integrity Risks

Adolescents' media environments create both exposure and agency: young people consume climate information through platforms and also produce and share content. This creates integrity risks, particularly when platform incentives reward attention and emotional engagement. Empirical work on Twitter discourse illustrates the politicized nature of "fake news" narratives and the prevalence of denial and natural-cycle claims in highly retweeted posts (Al-Rawi et al., 2021). Systematic review evidence also highlights that social media has become a central arena for climate discourse, raising concerns about polarization, misinformation, and the need for media literacy and critical evaluation skills (Sultana et al., 2024).

Algorithmic curation and short-form video intensify integrity risks for adolescents. Platforms such as TikTok and Instagram Reels privilege engagement cues (watch time, shares, comments) and can rapidly amplify emotive or polarizing content regardless of evidentiary quality. Research on environmental discourse on TikTok indicates that algorithmic dynamics influence what frames and claims become visible to users (Loupessis & Intahchomphoo, 2025). In practice, this means students may interpret trendiness, virality, or creator confidence as signals of truth. Integrity-oriented learning therefore needs to explicitly teach platform-aware heuristics (e.g., "viral is not verified") and routine cross-checking beyond the platform feed.

A further integrity challenge is the shift from denying climate science to undermining climate solutions—often described as a "new denial." Nicolosi et al. (2025) show that misinformation increasingly targets proposed solutions and their advocates, using frames that depict mitigation or adaptation actions as futile, corrupt, or harmful. For adolescents, solution-misinformation can erode perceived efficacy and willingness to act even when scientific consensus is accepted. Integrity work in schools therefore should cover both factual claims about climate science and evaluative claims about solutions (costs, trade-offs, fairness, and effectiveness), with explicit attention to how persuasion and ideology shape these narratives.

Evidence-Based Integrity Pedagogy: Verification and Inoculation

Integrity-oriented education can draw on two complementary evidence-informed strands. The first is explicit verification training (e.g., claim–source–evidence mapping and triangulation). The second is "prebunking" or psychological inoculation, which seeks to build resistance by exposing learners to weakened doses of misinformation techniques before they encounter them at scale. In climate communication experiments, inoculation has been shown to protect perceptions of scientific consensus against misinformation across ideological groups (van der Linden et al., 2017) and to reduce the impact of misinformation by exposing misleading argumentation techniques (Cook et al., 2017). More broadly, inoculation and prebunking approaches have been synthesized as promising tools for resilience against misinformation (Lewandowsky & van der Linden, 2021).

Evidence from cognitive and social psychology underscores why routine verification must be paired with careful communication design. Repetition alone can increase perceived truth (the illusory truth effect), including for counter-attitudinal climate-skeptical claims. In experimental work, repeated exposure increased perceived truth for both climate-science and climate-skeptical claims, even among climate-science endorsers (Jiang et al., 2024). For schools and LRCs, this implies safeguards in classroom talk and student products: avoid repeating false headlines as hooks without immediate correction and evidentiary context, and adopt "prebunking" or inoculation approaches that foreground manipulation techniques rather than rehearsing the false claim (Lewandowsky & van der Linden, 2021).

Education research indicates that students can be trained—within normal school constraints—to resist misinformation using structured activities embedded in science and information-literacy learning. An upper-secondary intervention integrating source evaluation, reasoning about evidence, and reflection on manipulation techniques reported measurable gains in students' capacity to judge unreliable information (Mellberg et al., 2025). This evidence supports the feasibility of embedding integrity routines within existing school structures: short, repeated activities (claim–evidence–source checks), integrated across topics and outputs, can produce skill gains without requiring extensive curricular redesign.

International Frameworks Supporting Integrity-Oriented Climate Learning

UNFCCC Action for Climate Empowerment (ACE)

ACE denotes work under Article 6 of the UNFCCC and Article 12 of the Paris Agreement and centers on six elements: climate change education, training, public awareness, public participation, public access to information, and international cooperation (UNFCCC, n.d.). The UNESCO–UNFCCC ACE guidelines emphasize integrating these elements into national strategies and highlight the need for monitoring and evaluation, as well as the dissemination of accessible learning resources (UNESCO & UNFCCC, 2016).

Information Integrity Governance and Platform Accountability

The United Nations Global Principles for Information Integrity provide a holistic framework for multi-stakeholder action and explicitly note climate change as an area where disinformation can delay or derail action (United Nations, 2024b). The OECD policy framework similarly emphasizes three complementary aims: enhancing transparency and plurality; fostering societal resilience; and upgrading governance measures to uphold information integrity

(OECD, 2024). UNESCO's Guidelines for the Governance of Digital Platforms articulate duties and roles for stakeholders and specify principles such as transparency and human-rights-based design and curation processes (UNESCO, 2023). Regulatory initiatives such as the EU's strengthened Code of Practice on Disinformation illustrate increasing expectations that platforms and advertisers reduce incentives for disinformation and improve transparency and accountability (European Commission, 2022).

Climate-Specific Integrity Initiatives

The Global Initiative for Information Integrity on Climate Change—established by UNESCO, the Government of Brazil, and the UN—supports research, policy development, and campaigns to address climate disinformation and to safeguard those reporting on climate issues (UNESCO, 2025b). The COP30 Declaration on Information Integrity on Climate Change calls for equitable access to accurate, evidence-based climate information, and explicitly supports including information integrity measures in ACE implementation (UNESCO, 2025a).

Recent international policy developments explicitly elevate climate information integrity as a climate action enabler. The United Nations launched the Global Initiative for Information Integrity on Climate Change to mobilize governments and partners to counter climate disinformation and strengthen evidence-based climate communication (United Nations, 2024a). UNESCO's COP30 Declaration on Information Integrity on Climate Change (Belém, 12 November 2025) frames climate disinformation as a barrier to effective action and calls for coordinated responses that protect freedom of expression while increasing the reliability of climate information ecosystems (UNESCO, 2025a). These developments legitimize the "integrity" vocabulary in school settings and provide policy justification for school-based verification and responsible communication activities.

In parallel, the OECD's information integrity framework emphasizes improving transparency and accountability of information sources, strengthening societal resilience, and upgrading governance measures and institutional architecture to protect information ecosystems (Organisation for Economic Co-operation and Development, 2024). In school settings, these aims translate into practical requirements: (i) trusted resource infrastructures and clear sourcing norms; (ii) resilience-building pedagogy (verification routines and inoculation); and (iii) institutional support for implementation (time, training, and cross-role collaboration). The Oman case examined here aligns with these requirements, while also revealing the support gaps that must be addressed to operationalize integrity as a routine component of climate learning.

Climate Education and Whole-School Readiness

Beyond integrity governance, international education policy increasingly frames climate learning as a whole-school priority. UNESCO's Greening Education Partnership aims to prepare every learner to acquire the knowledge, skills, values, and attitudes to tackle climate change, building on Education for Sustainable Development and system-level coordination (UNESCO, 2024b). This "climate-ready learner" agenda implies that integrity competencies must be embedded not only in lessons but also in school routines: resource selection, classroom tasks, student media outputs, and public-facing school campaigns.

Implications for Schools and LRCs

These global frameworks converge on an actionable implication: integrity is not solely an individual skill but an ecosystem responsibility, and education is a cornerstone of societal resilience. In schools, LRCs and information specialists are well-positioned to operationalize integrity through curated access, verification pedagogy, and youth communication safeguards aligned to MIL competencies.

Conceptual Framing: Operationalizing Climate Information Integrity Through MIL

We define climate information integrity in schools as the extent to which climate learning and student climate communication are anchored in accurate, evidence-based, transparent, and ethically shared information. This definition emphasizes both epistemic quality (truthfulness, evidence, consistency with credible scientific sources) and social responsibility (avoiding amplification of unverified claims, acknowledging uncertainty appropriately, and respectful engagement).

To operationalize integrity-oriented learning, we adopt a directed coding lens based on four MIL-aligned competencies:

(1) Access: the ability to locate and obtain credible climate information and data;
(2) Evaluate: the ability to assess credibility, evidence strength, bias/incentives, and to distinguish reliable claims from mis/disinformation;
(3) Create: the ability to produce climate communication artifacts (posters, videos, presentations) that are accurate, properly sourced, and audience-appropriate; and
(4) Engage responsibly: the ability to share and discuss climate information ethically, respectfully, and in ways that contribute to constructive civic engagement.

This competency model is consistent with integrity frameworks that emphasize public empowerment and societal resilience (OECD, 2024; United Nations, 2024b) and aligns with the LRC mandate for information stewardship.

Methods

Design and Data Provenance

This paper reports a secondary analysis of an existing dataset collected as part of a broader research programme on climate change literacy and school-based learning in Oman. The original data were collected using a structured questionnaire administered in Arabic during the 2024–2025 academic year. The questionnaire was distributed to school information specialists (librarians/LRC coordinators) across Omani governorates, using purposive sampling to ensure representation of both girls' and boys' schools. The instrument combined background questions (demographic and professional profile), closed items (selected-response and Likert-type items measuring resource availability, activity frequency, collaboration patterns, and perceived roles), and open-ended questions capturing narrative descriptions of practices, proposals, and desired initiatives related to climate education. Distribution was coordinated through the Ministry of Education's administrative channels, and participation was voluntary. The final dataset includes complete responses from 22 school information specialists in Oman (11 from girls' schools and 11 from boys' schools), representing a range of school contexts and geographic settings within the country.

Clarifying the "Secondary" Nature of the Data

The primary purpose of the original questionnaire was to map the status of climate education support within school LRCs, including resources, activity frequency, collaboration, and perceived roles. The original data collection was designed to produce a descriptive inventory of LRC climate-related activities and capacities rather than to test a hypothesis about information integrity. For this paper, we re-analyze the same dataset through an "information integrity" lens, using MIL competencies (access, evaluate, create, and engage responsibly) and integrity policy frameworks to reinterpret practices and gaps. This secondary analysis approach is methodologically appropriate because the original questionnaire items elicited detailed accounts of how respondents select, evaluate, and disseminate climate information—activities that map directly onto integrity constructs—even though the questionnaire did not use the term "information integrity" explicitly. No additional data were collected or solicited; the analytic contribution lies in the application of a different conceptual framework to an existing, already-collected dataset.

Ethical Considerations

The original data collection was conducted under a research programme approved by Sultan Qaboos University, College of Arts and Social Sciences. Participation in the questionnaire was voluntary, and respondents were informed about the purpose of the study and how their responses would be used. The raw questionnaire forms include identifiable school names; however, for this secondary analysis, all reporting is aggregated and de-identified. Respondents are referenced only by anonymized codes (R1–R22), and no school names, locations, or other identifying details are disclosed. Verbatim quotations included in the paper are limited to descriptions of professional practices and do not contain personal or sensitive information. No new data were collected for this paper, and the secondary analysis does not alter the risk profile established by the original ethical approval. The re-analysis through an information integrity lens does not involve any additional contact with participants or collection of supplementary information.

Analysis Approach

Closed items were summarized descriptively (counts and proportions) to characterize training, resources, and practice patterns. Open-ended responses were analyzed using a qualitative descriptive approach supported by directed coding aligned to the MIL competencies (access, evaluate, create, engage responsibly). Selected verbatim excerpts are provided in Arabic with brief English translations.

Results

Descriptive Results: Training, Resources, and Activity Patterns

Descriptive results establish feasibility constraints for integrity-oriented climate learning. Only 2/22 respondents reported prior training in climate/environment education, while 15/22 reported training in IT/media production. This pattern suggests that media-production capacity may exist in schools, but climate-specific verification and evidence interpretation may require dedicated professional development.

Resources in LRCs were uneven. Books were most common (18/22), while multimedia/digital resources were reported by 8/22 and posters/visual aids by 3/22. Two respondents reported no climate-related resources. Given international emphasis on equitable access to accurate, understandable climate information (UNESCO, 2025a), these gaps represent a minimum baseline barrier.

Activity patterns indicated limited institutionalization: student engagement in climate discussions/activities was most commonly "rarely" (12/22) or "never" (6/22), with only one respondent reporting monthly engagement. Teacher collaboration was intermittent. Eight respondents reported supporting student media projects (posters/videos/design), indicating an entry point for integrity learning through responsible creation—particularly relevant because evidence-based inoculation interventions can be embedded in participatory communication tasks rather than delivered as abstract lectures (Cook et al., 2017; van der Linden et al., 2017).

Thematic Analysis: Integrity Practices, Gaps, and Needs

Directed coding of open-ended responses yielded four overarching themes:

T1. Integrity as critical thinking and evidence-based decision-making.
T2. Integrity enacted through curated access and guidance.
T3. Integrity enacted through youth communication outputs and environmental awareness activities.
T4. Constraints and capability gaps limiting integrity-oriented practice.

Integrity Framed as Critical Thinking and Evidence

Some respondents explicitly conceptualized climate learning as requiring evaluation of sources and evidence-based decisions—an integrity framing aligned with the "evaluate" competency. "Climate change is complex and multi-dimensional… requiring students to engage with scientific information, evaluate different sources, and make evidence-based decisions" (R12). This framing aligns with integrity research emphasizing the need to pre-empt manipulation and strengthen resilience (Lewandowsky, 2021; OECD, 2024) and provides a clear anchor for LRC-based verification micro-lessons.

Integrity Enacted Through Curated Access and Guidance

The dominant integrity-related practice was guided access—providing materials and directing students to suitable references. This corresponds to the MIL "access" competency and the LRC's core mandate. "Providing materials and books" (R1). "Guiding students to appropriate references." (R9). In some cases, guided access extended to digital channels: "By publishing information on the school's social media" (R10). While access is necessary, global policy emphasizes that integrity also requires transparency, resilience-building and responsible incentives (OECD, 2024; United Nations, 2024b). Accordingly, access practices should be strengthened through explicit curation criteria (authority, evidence, currency) and by linking resources to trusted scientific syntheses (e.g., Intergovernmental Panel on Climate Change [IPCC], 2023) and to nationally credible agencies.

Youth Communication Outputs as an Integrity-Learning Pathway

Reported successful activities often combined awareness with hands-on engagement, including recycling, tree planting, and occasional youth media outputs. These activities can support

integrity when paired with sourcing and review safeguards. "A workshop on recycling using plastic and paper to make school tools" (R1). "A tree-planting campaign within the school and its grounds…" (R3). Some respondents described emerging digital production, including AI-supported outputs: "LRC books, competitions, and an AI-generated video—best climate design about climate in Oman" (R5). Another respondent noted posters and a short video: "I participated in preparing posters and a short video… and it had a positive impact among students" (R14).

These examples suggest a scalable pathway: students learn integrity by producing shareable communication. This is consistent with evidence showing that technique-focused "pre-emptive" strategies can reduce susceptibility to climate misinformation (Cook et al., 2017; Lewandowsky & van der Linden, 2021; van der Linden et al., 2017). Importantly, the rise of multimodal misinformation and AI-assisted content generation makes it increasingly important that youth creation tasks include explicit checks for evidence and provenance (Neylan et al., 2023).

Constraints and Actions Needed

The data show four recurring gaps limiting integrity-oriented climate learning:

- Training: very limited climate/environment training (2/22).
- Updated resources and local data: uneven multimedia access and two reports of no climate resources.
- Collaboration: teacher collaboration is intermittent; interventions must be modular and low-friction.
- Institutional support: limited prioritization and time constrain sustained practice.

Respondents proposed structural actions aligned with these gaps. For example: "Create a dedicated climate education corner in the LRC" (R4). "Organize motivational competitions and disseminate awareness within the school" (R1). Others proposed partnerships with national agencies (ACE's "access to information" and "cooperation" elements) (UNESCO & UNFCCC, 2016; UNFCCC, n.d.): "Collaborate with the Meteorology Authority and provide lectures for students and teachers" (R22).

Finally, respondents recognized that students rely on platforms such as YouTube and social media: "YouTube and social media" (R15).

This is significant because integrity governance frameworks emphasize that platform design and curation can shape exposure, incentives, and risks (UNESCO, 2023; United Nations, 2024b). Schools therefore need explicit platform-aware verification routines, not only resource provision.

Summary of Themes, Practices, Gaps, and Enabling Actions

Across the four themes, the data reveal a consistent pattern: integrity-relevant practices exist but remain informal, uneven, and under-supported. Theme 1 (critical thinking and evidence) provides a conceptual anchor but is articulated by only a subset of respondents. Theme 2 (curated access) is the most widespread practice, yet it focuses on provision rather than explicit credibility criteria. Theme 3 (youth communication outputs) offers a scalable pathway for integrity learning through production, but currently lacks structured sourcing and review safeguards. Theme 4 (constraints) identifies four recurring gaps—training, updated resources,

collaboration, and institutional support—that must be addressed for integrity-oriented practice to move from informal to institutionalised. The actions needed span school, system, and ecosystem levels and are discussed in Section 6.

Discussion

From Climate Literacy to Climate Information Integrity

The findings reinforce a major shift: climate literacy is no longer only about understanding greenhouse gases or impacts; it is also about epistemic resilience—students' ability to maintain reliable beliefs and responsible communication in contested information spaces. Climate disinformation can delay action and erode trust in science and institutions (Lewandowsky, 2021). Platform discourse studies show the politicization of climate narratives and the weaponization of "fake news" framing (Al-Rawi et al., 2021). This underscores the need for integrity-explicit school interventions.

Positioning integrity as an educational objective aligns with emerging global governance frames. International policy increasingly treats information integrity as a public good and as a prerequisite for effective climate action, including protection for scientific voices and support for evidence-based communication (UNESCO, 2025a; United Nations, 2024b). The present findings therefore have relevance beyond individual LRCs: they identify implementation levers that are often feasible in schools (curation, micro-verification routines, and youth communication scaffolds) and specify where systemic capacity is required (training, collaboration, and platform-aware safeguards).

Interpreting Oman's LRC Landscape: Assets and Constraints

Three assets are evident. First, many LRCs have books and references, offering a baseline integrity infrastructure. Second, many information specialists have IT/media training, enabling youth outputs. Third, respondents propose partnerships with national agencies, consistent with ACE's emphasis on access to information and cooperation (UNFCCC, n.d.).

However, constraints are substantial. With only 2/22 reporting climate/environment training, integrity instruction cannot assume climate expertise. Uneven resources and low activity frequency indicate that integrity is not yet institutionalized. These patterns mirror international observations that resilient information ecosystems require both access and capability-building, especially for youth (United Nations, 2024b).

Integrity-Enhancing Practices to Scale

(a) Credible curation: Many respondents already provide materials and references. This can be strengthened by adopting curation criteria (authority, evidence, currency) and by anchoring core materials to trusted syntheses (IPCC, 2023). (b) Micro-verification routines: Respondents' language about evaluating sources can be operationalized via short classroom/LRC routines: triangulation, claim-evidence mapping, and distinguishing data from opinion. (c) Youth communication with safeguards: Posters and videos are already used in some schools. Evidence suggests inoculation-style interventions can reduce susceptibility to climate misinformation (Cook et al., 2017; van der Linden et al., 2017). Embedding technique awareness into student production tasks can therefore build resilience while maintaining engagement.

The questionnaire responses indicate that many integrity-enhancing practices already exist as informal routines. Respondents described directing students to "official websites," selecting "credible" materials, and guiding learners to teacher-approved resources (e.g., "I always direct them to official websites and scientific sources"; "We use ministry-approved resources and credible websites"). These routines can be strengthened by making them explicit, repeatable, and assessable. A short credibility checklist can be used consistently across lessons and tasks (authority, evidence, date, purpose, and corroboration), enabling students to articulate why a source is credible rather than treating credibility as a teacher-given label.

A second scalable practice is verification-through-production: using youth communication outputs (posters, infographics, short videos, school campaigns) as a structured pathway for integrity learning. Several respondents noted that students produce awareness materials and that specialists support content selection and messaging (e.g., "students make posters and presentations"; "we help them design awareness campaigns"). In integrity terms, production tasks create a natural requirement for evidence: students must justify claims, include credible citations, and avoid exaggeration. This is where LRC specialists can add distinctive value by providing templates, exemplars, and a lightweight review process that checks sources and language before school-wide dissemination.

What is Missing

The data suggest gaps in: (i) structured verification pedagogy; (ii) standardized safeguarding for student outputs (citations, review workflows); (iii) platform literacy (understanding how algorithmic curation shapes exposure); and (iv) institutional supports (time, recognition, collaboration mechanisms). These gaps align with OECD's call to foster societal resilience while upgrading governance measures (OECD, 2024) and with UNESCO's platform governance emphasis on transparency and accountability (UNESCO, 2023).

Two integrity gaps deserve emphasis. First, the data suggest limited systematic attention to platform-driven solution misinformation. While respondents discuss credibility in general terms, few explicitly reference verifying claims about renewables, adaptation measures, or policy trade-offs—topics increasingly targeted by "new denial" narratives that undermine confidence in solutions (Nicolosi et al., 2025). Second, the apparent absence of explicit instruction about repetition effects matters: well-intended classroom discussions can inadvertently reinforce false claims if they are repeated without careful framing. Given experimental evidence that repetition increases belief even among climate-science endorsers (Jiang et al., 2024), integrity-oriented pedagogy should teach students to identify persuasive repetition and to respond by checking primary sources rather than by forwarding or debating unverified content.

Actions Needed (School, System, Ecosystem)

School/LRC Level

- Establish a climate integrity corner with a trusted-source list; apply basic curation rules (IPCC, 2023).
- Adopt a two-source rule and a claim-check worksheet for student climate projects.
- Require citations and a "sources slide" for student posters/videos; implement pre-publication review.

System/Ministry Level

- Provide climate integrity professional development for information specialists and teachers.
- Produce Arabic, youth-friendly resource packs and guidance on trusted climate sources.
- Recognize LRC-led integrity activities in school plans and evaluation.

Ecosystem Level

- Partner with national agencies and universities for local data and credible updates.
- Align school integrity work with ACE implementation and with international integrity initiatives (UNESCO, 2025a, 2025b).

Why This Matters for Developing and Climate-Vulnerable Contexts

Reviewer feedback emphasized relevance for developing countries highly vulnerable to climate change. In such contexts, schools often face constrained resources and unequal access to high-quality learning materials, while communities may experience heightened exposure to rumor, politicized narratives, or commercial greenwashing. Information integrity is therefore not merely a "media studies" concern—it is a justice and capability concern. The United Nations Global Principles explicitly note that erosion of information integrity can worsen vulnerabilities and hinder progress on the Sustainable Development Goals, with particular impacts for the Global South (United Nations, 2024b). The COP30 Declaration similarly frames integrity as necessary for equitable access to evidence-based climate information and for effective public participation (UNESCO, 2025a). From this perspective, LRC-based integrity practice supports climate action by enabling adolescents to participate as informed communicators rather than passive recipients of contested narratives.

Limitations and Pathway to an Extended Journal Paper

This conference paper is limited by the available secondary dataset. The data are questionnaire-based rather than long-form interviews; therefore, thematic depth is constrained and some integrity practices may be under-reported. The sample (n = 22) supports exploratory mapping rather than statistical generalization. Additionally, the study does not include direct measures of student verification skills or systematic analysis of student-produced artifacts, limiting evaluative claims.

Data provenance and secondary analysis. The dataset comprises written responses from 22 school information specialists in Oman (female and male schools), collected via structured questionnaires as part of a broader inquiry into school-based climate literacy activities. This conference paper conducted a secondary analysis of these responses using directed coding aligned to MIL competencies (access, evaluate, create, and engage responsibly). Secondary analysis is efficient and reduces respondent burden, but it constrains analytic depth because responses were not originally elicited to probe "information integrity" constructs in detail.

Ethics and confidentiality. Responses were anonymized for analysis and reporting; quotes are presented without identifying details and are limited to practice descriptions. Nonetheless, questionnaire responses can be affected by social desirability and may over-represent "official" practices aligned with policy expectations. Future work that collects observational data, student artifacts, or platform-related examples should incorporate explicit consent, safeguarding

protocols for youth-produced content, and procedures to minimize identifiable digital traces in publications.

These limitations also define a clear pathway to an extended journal article. A follow-on study should: (i) conduct in-depth interviews with information specialists and teachers; (ii) run student focus groups to map platform use and credibility heuristics; (iii) analyze student artifacts using an integrity rubric; and (iv) pilot integrity-oriented practice recommendations with pre/post measures of verification competencies and responsible sharing intentions. Inclusion of classroom/LRC observations would further strengthen causal interpretation by documenting real-time verification talk and the institutional conditions that enable integrity routines.

Measurement and generalizability. The study does not directly measure student learning outcomes, shifts in misinformation susceptibility, or the quality of student climate communication. It cannot establish causal links between specific LRC practices and student behaviors. In addition, the sample is context-specific and not designed for prevalence estimation; findings should be treated as a transferable practice model for comparable systems rather than a statistical representation of national practice.

Pathway to an extended journal paper (additional data to collect). To move from a practice model to an evidence-of-impact contribution, the next study should triangulate multiple data sources: (1) in-depth interviews with information specialists and teachers to map collaboration, workload, and decision rules for curation and review; (2) student focus groups and short performance tasks (evaluating claims, identifying manipulation techniques, justifying source choices); (3) structured observation of LRC-supported sessions and review workflows; and (4) artifact analysis of youth outputs (posters/videos) using an integrity rubric (source quality, accuracy, balance, transparency, and responsible framing). A pre–post design over one term could evaluate whether integrity-oriented practice interventions improve specific competencies and reduce uncritical sharing behaviors.

Conclusion

Strengthening climate literacy now requires strengthening climate information integrity. In this study, school information specialists in Oman described practices that already align with integrity work—resource provision, awareness activities, and emerging youth communication outputs—yet they also reported significant constraints, especially limited climate-focused training, uneven resourcing, and intermittent collaboration. International frameworks (ACE, global information integrity principles, platform governance guidance, and COP30 climate integrity commitments) provide strong justification for institutionalizing verification and responsible communication as core competencies. The findings identify actionable practice levers—credible curation, micro-verification routines, and youth communication with safeguards—that can be adapted to different school capacities and implemented within existing resource constraints. With targeted training and institutional support, LRCs can become scalable integrity infrastructures that help adolescents evaluate and communicate climate knowledge responsibly.

Acknowledgements

This research was supported by the Ministry of Higher Education, Research and Innovation (MoHERI), Sultanate of Oman, under the 2024 Block-Funding Program (SQU Project Code: RC/RG/ART/DIS/24/184).

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The authors declare that Claude (Anthropic), an AI assistant, was used to support the formatting, editing, and reference verification of the manuscript. The substantive content, research design, data analysis, findings, and discussion are the original work of the author derived from systematic conduct of the research.

References

Al-Rawi, A., O'Keefe, D., Kane, O., & Bizimana, A.-J. (2021). Twitter's fake news discourses around climate change and global warming. *Frontiers in Communication, 6*, 729818. https://doi.org/10.3389/fcomm.2021.729818

Cook, J., Lewandowsky, S., & Ecker, U. K. H. (2017). Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence. *PLOS ONE, 12*(5), e0175799. https://doi.org/10.1371/journal.pone.0175799

European Commission. (2022). *The 2022 Code of Practice on Disinformation. European Commission, Digital Strategy*. https://digital-strategy.ec.europa.eu/en/policies/code-practice-disinformation

Intergovernmental Panel on Climate Change. (2023). *Climate Change 2023: Synthesis Report (AR6 SYR—Longer Report)*. IPCC. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf

Jiang, Y., Schwarz, N., Reynolds, K. J., & Newman, E. J. (2024). Repetition increases belief in climate-skeptical claims, even for climate science endorsers. *PLOS ONE, 19*(8), e0307294. https://doi.org/10.1371/journal.pone.0307294

Lewandowsky, S. (2021). Climate change disinformation and how to combat it. *Annual Review of Public Health, 42*, 1–21. https://doi.org/10.1146/annurev-publhealth-090419-102409

Lewandowsky, S., & van der Linden, S. (2021). Countering misinformation and fake news through inoculation and prebunking. *European Review of Social Psychology, 32*(2), 348–384. https://doi.org/10.1080/10463283.2021.1876983

Loupessis, I., & Intahchomphoo, C. (2025). Framing the climate: How TikTok's algorithm shapes environmental discourse. *Telematics and Informatics, 102*, 102329. https://doi.org/10.1016/j.tele.2025.102329

Mellberg, S., Danielsson Friberg, A., & Nygren, T. (2025). Science education against misinformation: An educational intervention in upper-secondary schools. *International Journal of Science Education,* 1–33. https://doi.org/10.1080/09500693.2025.2571131

Neylan, J., Biddlestone, M., Roozenbeek, J., & van der Linden, S. (2023). How to "inoculate" against multimodal misinformation: A conceptual replication of Roozenbeek and van der Linden (2020). *Scientific Reports, 13*(1), 18273. https://doi.org/10.1038/s41598-023-43885-2

Nicolosi, E., Medina, R., Brewer, S., Vorkink, M., & Allred, A. (2025). The new denial: Climate solution misinformation on social media. *Global Sustainability, 8*, e31. https://doi.org/10.1017/sus.2025.10016

Organisation for Economic Co-operation and Development. (2024). *Facts not Fakes: Tackling disinformation, strengthening information integrity*. OECD Publishing. https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/03/facts-not-fakes-tackling-disinformation-strengthening-information-integrity_ff96d19f/d909ff7a-en.pdf

Sultana, B. C., Prodhan, M. T. R., Alam, E., Sohel, M. S., Bari, A. B. M. M., Pal, S. C., Islam, M. K., & Islam, A. R. M. T. (2024). A systematic review of the nexus between climate change and social media: Present status, trends, and future challenges. *Frontiers in Communication, 9*, 1301400. https://doi.org/10.3389/fcomm.2024.1301400

UNESCO. (2023). *Guidelines for the governance of digital platforms: Safeguarding freedom of expression and access to information through a multi-stakeholder approach*. UNESCO. https://www.unesco.org/en/internet-trust/guidelines

UNESCO. (2024). *Greening Education Partnership: Getting every learner climate-ready*. https://www.unesco.org/en/articles/greening-education-partnership-getting-every-learner-climate-ready

UNESCO. (2025a). *Declaration on Information Integrity on Climate Change* (COP30, Belém, 12 November 2025). https://www.unesco.org/sites/default/files/medias/fichiers/2025/11/cop_30_declaration_information_integrity_on_climate_change_12112025.pdf

UNESCO. (2025b). *Global Initiative for Information Integrity on Climate Change*. https://www.unesco.org/en/information-integrity-climate-change

UNESCO, & UNFCCC. (2016). *Action for Climate Empowerment: Guidelines for accelerating solutions through education, training and awareness-raising*. https://unfccc.int/sites/default/files/action_for_climate_empowerment_guidelines.pdf

United Nations. (2024a). *Global Initiative for Information Integrity on Climate Change*. https://www.un.org/en/climatechange/information-integrity

United Nations. (2024b). *United Nations Global Principles for Information Integrity*. https://www.un.org/en/information-integrity/global-principles

United Nations Framework Convention on Climate Change. (n.d.). *Action for Climate Empowerment* (ACE). UNFCCC. https://unfccc.int/topics/education-and-youth/big-picture/ACE

van der Linden, S., Leiserowitz, A., Rosenthal, S., & Maibach, E. (2017). Inoculating the public against misinformation about climate change. *Global Challenges, 1*(2), Article 1600008. https://doi.org/10.1002/gch2.201600008

Wardle, C., & Derakhshan, H. (2017). *Information disorder: Toward an interdisciplinary framework for research and policy making*. Council of Europe. https://rm.coe.int/information-disorder-toward-an-interdisciplinary-framework-for-researc/168076277c

Contact email: f.hamad@squ.edu.om