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White Paper

Enhancing Science and Climate Literacy in Latin America and the Caribbean

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Abstract: The Intercontinental Meeting on Science Literacy 2024 brought together experts, educators, and policymakers to discuss the changing landscape of science and climate literacy in Latin America and the Caribbean. This document synthesizes the ideas shared at the conference and aims to serve as a resource to promote science literacy measures. Key topics include the impact of digital transformation on education, the integration of climate literacy into school curricula, the importance of cultural relevance, and the challenges of accessibility and misinformation. Opportunities to improve scientific literacy through collaborative networks, public engagement, and supportive policies are also highlighted. The white paper presents strategies to integrate digital tools, promote inclusion, and promote lifelong learning. These recommendations will be integrated into the ongoing development of the Declaration on Science and Climate Literacy, initially published in 2021 by the Andean Road Countries for Science and Technology and its collaborators.

Keywords: science literacy; science culture construction; annual meeting on science literacy

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1. Introduction

The 2024 Intercontinental Meeting on Scientific Literacy 2024 brought together leading experts, educators, and policymakers to address the changing landscape of scientific and climate literacy in Latin America and the Caribbean. The insights and responses shared by our esteemed speakers have been carefully compiled into this comprehensive white paper. This document is intended to serve as a valuable resource for current and future initiatives and will be integrated into the framework of the Latin American and Caribbean Declaration on Scientific and Climate Literacy. Our goal is to build on this declaration and ensure that it continues to evolve to address today's most pressing challenges and opportunities in scientific literacy.

2. The evolution of scientific culture

2.1. Digital transformation

The rapid digital transformation affecting the entire world is profoundly reshaping the way science is communicated, taught, and understood. Digital tools, including online platforms, social media, and virtual reality, offer new possibilities to engage diverse audiences in scientific debates. This entails transformative opportunities to expand access to scientific knowledge beyond the traditional classroom to a broader and more diverse audience. However, this also poses challenges, such as the need for digital literacy among teachers and students and the risk of a digital divide that could exacerbate existing inequalities. Effective use of digital tools requires specific strategies to ensure that they enhance, rather than hinder, scientific literacy efforts.

2.2. Climate change awareness

Climate literacy has become an integral part of scientific literacy, especially as the impacts of climate change become more apparent in the region. Society should be educated about the science behind climate change, its impacts, and the importance of adopting sustainable practices. This involves not only understanding scientific principles but also recognizing the socioeconomic and cultural dimensions of climate change. Curricula and public engagement initiatives should be developed to emphasize the urgency of climate action and provide practical advice for individuals and communities to reduce environmental impacts.

2.3. Cultural relevance

Science literacy efforts must be culturally relevant to resonate with diverse populations in Latin America and the Caribbean. The region is characterized by a rich diversity of languages, traditions, and knowledge systems, each of which can play a vital role in promoting a deeper understanding of science. Incorporating indigenous knowledge, local traditions, and culturally appropriate examples into science education can make scientific concepts more relevant and accessible. Furthermore, respecting these diverse perspectives and integrating

them into science literacy initiatives can close the gap between modern understanding of science and traditional forms of knowledge, thereby enriching mainstream discourse.

3. Challenges faced by the science culture construction

3.1. Accessibility

One of the most significant challenges in promoting science and climate literacy is ensuring that scientific information is accessible to all individuals, regardless of their socioeconomic status, geographic location, or educational background. In many parts of Latin America and the Caribbean, access to quality education, internet connectivity, and scientific resources remains limited. This disparity can lead to a significant knowledge gap, where only a fraction of the population benefits from advancements in science and technology. Overcoming these barriers requires innovative solutions, such as mobile learning platforms, community-based education programs, and policies that prioritize equitable access to educational resources.

3.2. Misinformation

The proliferation of misinformation, particularly through social media and other online platforms, poses a significant threat to public understanding of science. Misinformation can undermine trust in scientific institutions, spread false narratives about critical issues like climate change, and lead to harmful behaviors. Combating misinformation requires a multifaceted approach that includes educating the public on how to critically evaluate sources of information, promoting media literacy, and ensuring that accurate and reliable scientific information is readily available. Additionally, fostering a culture of transparency and open communication within the scientific community is essential to building public trust.

3.3. Integration into Education Systems

Integrating science and climate literacy into formal education systems presents both opportunities and challenges. While there is widespread recognition of the importance of these topics, translating that recognition into actionable changes in curricula, teacher training, and assessment methods can be difficult. Education systems across the region vary widely in their capacity to incorporate new content and pedagogical approaches. Ensuring that science and climate literacy are prioritized in national education agendas, providing educators with the necessary training and resources, and developing assessments that accurately measure students' understanding of these topics are all critical steps in this process.

3.4 Digital Tools

The development of educational materials that include mathematical techniques, infographics, images, videos, and interactive manuals, and also accompanied by gamification methods incorporating STEAM concepts enrich the process of literacy playfully and innovatively across a variety of topics, especially for younger

populations. Computational models to simulate ecosystems and the effects of climate change on them can be integrated into educational applications to present three-dimensional interactive scenarios whose behavior teaches the consequences of climate change. By using principles of Augmented Reality and Virtual Reality, immersive experiences can be created, allowing users to explore habitats and see the impact of their actions in a virtual environment while interacting with the system to understand environmental concepts. Digital educational resources such as educational games, video games, and interactive workshops can be highly effective in promoting scientific literacy by addressing topics like the climate crisis and biodiversity. These gamified and playful formats not only facilitate the understanding of complex subjects but are also well-received by the population. The use of interactive and dynamic tools optimizes the learning process, making the content more accessible and engaging.

4. Opportunities for Advancing Science Literacy Collaborative Networks

The creation and strengthening of collaborative networks across Latin America and the Caribbean offer significant opportunities to advance science literacy. Such networks facilitate the sharing of resources, best practices, and research findings among countries with varying levels of development and expertise. The International Green Science Academy Network was highlighted as a successful model of regional collaboration, bringing together educational institutions, research centers, and policymakers to work towards common goals. Expanding these networks and fostering greater collaboration across borders can help to pool resources, amplify impact, and address shared challenges more effectively.

4.1. Public Engagement Initiatives

Public engagement is a cornerstone of science literacy, and there are numerous opportunities to increase public participation in science-related activities. Initiatives such as citizen science projects, science festivals, and online courses provide platforms for individuals to engage with scientific topics in meaningful ways. These initiatives not only increase public understanding of science but also foster a sense of ownership and empowerment, encouraging individuals to apply scientific knowledge in their daily lives. Additionally, public engagement initiatives can serve as a bridge between the scientific community and the general public, facilitating dialogue and mutual understanding.

4.2.Policy Support

Support from governments and policymakers is crucial for the success of science literacy initiatives. Policies that prioritize science education, fund public engagement efforts, and promote the integration of science and technology into everyday life are essential. Advocating for policies that address the unique needs of Latin America and the Caribbean, such as those that support bilingual education, protect indigenous knowledge, and promote sustainable development,

can help to create an enabling environment for science literacy. Additionally, aligning science literacy initiatives with broader policy goals, such as economic development and environmental protection, can increase their impact and sustainability.

5. Integration with the Declaration of Science and Climate Literacy

Strengthening the Role of Education Education is at the heart of science and climate literacy, and strengthening its role is essential for the continued evolution of the Declaration of Science and Climate Literacy. This includes a focus on early childhood education, where foundational concepts of science and environmental stewardship can be introduced. Lifelong learning opportunities, such as adult education programs and continuing professional development, are also crucial for keeping the public informed about new scientific discoveries and emerging technologies. By embedding science literacy into all levels of education, we can ensure that individuals are equipped with the knowledge and skills they need to navigate an increasingly complex world.

5.1. Promoting Inclusivity

Inclusivity is a core principle of the Declaration, and it is vital to ensure that science literacy initiatives reach all segments of society, particularly marginalized and underserved communities. This includes addressing barriers related to language, disability, gender, and economic status. Tailoring science literacy programs to meet the needs of diverse populations can help to create a more equitable society where everyone has the opportunity to benefit from scientific advancements. Promoting inclusivity also involves actively engaging underrepresented groups in the scientific community, ensuring that their voices and perspectives are heard and valued.

5.2. Addressing Emerging Challenges

The Declaration of Science and Climate Literacy must be a living document that evolves to address emerging challenges. These challenges include the ethical implications of new technologies, such as artificial intelligence and biotechnology, as well as the ongoing global climate crisis. Adapting the declaration to reflect these challenges ensures that it remains relevant and effective in guiding science literacy efforts. Additionally, the declaration should provide a framework for anticipating future challenges and preparing society to respond to them in a proactive and informed manner.

6. Conclusion

The Intercontinental Meeting on Science Literacy 2024 has provided valuable insights and recommendations that will shape the future of science and climate literacy in Latin America and the Caribbean. This white paper serves as a roadmap for integrating these insights into the ongoing development of the Declaration of Science and Climate Literacy. By working together, we can build a more scientifically literate society that is better equipped to tackle the challenges of today and tomorrow.

Next Steps

- Integration into the Declaration: Work with the drafting committee to integrate the findings of this white paper into the updated Declaration of Science and Climate Literacy. This will involve a thorough review of the current declaration and the development of new strategies to address emerging challenges.
- Dissemination: Distribute the white paper to relevant stakeholders, including governments, educational institutions, NGOs, and the broader public. Effective dissemination is crucial for ensuring that the insights and recommendations outlined in this document are widely understood and implemented.
- Ongoing Collaboration: Continue to foster collaboration across the region to ensure the successful implementation of the recommendations outlined in this document. This includes building new partnerships, strengthening existing networks, and encouraging cross-sectoral dialogue and cooperation.

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