

ENHANCING SCIENTIFIC LITERACY ACROSS DISCIPLINES: A PATHWAY TO INFORMED AND CRITICAL THINKING

by:

Noime Saavedra Diwa

Teacher I, Pablo Roman National High School

In the 21st century, scientific literacy is no longer a skill reserved for scientists and researchers alone; it is a vital competence for all individuals. As we face unprecedented global challenges—climate change, pandemics, technological advances—understanding scientific principles is crucial for informed decision-making in both personal and public spheres. However, scientific literacy is often confined to the boundaries of science classrooms and is not sufficiently integrated across other disciplines. This article explores the importance of promoting scientific literacy across various fields of education, its potential benefits, and strategies for fostering it in non-scientific disciplines.

The term "scientific literacy" refers to the ability to understand, evaluate, and apply scientific concepts and methods in various contexts. This includes not only knowledge of scientific facts but also the ability to critically analyze scientific information, understand the scientific process, and recognize the role of science in addressing societal challenges. Scientific literacy also involves the capacity to communicate scientific ideas and findings effectively, making them accessible to a broad audience.

While scientific literacy is often emphasized within the natural sciences—such as biology, chemistry, and physics—its value extends far beyond these domains. Fields like history, literature, economics, and even the arts benefit from a scientific understanding that enhances critical thinking, problem-solving, and decision-making.

Scientific literacy equips individuals with the tools to approach problems analytically and with evidence-based reasoning. In subjects like history or political

science, understanding scientific data and methodologies allows students to better evaluate claims, detect biases, and discern between fact and opinion. For instance, in economics, scientific literacy helps students understand data models, trends, and empirical research, enhancing their ability to navigate complex global issues such as economic inequality or environmental sustainability.

In fields like public policy, law, and economics, scientific literacy can inform decisions on health, the environment, and technology. During the COVID-19 pandemic, for example, individuals with higher scientific literacy were better equipped to understand epidemiological models, vaccine development, and the implications of scientific studies on public health. Scientific literacy can therefore bridge the gap between technical expertise and effective policymaking, ensuring that policies are based on sound, evidence-based science.

As emerging technologies—like artificial intelligence, genetic engineering, and biotechnology—continue to shape society, interdisciplinary approaches to scientific literacy can help students engage with the ethical implications of these advances. By understanding the science behind these technologies, individuals can contribute more thoughtfully to discussions about their societal impact, addressing issues such as privacy, equity, and environmental sustainability.

To promote scientific literacy in non-scientific disciplines, education systems must adopt interdisciplinary approaches that emphasize the relevance of science in diverse contexts. Here are several strategies for achieving this integration: Interdisciplinary Curriculum Design, Inquiry-Based Learning, Collaborative Projects and Case Studies, Teacher Professional Development, and Use of Technology and Media.

Integrating scientific literacy into diverse fields of education yields numerous benefits. Scientific literacy allows individuals to engage in public discourse about issues that require an understanding of science, such as climate change, healthcare, and

technology policy. This leads to more informed voting, decision-making, and participation in democratic processes.

By applying scientific reasoning to various disciplines, students develop stronger analytical skills, enabling them to assess information critically and make evidence-based decisions in all aspects of their lives.

As the workforce increasingly demands interdisciplinary skills, graduates who can navigate both scientific and non-scientific domains are better prepared for careers that span a wide range of industries, from technology and business to policymaking and the arts.

Promoting scientific literacy across disciplines is not just a matter of enhancing students' knowledge of science; it is about equipping them with the tools necessary to think critically, solve complex problems, and engage with the world in an informed and responsible manner. By embedding scientific literacy in all areas of education, we can help create a society that is not only scientifically informed but also capable of addressing the complex challenges of the future.

References:

American Association for the Advancement of Science (AAAS). (2011). *Vision and Change in Undergraduate Biology Education: A Call to Action*. Washington, DC: AAAS.

National Research Council. (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*.* Washington, DC: National Academies Press.

Sadler, T. D., & Donnelly, L. A. (2006) Sociocentric Issues in the Classroom: Teaching and Learning about Scientific Controversies. *Science Education*, 90(6), 1012-1030. <https://doi.org/10.1002/sce.20239>

Robinson, R. D., & Schuenemann, R. (2011). Promoting Scientific Literacy Through Multidisciplinary Approaches.* Cambridge University Press.

Osborne, J., & Dillon, J. (2008) Science Education in Europe: Critical Reflections. Studies in Science Education, 44(2), 191-225. <https://doi.org/10.1080/03057260802253394>