Ciência e Tecnologia

Para o Desenvolvimento Ambiental, Cultural e Socioeconômico

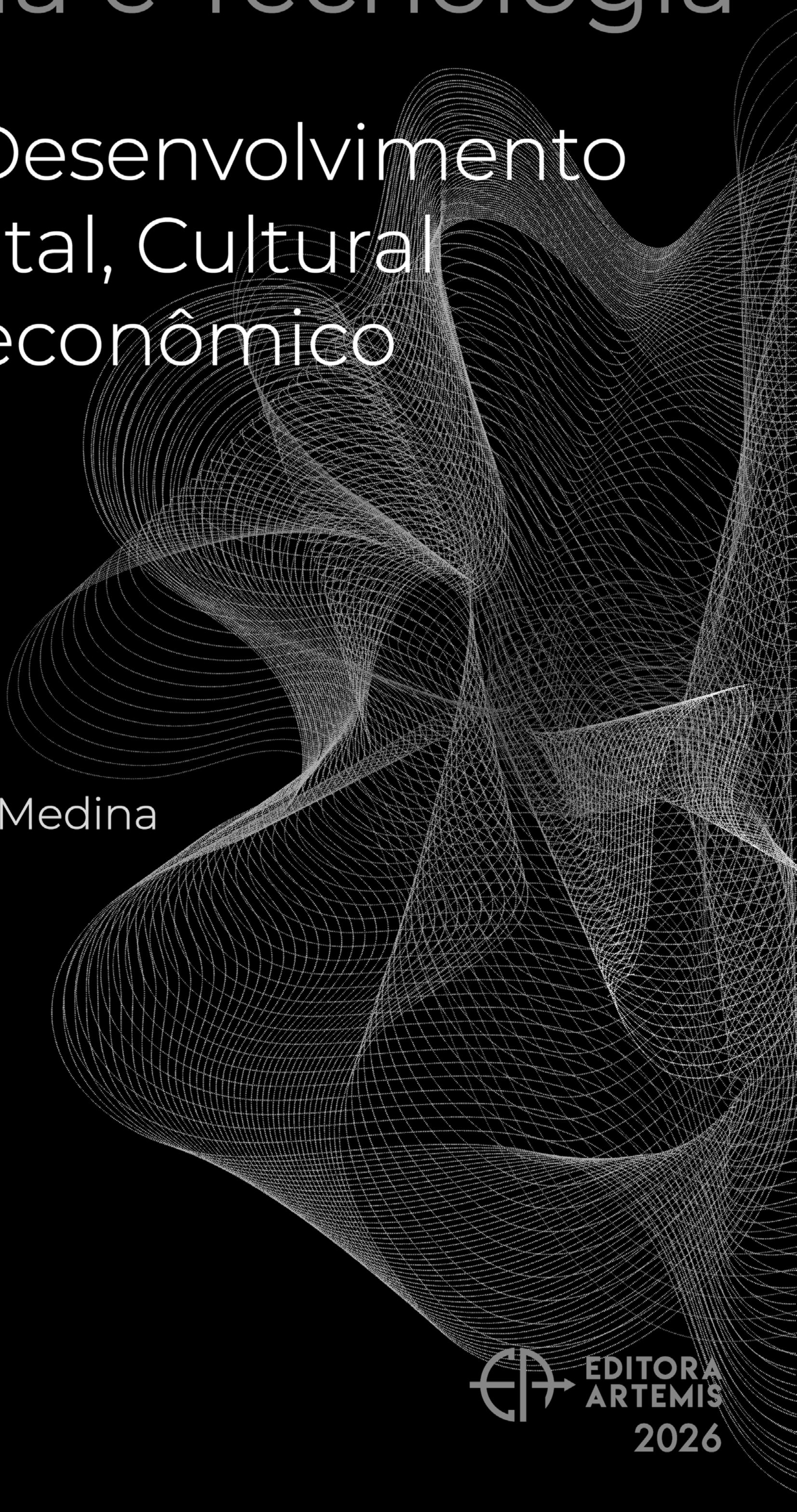
Xosé Somoza Medina
(organizador)

EDITORA ARTEMIS
2026

VOL IX

Ciência e Tecnologia

Para o Desenvolvimento Ambiental, Cultural e Socioeconômico



Xosé Somoza Medina
(organizador)

EDITORA ARTEMIS
2026

VOL IX

2026 by Editora Artemis
Copyright © Editora Artemis
Copyright do Texto © 2026 Os autores
Copyright da Edição © 2026 Editora Artemis

O conteúdo deste livro está licenciado sob uma Licença de Atribuição Creative Commons Atribuição-Não-Comercial NãoDerivativos 4.0 Internacional (CC BY-NC-ND 4.0). Direitos para esta edição cedidos à Editora Artemis pelos autores. Permitido o download da obra e o compartilhamento, desde que sejam atribuídos créditos aos autores, e sem a possibilidade de alterá-la de nenhuma forma ou utilizá-la para fins comerciais.

A responsabilidade pelo conteúdo dos artigos e seus dados, em sua forma, correção e confiabilidade é exclusiva dos autores. A Editora Artemis, em seu compromisso de manter e aperfeiçoar a qualidade e confiabilidade dos trabalhos que publica, **conduz a avaliação cega pelos pares de todos manuscritos publicados, com base em critérios de neutralidade e imparcialidade acadêmica.**

Editora Chefe	Profª Drª Antonella Carvalho de Oliveira
Editora Executiva	M.ª Viviane Carvalho Mocellin
Direção de Arte	M.ª Bruna Bejarano
Diagramação	Elisangela Abreu
Organizador	Prof. Dr. Xosé Somoza Medina
Imagem da Capa	peacestock/123RF
Bibliotecário	Maurício Amormino Júnior – CRB6/2422

Conselho Editorial

Prof.ª Dr.ª Ada Esther Portero Ricol, *Universidad Tecnológica de La Habana "José Antonio Echeverría"*, Cuba
Prof. Dr. Adalberto de Paula Paranhos, Universidade Federal de Uberlândia, Brasil
Prof. Dr. Agustín Olmos Cruz, *Universidad Autónoma del Estado de México*, México
Prof.ª Dr.ª Amanda Ramalho de Freitas Brito, Universidade Federal da Paraíba, Brasil
Prof.ª Dr.ª Ana Clara Monteverde, *Universidad de Buenos Aires*, Argentina
Prof.ª Dr.ª Ana Júlia Viamonte, Instituto Superior de Engenharia do Porto (ISEP), Portugal
Prof. Dr. Ángel Mujica Sánchez, *Universidad Nacional del Altiplano*, Peru
Prof.ª Dr.ª Angela Ester Mallmann Centenaro, Universidade do Estado de Mato Grosso, Brasil
Prof.ª Dr.ª Begoña Blandón González, *Universidad de Sevilla*, Espanha
Prof.ª Dr.ª Carmen Pimentel, Universidade Federal Rural do Rio de Janeiro, Brasil
Prof.ª Dr.ª Catarina Castro, Universidade Nova de Lisboa, Portugal
Prof.ª Dr.ª Cirila Cervera Delgado, *Universidad de Guanajuat*o, México
Prof.ª Dr.ª Cláudia Neves, Universidade Aberta de Portugal
Prof.ª Dr.ª Cláudia Padovesi Fonseca, Universidade de Brasília-DF, Brasil
Prof. Dr. Cleberton Correia Santos, Universidade Federal da Grande Dourados, Brasil
Dr. Cristo Ernesto Yáñez León – New Jersey Institute of Technology, Newark, NJ, Estados Unidos
Prof. Dr. David García-Martul, *Universidad Rey Juan Carlos de Madrid*, Espanha

Editora Artemis
Curitiba-PR Brasil
www.editoraartemis.com.br
e-mail:publicar@editoraartemis.com.br

Prof.ª Dr.ª Deuzimar Costa Serra, Universidade Estadual do Maranhão, Brasil
Prof.ª Dr.ª Dina Maria Martins Ferreira, Universidade Estadual do Ceará, Brasil
Prof.ª Dr.ª Edith Luévano-Hipólito, *Universidad Autónoma de Nuevo León*, México
Prof.ª Dr.ª Eduarda Maria Rocha Teles de Castro Coelho, Universidade de Trás-os-Montes e Alto Douro, Portugal
Prof. Dr. Eduardo Eugênio Spers, Universidade de São Paulo (USP), Brasil
Prof. Dr. Eloi Martins Senhoras, Universidade Federal de Roraima, Brasil
Prof.ª Dr.ª Elvira Laura Hernández Carballido, *Universidad Autónoma del Estado de Hidalgo*, México
Prof.ª Dr.ª Emilas Darlene Carmen Lebus, *Universidad Nacional del Nordeste*, Argentina
Prof.ª Dr.ª Erla Mariela Morales Morgado, *Universidad de Salamanca*, Espanha
Prof. Dr. Ernesto Cristina, *Universidad de la República*, Uruguay
Prof. Dr. Ernesto Ramírez-Briones, *Universidad de Guadalajara*, México
Prof. Dr. Fernando Hitt, *Université du Québec à Montréal*, Canadá
Prof. Dr. Gabriel Díaz Cobos, *Universitat de Barcelona,* Espanha
Prof.ª Dr.ª Gabriela Gonçalves, Instituto Superior de Engenharia do Porto (ISEP), Portugal
Prof.ª Dr.ª Galina Gumovskaya – Higher School of Economics, Moscow, Russia
Prof. Dr. Geoffroy Roger Pointer Malpass, Universidade Federal do Triângulo Mineiro, Brasil
Prof.ª Dr.ª Gladys Esther Leoz, *Universidad Nacional de San Luis,* Argentina
Prof.ª Dr.ª Glória Beatriz Álvarez, *Universidad de Buenos Aires,* Argentina
Prof. Dr. Gonçalo Poeta Fernandes, Instituto Politécnido da Guarda, Portugal
Prof. Dr. Gustavo Adolfo Juarez, *Universidad Nacional de Catamarca*, Argentina
Prof. Dr. Guillermo Julián González-Pérez, *Universidad de Guadalajara, México*
Prof. Dr. Håkan Karlsson, *University of Gothenburg*, Suécia
Prof.ª Dr.ª Iara Lúcia Tescarollo Dias, Universidade São Francisco, Brasil
Prof.ª Dr.ª Isabel del Rosario Chiyon Carrasco, *Universidad de Piura*, Peru
Prof.ª Dr.ª Isabel Yohena, *Universidad de Buenos Aires,* Argentina
Prof. Dr. Ivan Amaro, Universidade do Estado do Rio de Janeiro, Brasil
Prof. Dr. Iván Ramon Sánchez Soto, *Universidad del Bío-Bío*, Chile
Prof.ª Dr.ª Ivânia Maria Carneiro Vieira, Universidade Federal do Amazonas, Brasil
Prof. Me. Javier Antonio Albornoz, *University of Miami and Miami Dade College*, Estados Unidos
Prof. Dr. Jesús Montero Martínez, *Universidad de Castilla - La Mancha*, Espanha
Prof. Dr. João Manuel Pereira Ramalho Serrano, Universidade de Évora, Portugal
Prof. Dr. Joaquim Júlio Almeida Júnior, UniFIMES - Centro Universitário de Mineiros, Brasil
Prof. Dr. Jorge Ernesto Bartolucci, *Universidad Nacional Autónoma de México*, México
Prof. Dr. José Cortez Godinez, Universidad Autónoma de Baja California, México
Prof. Dr. Juan Carlos Cancino Diaz, Instituto Politécnico Nacional, México
Prof. Dr. Juan Carlos Mosquera Feijoo, *Universidad Politécnica de Madrid*, Espanha
Prof. Dr. Juan Diego Parra Valencia, *Instituto Tecnológico Metropolitano de Medellín*, Colômbia
Prof. Dr. Juan Manuel Sánchez-Yáñez, *Universidad Michoacana de San Nicolás de Hidalgo,* México
Prof. Dr. Juan Porras Pulido, *Universidad Nacional Autónoma de México*, México
Prof. Dr. Júlio César Ribeiro, Universidade Federal Rural do Rio de Janeiro, Brasil

EDITORA ARTEMIS
2026

Editora Artemis
Curitiba-PR Brasil
www.editoraartemis.com.br
e-mail:publicar@editoraartemis.com.br

Prof. Dr. Leinig Antonio Perazolli, Universidade Estadual Paulista (UNESP), Brasil
Prof.ª Dr.ª Lívia do Carmo, Universidade Federal de Goiás, Brasil
Prof.ª Dr.ª Luciane Spanhol Bordignon, Universidade de Passo Fundo, Brasil
Prof. Dr. Luis Fernando González Beltrán, *Universidad Nacional Autónoma de México*, México
Prof. Dr. Luis Vicente Amador Muñoz, *Universidad Pablo de Olavide*, Espanha
Prof.ª Dr.ª Macarena Esteban Ibáñez, *Universidad Pablo de Olavide*, Espanha
Prof. Dr. Manuel Ramiro Rodriguez, *Universidad Santiago de Compostela*, Espanha
Prof. Dr. Manuel Simões, Faculdade de Engenharia da Universidade do Porto, Portugal
Prof.ª Dr.ª Márcia de Souza Luz Freitas, Universidade Federal de Itajubá, Brasil
Prof. Dr. Marcos Vinicius Meiado, Universidade Federal de Sergipe, Brasil
Prof.ª Dr.ª Mar Garrido Román, *Universidad de Granada*, Espanha
Prof.ª Dr.ª Margarida Márcia Fernandes Lima, Universidade Federal de Ouro Preto, Brasil
Prof.ª Dr.ª María Alejandra Arecco, *Universidad de Buenos Aires*, Argentina
Prof.ª Dr.ª Maria Aparecida José de Oliveira, Universidade Federal da Bahia, Brasil
Prof.ª Dr.ª Maria Carmen Pastor, *Universitat Jaume I*, Espanha
Prof.ª Dr.ª Maria da Luz Vale Dias – Universidade de Coimbra, Portugal
Prof.ª Dr.ª Maria do Céu Caetano, Universidade Nova de Lisboa, Portugal
Prof.ª Dr.ª Maria do Socorro Saraiva Pinheiro, Universidade Federal do Maranhão, Brasil
Prof.ª Dr.ª MªGraça Pereira, Universidade do Minho, Portugal
Prof.ª Dr.ª Maria Gracinda Carvalho Teixeira, Universidade Federal Rural do Rio de Janeiro, Brasil
Prof.ª Dr.ª María Guadalupe Vega-López, *Universidad de Guadalajara, México*
Prof.ª Dr.ª Maria Lúcia Pato, Instituto Politécnico de Viseu, Portugal
Prof.ª Dr.ª Maritza González Moreno, *Universidad Tecnológica de La Habana*, Cuba
Prof.ª Dr.ª Mauriceia Silva de Paula Vieira, Universidade Federal de Lavras, Brasil
Prof. Dr. Melchor Gómez Pérez, Universidad del Pais Vasco, Espanha
Prof.ª Dr.ª Ninfa María Rosas-García, Centro de Biotecnología Genómica-Instituto Politécnico Nacional, México
Prof.ª Dr.ª Odara Horta Boscolo, Universidade Federal Fluminense, Brasil
Prof. Dr. Osbaldo Turpo-Gebera, *Universidad Nacional de San Agustín de Arequipa*, Peru
Prof.ª Dr.ª Patrícia Vasconcelos Almeida, Universidade Federal de Lavras, Brasil
Prof.ª Dr.ª Paula Arcoverde Cavalcanti, Universidade do Estado da Bahia, Brasil
Prof. Dr. Rodrigo Marques de Almeida Guerra, Universidade Federal do Pará, Brasil
Prof. Dr. Saulo Cerqueira de Aguiar Soares, Universidade Federal do Piauí, Brasil
Prof. Dr. Sergio Bitencourt Araújo Barros, Universidade Federal do Piauí, Brasil
Prof. Dr. Sérgio Luiz do Amaral Moretti, Universidade Federal de Uberlândia, Brasil
Prof.ª Dr.ª Silvia Inés del Valle Navarro, *Universidad Nacional de Catamarca*, Argentina
Prof.ª Dr.ª Solange Kazumi Sakata, Instituto de Pesquisas Energéticas e Nucleares (IPEN)- USP, Brasil
Prof.ª Dr.ª Stanislava Kashtanova, *Saint Petersburg State University,* Russia
Prof.ª Dr.ª Susana Álvarez Otero – Universidad de Oviedo, Espanha
Prof.ª Dr.ª Teresa Cardoso, Universidade Aberta de Portugal
Prof.ª Dr.ª Teresa Monteiro Seixas, Universidade do Porto, Portugal

EDITORA ARTEMIS
2026

Editora Artemis
Curitiba-PR Brasil
www.editoraartemis.com.br
e-mail:publicar@editoraartemis.com.br

Prof. Dr. Valter Machado da Fonseca, Universidade Federal de Viçosa, Brasil
Prof.ª Dr.ª Vanessa Bordin Viera, Universidade Federal de Campina Grande, Brasil
Prof.ª Dr.ª Vera Lúcia Vasilévski dos Santos Araújo, Universidade Tecnológica Federal do Paraná, Brasil
Prof. Dr. Wilson Noé Garcés Aguilar, *Corporación Universitaria Autónoma del Cauca*, Colômbia
Prof. Dr. Xosé Somoza Medina, *Universidad de León*, Espanha

Dados Internacionais de Catalogação na Publicação (CIP)
(eDOC BRASIL, Belo Horizonte/MG)

C569 Ciência e Tecnologia para o Desenvolvimento Ambiental, Cultural e Socioeconômico IX [livro eletrônico] / Organizador Xosé Somoza Medina. – 1. ed. – Curitiba, PR: Editora Artemis, 2026.
il. color.

Formato: PDF
Requisitos de sistema: Adobe Acrobat Reader
Modo de acesso: World Wide Web
Edição bilíngue.
Inclui bibliografia.
ISBN 978-65-82858-30-7
DOI 10.37572/EdArt_280926307

1. Ciência e tecnologia. 2. Meio ambiente. 3. Desenvolvimento sustentável. I. Somoza Medina, Xosé.

CDD 600

Elaborado por Maurício Amormino Júnior – CRB6/2422

EDITORA ARTEMIS
2026

Editora Artemis
Curitiba-PR Brasil
www.editoraartemis.com.br
e-mail:publicar@editoraartemis.com.br

PRÓLOGO

Un nuevo volumen de la serie ***Ciência e Tecnologia para o Desenvolvimento Ambiental, Cultural e Socioeconômico***, el noveno ya, nos permite volver a reflexionar sobre los avances científico-tecnológicos y la transferencia de conocimientos a la sociedad. La ciencia y la tecnología ocupan hoy un lugar central en la comprensión y transformación de los distintos ámbitos de la vida contemporánea, pero tan importante es el avance en sí como la creciente posibilidad de difusión de esas innovaciones. El desarrollo actual no se limita a la creación de nuevos dispositivos, procesos o sistemas, sino que se manifiesta también en la capacidad de analizar problemas complejos, optimizar recursos, generar soluciones sostenibles, fortalecer la formación científica y ampliar las formas de interacción entre conocimiento, sociedad y desarrollo. Este libro es un buen ejemplo de esto último.

El presente volumen, ***Ciência e Tecnologia para o Desenvolvimento Ambiental, Cultural e Socioeconômico IX***, reúne investigaciones que reflejan esta diversidad de aplicaciones a la sociedad de diferentes avances científicos y técnicos. Los capítulos aquí presentados abordan problemas y aplicaciones diversas, pero comparten una misma orientación: la búsqueda de respuestas actuales a situaciones problemáticas fundamentadas desde la ingeniería, la innovación tecnológica, la ciencia de materiales, la energía, el ambiente, la inteligencia artificial, la formación científico-tecnológica, o la comunicación de la ciencia.

La obra se organiza en tres grandes ejes temáticos.

El primero, "**Ingeniería, Metodologías y Procesos Tecnológicos**", reúne seis trabajos vinculados con modelado dinámico, robótica, diagnóstico técnico mediante vibraciones, procesos de corte y manufactura, mejora de la productividad industrial, estudio de materiales y biopolímeros y metodología de investigación en ingeniería. Estos capítulos evidencian el papel de la tecnología en la modelización, experimentación y optimización de procesos y la importancia de los avances metodológicos en el desarrollo de soluciones aplicadas a contextos industriales y científicos.

El segundo eje, "**Energía y Sostenibilidad**", integra cinco investigaciones relacionadas con la generación de energía mediante microturbinas hidráulicas, el aprovechamiento de la energía de las mareas, la exposición a contaminantes derivados del uso de biomasa como fuente de energía, la importancia de las plantas medicinales en la dieta y en la cultura tradicional y los nuevos enfoques de la comunicación pública sobre energía nuclear. En conjunto, estos estudios muestran cómo la energía, cualquier tipo de energía, es un ámbito del conocimiento científico y técnico de importancia clave en nuestra sociedad actual. La energía importa, más que nunca, y la ciencia y la tecnología pueden contribuir tanto al aprovechamiento responsable de los recursos naturales como a la comprensión de sus impactos ambientales y sociales.

El tercer eje, "**Formación y Comunicación en la era de la Inteligencia Artificial**", amplía el campo de análisis hacia otro ámbito de total actualidad científica y tecnológica, la Inteligencia Artificial. Los seis trabajos reunidos en esta sección examinan el rendimiento académico a través de análisis estadísticos avanzados, el uso de podcasts como herramientas de desarrollo socioemocional docente, la aplicación de la inteligencia artificial en la gestión pública, las dificultades en el aprendizaje por la falta de pensamiento lógico-matemático en una muestra de estudiantes de ingeniería de sistemas computacionales, un modelo de análisis multivariante para evaluar el proceso de aprendizaje y el uso de mundos virtuales para mejorar las capacidades del profesorado. Este conjunto de contribuciones permite observar cómo las tecnologías digitales y la Inteligencia Artificial no solo modifican procedimientos técnicos, sino también las formas de enseñar, aprender y construir significado en el mundo académico.

La diversidad de enfoques presente en esta obra constituye uno de sus principales aportes. Lejos de entender la ciencia y la tecnología como campos aislados, los trabajos aquí reunidos muestran su carácter transversal y su capacidad para dialogar con cuestiones ambientales, educativas, sociales, productivas y culturales.

Esperamos que este volumen contribuya al intercambio de conocimientos, al fortalecimiento de nuevas investigaciones y a la difusión de experiencias y propuestas capaces de ampliar las posibilidades de desarrollo científico y tecnológico en diferentes contextos.

Xosé Somoza Medina
Universidad de León, Espanha

SUMÁRIO

ENGENHARIA, METODOLOGIAS E PROCESSOS TECNOLÓGICOS

CAPÍTULO 1 1

ANÁLISIS DEL MODELO DINÁMICO DE UN MANIPULADOR ROBÓTICO INDUSTRIAL EN REFERENCIA AL DISEÑO DE SU SISTEMA DE CONTROL

Alejandro Armando Hossian
Roberto Carabajal
Carolina Hirschfeldt
Emanuel Maximiliano Alveal

https://doi.org/10.37572/EdArt_2809263071

CAPÍTULO 2 16

APPLICATION OF VIBRATION EFFECTS IN TECHNICAL DIAGNOSTICS AND IDENTIFICATION

Vitalijs Beresnevics

https://doi.org/10.37572/EdArt_2809263072

CAPÍTULO 3 32

CORTE POR CIZALLAMIENTO DE UNA SILUETA CIRCULAR BAJO CONDICIONES DE MÍNIMO Y MÁXIMO MATERIAL

Pedro de Jesús García Zugasti
Enrique Alejandro Vázquez Hernández
José de Jesús Navarro Delgado
Yolanda Rodríguez Corpus
Juan Compeán Rodríguez

https://doi.org/10.37572/EdArt_2809263073

CAPÍTULO 4 46

IMPLEMENTACIÓN DE METODOLOGÍA ERIM PARA INCREMENTO DE PRODUCCIÓN EN ÁREA DE ACABADO DE ROTORES

Enrique Alejandro Vázquez Hernández
Pedro de Jesús García Zugasti
Juan Gabriel Sandoval Granja
Gerardo García Liñán
Luis Antonio Renovato Rivera

https://doi.org/10.37572/EdArt_2809263074

CAPÍTULO 5 .... **58**

ROLE OF THE INTERACTION AMYLOSE-NANOCELLULOSE ON THE RHEOLOGICAL PROPERTIES AND MOISTURE SORPTION OF MAIZE STARCH

Ignacia González
Makarena Jiménez
Paulo Díaz-Calderón

https://doi.org/10.37572/EdArt_2809263075

CAPÍTULO 6 .... **72**

CONSTRUCCIÓN DEL MARCO TEÓRICO EN PROYECTOS DE INVESTIGACIÓN EN INGENIERÍA: REVISIÓN NARRATIVA Y ORIENTACIONES DIDÁCTICAS PARA ESTUDIANTES DE LICENCIATURA

Javier Montoya Ponce
Bertha Ivonne Sánchez Luján
María Teresa Martinez Acosta
María Guadalupe Amado Moreno

https://doi.org/10.37572/EdArt_2809263076

ENERGIA E SUSTENTABILIDADE

CAPÍTULO 7 .... **98**

GENERACIÓN DE ENERGÍA ELÉCTRICA MEDIANTE MICROTURBINAS HIDRÁULICAS

Nelson Ramiro Gutiérrez Suquillo
Luis Miguel Sánchez Muyulema
Jonnathan Ismael Chamba Cruz
Guillermo Raúl Tumalli Naranjo

https://doi.org/10.37572/EdArt_2809263077

CAPÍTULO 8 .... **114**

ENERGÍA DE LAS MAREAS, AGUA Y AIRE

Antonio Rabina Merelas

https://doi.org/10.37572/EdArt_2809263078

CAPÍTULO 9 128

EXPOSICIÓN A HIDROCARBUROS AROMÁTICOS POLICÍCLICOS POR EL USO DE LEÑA EN LA COMUNIDAD LA MARCELA, MIQUIHUANA, TAMAULIPAS

Lorenzo Heyer Rodríguez
Valeria Navarro López
Bárbara Azucena Hernández Macias
Elizabeth del Carmen Andrade Limas
Jacinto Treviño Carreón

doi **https://doi.org/10.37572/EdArt_2809263079**

CAPÍTULO 10 148

TALLER SOBRE FARMACIA Y COCINA VIVIENTE EN LA RESERVA DE LA BIÓSFERA SIERRA DE HUAUTLA

Amanda Ortiz Sánchez
Angélica María Alemán Octaviano

doi **https://doi.org/10.37572/EdArt_28092630710**

CAPÍTULO 11 159

BEYOND PUBLIC ACCEPTANCE: REFRAMING NUCLEAR ENERGY COMMUNICATION IN INDONESIA

Muhammad Yunus Zulkifli
Yunita Permatasari
Atika Ratna Sari

doi **https://doi.org/10.37572/EdArt_28092630711**

FORMAÇÃO E COMUNICAÇÃO NA ERA DA INTELIGÊNCIA ARTIFICIAL

CAPÍTULO 12 171

ANÁLISIS DEL RENDIMIENTO ACADÉMICO MEDIANTE TÉCNICAS ESTADÍSTICAS MULTIVARIANTES: UN ENFOQUE REPRODUCIBLE CON RMARKDOWN

Alberto Hananel Baigorria

doi **https://doi.org/10.37572/EdArt_28092630712**

CAPÍTULO 13 .... **194**

EL PODCAST EDUCATIVO COMO DISPOSITIVO DE AUDIO-MEDIACIÓN PARA EL DESARROLLO SOCIOEMOCIONAL DOCENTE: ARQUITECTURA, MODELO ECOS Y CONSIDERACIONES ÉTICAS PARA EL DISEÑO DE APPS DE PODCAST SEL

Paula Correa-Gutiérrez
Fabiola Sáez-Delgado
Pilar Jara-Coatt
Natalia Zañartu-Canihuante
Felipe Albarrán-Torres

https://doi.org/10.37572/EdArt_28092630713

CAPÍTULO 14 .... **217**

INNOVACIÓN TECNOLÓGICA EN LA GESTIÓN PÚBLICA: INTELIGENCIA ARTIFICIAL Y CALIDAD DEL SERVICIO AL CIUDADANO

José Ángel Meneses Jiménez
Manuel Rocha Gonzales
Raul Hernando Aguado Apolaya

https://doi.org/10.37572/EdArt_28092630714

CAPÍTULO 15 .... **230**

DIFICULTADES EN LA RESOLUCIÓN DE EJERCICIOS Y HABILIDADES MATEMÁTICAS DE ESTUDIANTES EN LA MATERIA DE LENGUAJES Y AUTÓMATAS I

María Eugenia Carreón Romero
Emmanuel Vázquez Benito
Roberto Carlos Carreón Romero

https://doi.org/10.37572/EdArt_28092630715

CAPÍTULO 16 .... **243**

ANÁLISIS MULTIVARIANTE DEL RENDIMIENTO ACADÉMICO MEDIANTE R: UN ENFOQUE PRÁCTICO Y REPRODUCIBLE

Alberto Hananel Baigorria

https://doi.org/10.37572/EdArt_28092630716

CAPÍTULO 17 ....**268**

COMPUTACIÓN AFECTIVA Y DISEÑO TECNOPEDAGÓGICO DE SISTEMAS DE MUNDO VIRTUAL PARA EL ENTRENAMIENTO SOCIOEMOCIONAL DOCENTE: REQUERIMIENTOS, COMPONENTES, PARÁMETROS DE INMERSIÓN Y EL MODELO SEED DE DESARROLLO PSICOEMOCIONAL SIMULADO

Fabiola Sáez-Delgado
Pilar Jara-Coatt
Javier Mella-Norambuena
Paulo César Coronado-Sánchez
Paula Correa-Gutiérrez

https://doi.org/10.37572/EdArt_28092630717

SOBRE O ORGANIZADOR..**295**

ÍNDICE REMISSIVO **296**

CAPÍTULO 11

BEYOND PUBLIC ACCEPTANCE: REFRAMING NUCLEAR ENERGY COMMUNICATION IN INDONESIA

Data de submissão: 18/09/2026
Data de aceite: 23/09/2026

Muhammad Yunus Zulkifli
National Research and Innovation Agency of Indonesia (BRIN)
Jakarta-Indonesia
https://orcid.org/0000-0002-8521-7887

Yunita Permatasari
National Research and Innovation Agency of Indonesia (BRIN)
Jakarta-Indonesia
https://orcid.org/0000-0002-3707-5028

Atika Ratna Sari
National Research and Innovation Agency of Indonesia (BRIN)
Jakarta-Indonesia
https://orcid.org/0009-0002-2101-4885

ABSTRACT: Nuclear energy communication is often framed as an effort to improve public understanding and increase public acceptance of nuclear technology. Such an approach, however, may reduce communication to an instrumental activity in which scientific information is transmitted to the public to support a predetermined technological or policy agenda. This chapter proposes a broader understanding of nuclear energy communication as a process through which scientific knowledge is translated, represented, circulated, and interpreted as a public issue. Drawing on a constructivist paradigm and a qualitative case study, the chapter examines the communication practices of the Indonesian Nuclear Society Association (HIMNI), nuclear scientists, and Indonesian research institutions. Data were collected through interviews with nuclear scientists, participatory observation of HIMNI webinar activities, and document analysis of communication materials produced by HIMNI, the National Research and Innovation Agency, and the former National Nuclear Energy Agency. The analysis shows that nuclear energy communication in Indonesia is shaped by several interconnected processes. First, nuclear energy is commonly represented through scientific, technological, and developmental narratives. Second, complex technical knowledge is translated into more accessible public explanations through popular media, webinars, and institutional communication. Third, communication tends to emphasize the potential benefits of nuclear technology, while uncertainty, risk, historical controversy, and competing public interpretations receive less systematic attention. Fourth, institutional changes from BATAN to BRIN have created a communication gap, particularly through the discontinuation of NUTECH and the limited availability of public-oriented nuclear education content on institutional platforms. The chapter argues

that nuclear energy communication should be understood not merely as a strategy for producing acceptance, but as a process of constructing public meaning around energy, technology, risk, and national development.

KEYWORDS: nuclear energy communication; science communication; media representation; knowledge translation; public meaning.

1. INTRODUCTION

Science is not only a body of specialized knowledge. It is also a way of thinking and a social practice that becomes meaningful through its relationship with wider society. Scientific knowledge is therefore not confined to scientists, research institutions, or technical communities. It is also interpreted by citizens, journalists, policymakers, educators, and other social actors. However, the relationship between scientific knowledge and public understanding is not always straightforward. Technical language, institutional boundaries, unequal access to information, and differences in cultural experience may create difficulties in translating scientific explanations into forms that can be understood and interpreted by wider publics.

Science communication has an important role in this process. It connects scientific communities, public institutions, media organizations, and citizens through different forms of interaction. These forms include journalistic reporting, public lectures, exhibitions, webinars, social media, institutional websites, and educational activities. Science communication is consequently not limited to the transmission of scientific facts. It also involves the selection of issues, the organization of narratives, the use of particular media forms, and the negotiation of meanings between experts and non-experts (Bauer & Bucchi, 2008; Bucchi, 2013; Bucchi & Trench, 2014; Kappel & Holmen, 2019; Nielsen, 2022).

The issue becomes more complex when scientific knowledge concerns contested or risk-associated technologies. Nuclear energy is linked to low-carbon development and energy security, but also to safety, radioactive waste, economic cost, institutional accountability, emergency preparedness, and public trust. In Indonesia, nuclear power has been discussed in relation to energy planning, net-zero emissions, and energy diversification, yet sustained and coordinated public communication remains limited (Rahmanta et al., 2023); (Santosa et al., 2023); (Massagony et al., 2025).

Previous discussions of nuclear energy communication emphasize public understanding, literacy, trust, and acceptance. These concerns are important, but they may create an instrumental understanding of communication, evaluated primarily by whether it makes the public more supportive of nuclear technology. Such a framework can overlook how nuclear energy becomes meaningful through scientific explanations, institutional statements, media narratives, educational materials, and public discussions.

Previous research in Indonesia has examined educational innovation, nuclear scientists, and professional organizations in translating complex scientific knowledge for wider publics. Zulkifli (2026), for example, analyzed HIMNI communication activities and highlighted public-oriented communication, digital media, and educational strategies in presenting nuclear technology (Rogers et al., 2014). Building on this study, the present chapter shifts the analytical focus toward how nuclear energy is represented, translated, and constructed as a public issue.

This chapter therefore shifts the analytical focus from communication as an instrument for producing acceptance to communication as a process of constructing public meaning. The central concern is not simply whether nuclear scientists communicate effectively, but how nuclear energy is represented and translated as a public issue. This includes examining how scientific, environmental, technological, economic, and political meanings are connected in communication practices.

The chapter addresses the following main research question:

How is nuclear energy constructed as a public issue through scientific communication and media representation in Indonesia?

The question is developed through three subsidiary questions:

1. How are nuclear energy and nuclear power plants represented in public communication materials?
2. How are scientific, environmental, economic, political, and technological meanings connected in these representations?
3. How do communication practices translate complex nuclear issues into narratives that can be interpreted by wider publics?

2. NUCLEAR ENERGY COMMUNICATION IN INDONESIA

Nuclear technology in Indonesia has developed through both energy and non-energy applications. Non-energy applications include agriculture, health, industry, and other technical fields, while the energy sector concerns the development of nuclear power plants. The distinction is important because public communication about nuclear technology may produce different meanings depending on the application being discussed. Nuclear technology used in health or agriculture may be represented through narratives of service, innovation, and social benefit. Nuclear power plants, by contrast, are more directly connected with questions of national energy policy, environmental impact, infrastructure, safety, and long-term public responsibility.

The development of nuclear power plants in Indonesia has been linked to national energy security and the energy transition. Some policy discussions identify nuclear energy as a potential source of low-carbon electricity, particularly in relation to the target of achieving net-zero emissions by 2060. However, nuclear energy also raises economic and institutional questions, including the cost of construction and maintenance, fuel availability, regulatory capacity, and the readiness of national institutions. These dimensions mean that nuclear energy cannot be understood only as a technical object. It is simultaneously an energy policy, an economic project, an environmental issue, and a public controversy.

Communication connects these dimensions. Public understanding is shaped not only by scientific information but also by the forms through which it circulates. Mainstream media, face-to-face events, institutional websites, social media, and online discussions contribute to the circulation of nuclear narratives. Bultitude (2011) identifies mainstream media, face-to-face communication, and online interaction as important science communication channels.

In Indonesia, nuclear communication is also shaped by institutional transformation. Nuclear research and development were historically associated with BATAN. Following the establishment of BRIN, nuclear research activities were incorporated into a broader institutional structure. This transition created opportunities for interdisciplinary research while raising questions about the continuity and visibility of public-facing nuclear communication.

The earlier communication infrastructure included NUTECH, a popular science publication associated with BATAN. The source material indicates that NUTECH was no longer published during the BRIN period, while BRIN's website contained limited content specifically designed for public education and campaigns concerning nuclear energy. Institutional reorganization can therefore alter the channels through which scientific knowledge is translated and circulated.

3. CONCEPTUAL FRAMEWORK

3.1. SCIENCE COMMUNICATION AS MEANING-MAKING

Science communication has traditionally been associated with the dissemination of scientific knowledge from experts to non-experts. However, contemporary scholarship emphasizes that communication is not simply a linear process of information transfer. It involves interaction, interpretation, negotiation, and the construction of meaning between different communities, including questions of credibility and the relationship between science and wider publics (Gregory & Miller, 1998).

Kappel & Holmen (2019) show that science communication may pursue several aims, including the transmission of information, the development of understanding, the promotion of participation, and the support of decision-making. These aims are not necessarily equivalent. Communication intended to inform the public may differ from communication intended to persuade the public to support a particular policy or technology.

If communication is understood primarily as persuasion, scientific explanations may be organized according to their ability to generate confidence in nuclear technology. If understood as meaning-making, analysis must also consider which concerns are visible, which uncertainties are acknowledged, and how different interpretations are accommodated.

Science communication is therefore treated in this chapter as a process through which scientific knowledge is made socially available and becomes connected to public concerns. The process includes at least four dimensions:

1. Selection, referring to the choice of scientific issues and information to be communicated.
2. Translation, referring to the movement from technical language into accessible explanations.
3. Representation, referring to the construction of narratives, images, categories, and frames.
4. Interpretation, referring to the ways in which publics may understand and evaluate the communicated issue.

These dimensions are analytically connected: selection shapes what can be translated; translation involves choices about language and emphasis; representation connects scientific information with broader social meanings; and interpretation is shaped by the narratives and contexts through which information becomes available.

3.2. MEDIA REPRESENTATION AND PUBLIC MEANING

Media representation is not a neutral mirror of reality. It organizes social issues through selections, emphases, and narrative structures. In science and technology, representation may connect technical objects with meanings such as progress, risk, modernization, environmental responsibility, national development, or public danger.

Nuclear energy may therefore be represented as a solution to energy insecurity, a low-carbon technology, a symbol of technological advancement, or a source of risk. These meanings may coexist, but they are not always equally visible. A communication environment dominated by benefit-oriented narratives may provide limited space for uncertainty, disagreement, or historical controversy.

The analysis does not assume that a representation is inherently correct or incorrect. Instead, it examines how representations are constructed and what kinds of public interpretation they make possible, consistent with a constructivist understanding of communication.

3.3. KNOWLEDGE TRANSLATION

Knowledge translation refers to transforming specialized knowledge into forms that can circulate beyond its original professional context. It may involve simplifying technical language, using analogies, selecting examples, producing visual materials, or connecting scientific concepts with everyday experience. The form and style of communication can shape accessibility to non-specialist audiences (Bucchi, 2013).

Translation is not purely technical. It also involves interpretation and framing. When scientists explain nuclear power plants to the public, they decide which dimensions to emphasize, what examples to use, and how to relate technical information to public concerns. Translation can therefore increase accessibility while narrowing or redirecting meanings.

The chapter uses knowledge translation to examine how nuclear scientists and institutions communicate complex issues to wider audiences. Translation is understood not as simple reduction of complexity, but as the reorganization of scientific knowledge into public narratives.

4. METHODOLOGY

This chapter uses a constructivist paradigm and a qualitative case study approach. The case concerns the communication of nuclear energy in Indonesia, with particular attention to the Indonesian Nuclear Society Association, or HIMNI, and to the public communication activities of nuclear scientists and research institutions.

The case study approach is appropriate because nuclear energy communication is situated within institutional, technological, political, and cultural contexts. The analysis focuses on communication practices rather than statistically measuring public acceptance.

Data were collected through three interconnected methods. First, interviews were conducted with two nuclear scientists associated with HIMNI. The first interviewee was Geni Rina Sunaryo, a female nuclear scientist affiliated with BRIN and formerly associated with BATAN. Her communication activities included writing for several media outlets. The second interviewee was Harun Ardiansyah, a doctoral graduate in nuclear-related science who had written for scientifically oriented media, including The Conversation.

Second, participatory observation was conducted through HIMNI webinar activities. The webinar series was observed as a form of public communication in which nuclear scientists and other participants discussed nuclear-related issues. The observation focused on the organization of communication, the role of experts, the subjects discussed, and the relationship between technical explanations and wider public concerns.

Third, document analysis was conducted on communication materials produced by HIMNI, BRIN, and BATAN. The materials included content published on the HIMNI website, information displayed through BRIN's institutional website, and NUTECH, the popular nuclear science publication associated with BATAN. The analysis considered the topics selected, the intended audiences, the narrative emphasis, and the availability of educational content.

The three forms of data were triangulated. Interviews provided insight into scientists' experiences and practices; observation captured communication activities in public settings; and document analysis examined institutional materials and representational patterns.

The analysis was organized around four categories: scientific and developmental narratives, knowledge translation, benefit-oriented representation, and institutional communication gaps. The purpose was to examine how nuclear energy was made intelligible and meaningful through communication rather than whether communication produced acceptance.

5. FINDINGS

5.1. NUCLEAR ENERGY AS A SCIENTIFIC AND DEVELOPMENTAL NARRATIVE

The communication of nuclear energy in Indonesia is strongly connected with scientific and developmental narratives. Nuclear technology is commonly introduced through its relationship with scientific progress, technological capability, energy security, and national development. In this narrative, nuclear scientists are positioned as important sources of knowledge who can explain technical issues to the public and policymakers.

However, positioning scientists as public communicators creates a particular structure of communication. Scientific knowledge tends to enter public discussion through expert authority, which may strengthen credibility while leaving limited space for local experience, public concern, historical memory, or critical interpretations.

The developmental representation places emphasis on what nuclear power may contribute to the country, connecting it with future energy provision and low-carbon development. Nuclear energy may consequently appear primarily as a matter of technological planning and national policy rather than an issue requiring public interpretation and deliberation.

5.2. TRANSLATING TECHNICAL KNOWLEDGE INTO PUBLIC NARRATIVES

The interviews and observations indicate that nuclear scientists recognize the importance of translating technical knowledge into language that can be understood by wider audiences. Scientific publications often use specialized terminology and focus on technical accuracy. Public communication, by contrast, requires attention to readability, context, examples, and the experiences of non-specialist audiences.

Translation remains demanding. The earlier study identified language, perception, and value-related problems as barriers. These concern movement from technical terminology into semi-popular language, the prioritization of scientific precision over accessibility, and assumptions about the attractiveness or newsworthiness of scientific issues for media audiences.

Knowledge translation is therefore not simply vocabulary simplification. It requires decisions about relevance, examples, and connections with public experience. For nuclear energy, this includes explaining less visible issues such as radiation, radioactive waste, emergency preparedness, regulatory oversight, and long-term responsibility.

The available data suggest that nuclear communication uses several channels for translation, but these have not formed a fully coordinated public communication system. Individual scientists may write for selected media outlets or participate in webinars, while institutional communication remains uneven.

5.3. THE DOMINANCE OF BENEFIT-ORIENTED COMMUNICATION

A recurring pattern in nuclear energy communication is the emphasis on the potential benefits of nuclear technology. These benefits include low-carbon electricity, energy security, technological advancement, and support for national development. Such narratives are understandable because nuclear energy is frequently discussed in relation to the energy transition and the need to diversify energy sources.

A benefit-oriented narrative may nevertheless produce an incomplete representation when it is not accompanied by discussion of uncertainty, risk, cost, and institutional accountability. Nuclear energy is also a socio-technical project requiring public trust, regulatory capacity, financial resources, and long-term institutional commitment.

A more comprehensive approach would place potential benefits alongside the uncertainties and responsibilities associated with nuclear development, allowing public meaning to be constructed through a broader narrative.

5.4. LIMITED VISIBILITY OF UNCERTAINTY AND CONTESTATION

Nuclear energy communication also reveals a limited visibility of uncertainty and contestation. Scientific and institutional communication often seeks to present information clearly and authoritatively. This is useful for public education, but it may obscure the fact that nuclear energy involves competing interpretations and unresolved questions. Ethical approaches to science communication emphasize responsibilities concerning transparency, uncertainty, public interests, and the conditions under which scientific issues are communicated (Medvecky & Leach, 2019; Priest et al., 2019).

Scientific uncertainty does not necessarily indicate a lack of knowledge. It may reflect limits of evidence, differences in models, or the complexity of future outcomes. Communicating uncertainty responsibly can help publics understand why experts may disagree and why policy decisions require deliberation.

In nuclear energy, uncertainty may concern economic feasibility, development timing, fuel availability, technological choices, safety arrangements, and regulatory capacity. Communication that does not address these dimensions may construct nuclear energy as a technical object whose development is primarily a matter of expert decision.

The limited visibility of contestation is also related to the institutional position of scientists. Scientists are often expected to provide accurate information and support evidence-based policy. However, public communication may require them to acknowledge the social and political dimensions of scientific issues. Nuclear energy is not interpreted only through scientific evidence. It is also connected with public values, historical experiences, environmental concerns, and perceptions of institutional trustworthiness.

5.5. INSTITUTIONAL GAPS IN NUCLEAR ENERGY COMMUNICATION

The document analysis indicates a significant institutional gap in the public communication of nuclear energy. NUTECH, which had served as a popular nuclear science publication during the BATAN period, was no longer published in the BRIN period. The discontinuation of this publication reduced one established channel through which nuclear science could be communicated to wider audiences.

The BRIN website also contained limited content specifically devoted to nuclear education and public campaigns. Although BRIN functions as an important institutional home for research and innovation, its public-facing communication did not appear to provide a sustained and easily identifiable stream of nuclear-related educational materials.

Institutional restructuring can affect the continuity of science communication. Research institutions may retain scientific expertise while weakening the media channels through which that expertise reaches the public. The issue therefore concerns communication infrastructure, institutional priorities, editorial continuity, and public-oriented content production.

HIMNI has the potential to bridge this gap through its network of nuclear scientists and activities such as webinars. However, the available evidence indicates that digital and popular-media activities remain limited and have not yet developed into a broad, systematic communication network.

6. DISCUSSION

The findings demonstrate that nuclear energy communication in Indonesia should be understood as a process of public meaning-making. Nuclear energy is not encountered by the public as a purely technical object. It is encountered through narratives that connect it with development, energy security, environmental responsibility, technological progress, and risk.

Scientists provide technical knowledge and may act as educators and communicators. Nevertheless, public meaning is also shaped by institutions, media organizations, communication technologies, and audiences. Scientific explanations become part of a wider environment in which institutional narratives, media selection, public concerns, and political priorities interact.

The findings also show that accessibility and completeness must be considered together. Scientific information needs to be translated into understandable language, but translation should not remove complexity that is socially important. A communication strategy that explains the benefits of nuclear energy without addressing uncertainty, risk, cost, and accountability may be accessible but incomplete. This also connects communication with public engagement, in which the public is not treated only as a recipient of information but as a participant in considering the implications of science and technology (Stilgoe et al., 2014).

A more comprehensive communication system would connect scientific expertise with accessible media production, public education, journalism, and opportunities for dialogue, while providing room for different interpretations rather than a single predetermined narrative.

7. CONCLUSION

This chapter examined nuclear energy communication in Indonesia as a process through which scientific knowledge is translated, represented, circulated, and interpreted as a public issue. Using a qualitative case study of HIMNI, nuclear scientists, and Indonesian research institutions, the analysis identified four main patterns.

First, nuclear energy is commonly represented through scientific and developmental narratives that connect nuclear technology with energy security, technological progress, and national development. Second, nuclear scientists play an important role in translating technical knowledge into public-oriented explanations through webinars, media writing, and other communication activities. Third, communication tends to emphasize the potential benefits of nuclear technology, while uncertainty, contestation, and institutional responsibility receive less systematic visibility. Fourth, institutional changes from BATAN to BRIN have generated gaps in public communication, particularly through the discontinuation of NUTECH and the limited availability of nuclear educational content on institutional platforms.

The chapter argues that nuclear energy communication should move beyond the narrow objective of increasing public acceptance. Communication is a process through which nuclear energy becomes meaningful as a technological, environmental, economic, political, and developmental issue.

This reframing has implications for scientists, research institutions, media organizations, and policymakers. Public communication should combine scientific accuracy with accessibility while acknowledging uncertainty, risk, disagreement, and public concerns.

The chapter is based on a limited qualitative case involving nuclear scientists, institutional communication materials, and HIMNI activities. Further research could examine media coverage, compare institutional and journalistic representations, and investigate how different publics interpret nuclear narratives in relation to their experiences and values.

REFERENCES

Bauer, M. W., & Bucchi, M. (2008). *Journalism, science and society: Science communication between news and public relations* (Vol. 7). Routledge.

Bucchi, M. (2013). Style in science communication. *Public Understanding of Science*, *22*(8), 904–915.

Bucchi, M., & Trench, B. (2014). Science communication research: themes and challenges. In *Routledge handbook of public communication of science and technology* (pp. 17–30). Routledge.

Bultitude, K. (2011). *Science Communication–Why and How?*

Gregory, J., & Miller, S. (1998). *Science in public: Communication, culture, and credibility*. Plenum Press.

Kappel, K., & Holmen, S. J. (2019). Why science communication, and does it work? A taxonomy of science communication aims and a survey of the empirical evidence. *Frontiers in Communication*, *4*, 55.

Massagony, A., Pandit, R., & White, B. (2025). Political economy of energy policy in Indonesia towards net zero emissions by 2060. *Energy for Sustainable Development*, *88*, 101757.

Medvecky, F., & Leach, J. (2019). (Science) Communication as Ethics. In *An Ethics of Science Communication* (pp. 33–39). Springer.

Nielsen, K. H. (2022). Histories of Science Communication. *Histories*, *2*(3), 334–340.

Priest, S., Goodwin, J., & Dahlstrom, M. F. (2019). *Ethics and practice in science communication*. University of Chicago Press.

Rahmanta, M. A., Adhi, A. C., Tambunan, H. B., Digwijaya, W., Damanik, N., & Al Hasibi, R. A. (2023). An analysis of national position, opportunity, and challenge of indonesia's nuclear program to support net-zero emissions by 2060. *Energies*, *16*(24), 8089.

Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). Diffusion of innovations. In *An integrated approach to communication theory and research* (pp. 432–448). Routledge.

Santosa, J., Kuncoro, A. H., Dwijatmiko, A., Hesty, N. W., & Darmawan, A. (2023). *The role of nuclear power plants in indonesia towards net zero emissions (nze) in 2060 with a multi regions approach*.

Stilgoe, J., Lock, S. J., & Wilsdon, J. (2014). Why should we promote public engagement with science? *Public Understanding of Science*, *23*(1), 4–15.

Zulkifli, M. Y. (2026). *Educational Innovation in Science Communication: Enhancing Public Understanding of Environmentally Friendly Nuclear Technology in Indonesia*. 703–714. https://doi.org/10.22492/issn.2186-5892.2026.54

SOBRE O ORGANIZADOR

Xosé Somoza Medina (1969, Ourense, España) Licenciado con Grado y premio extraordinario en Geografía e Historia por la Universidad de Santiago de Compostela (1994). Doctor en Geografía e Historia por la misma universidad (2001) y premio extraordinario de doctorado por su Tesis "Desarrollo urbano en Ourense 1895-2000". Profesor Titular en la Universidad de León, donde imparte clases desde 1997. En la Universidad de León fue Director del Departamento de Geografía entre 2004 y 2008 y Director Académico de la Escuela de Turismo entre 2005 y 2008. Entre 2008 y 2009 ejerció como Director del Centro de Innovación y Servicios de la Xunta de Galicia en Ferrol. Entre 2007 y 2009 fue vocal del comité "Monitoring cities of tomorrow" de la Unión Geográfica Internacional. En 2012 fue Director General de Rehabilitación Urbana del Ayuntamiento de Ourense y ha sido vocal del Consejo Rector del Instituto Ourensano de Desarrollo Local entre 2011 y 2015. Ha participado en diversos proyectos y contratos de investigación, en algunos de ellos como investigador principal, con temática relacionada con la planificación urbana, la ordenación del territorio, las nuevas tecnologías de la información geográfica, el turismo o las cuestiones demográficas. Autor de más de 100 publicaciones relacionadas con sus líneas de investigación preferentes: urbanismo, turismo, gobernanza, desarrollo, demografía, globalización y ordenación del territorio. Sus contribuciones científicas más importantes se refieren a la geografía urbana de las ciudades medias, la crisis del medio rural y sus posibilidades de desarrollo, la evolución del turismo cultural como generador de transformaciones territoriales y más recientemente las posibilidades de reindustrialización de Europa ante una nueva etapa posglobalización. Ha participado como docente en masters y cursos de especialización universitaria en Brasil, Bolivia, Colombia, Paraguay y Venezuela y como docente invitado en la convocatoria Erasmus en universidades de Bulgaria (Sofia), Rumanía (Bucarest) y Portugal (Porto, Guimarães, Coimbra, Aveiro y Lisboa). Ha sido evaluador de proyectos de investigación en la Agencia Estatal de Investigación de España y en la Organización de Estados Iberoamericanos (OEI). Como experto europeo en Geografía ha participado en reuniones de la Comisión Europea en Italia y Bélgica. Impulsor y primer coordinador del proyecto europeo URBACT, "come Ourense", dentro del Programa de la Unión Europea "Sostenibilidad alimentaria en comunidades urbanas" (2012-2014). Dentro de la experiencia en organización de actividades de I+D+i se pueden destacar la organización de diferentes reuniones científicas desarrolladas dentro de la Asociación de Geógrafos Españoles (en 2002, 2004, 2012 y 2018).

ÍNDICE REMISSIVO

A

Agentes conversacionales basados en LLM 269
Agua 59, 98, 101, 103, 104, 107, 108, 109, 110, 111, 112, 114, 116, 117, 118, 119, 120, 121, 122, 123, 124, 126, 127
Agua potable 98, 101, 103, 107, 108, 110, 111, 112
Aire 114, 115, 116, 117, 118, 119, 120, 121, 126, 127, 128, 129, 130, 131, 132, 134, 136, 138, 139, 140, 141, 142, 143, 144
Aire interior 128, 129, 130, 131, 132, 136, 138, 139, 140, 141, 142, 143, 144
Algoritmo computacional 2, 7, 14
Amylose 58, 60, 61, 62, 63, 64, 65, 67, 69
Análisis multivariante 171, 191, 243, 258, 267
Analítica multimodal del aprendizaje 268, 269, 270, 272, 281, 288
Arquitectura de software 269, 289
Audio-mediación 194, 195, 196, 197, 198, 203, 208, 213
Autómatas 230, 231, 233, 234, 235, 236, 237, 241

B

Bacterial cellulose 58, 59, 60, 61, 62, 64, 65, 66, 68, 70, 71
Benzo(a)pireno 128, 129, 136, 143
Bienestar docente 195, 198, 208, 214, 289, 291
Biorretroalimentación 268, 269, 283, 284, 285, 286, 288

C

Calidad del servicio 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229
Caras de Chernoff 171, 175, 178, 186, 187, 190, 191, 243, 245, 262, 263, 264, 266
Cellulose nanocrystals 58, 59, 60, 61, 62, 64, 65, 66, 68, 71
Cizallamiento 32, 33, 34, 35, 36, 37, 38, 39, 40, 44, 45
Competencias socioemocionales docentes 195, 202, 213
Computación afectiva 268, 269, 270, 273, 274, 289
Conocimiento local 148
Contaminación 129, 130

D

Desarrollo sostenible 98, 113
Dificultades 56, 91, 230, 232, 233, 234, 241, 242

E

Educación en ingeniería 72, 76, 77, 81, 242
Energía hidroeléctrica 98
Energía maremotriz 114
Energía Renovable 98, 113
Entrenamiento Socioemocional Docente 268, 269, 271, 289
ERIM 46, 47, 48, 50, 51, 52, 55, 56
Escritura académica 72, 74, 76
Estadística aplicada 243
Ética del diseño tecnológico 195

F

Fiabilidad 46, 47, 50, 55, 114, 217, 220, 222, 223, 225, 226, 227, 228
Fidelidad psicológica 269, 270, 280, 283, 289
Formación investigativa 72, 74, 76, 77, 79, 96
Formulación lagrangiana 2, 4
Frequency analysis 16
Fuerza de corte 32, 33, 35, 36, 39, 41, 42, 44, 45

G

Gestión pública local 217, 219, 226

H

Huertos familiares 148, 149, 150, 152, 154, 157

I

Inteligencia artificial 72, 74, 75, 76, 77, 78, 81, 88, 89, 96, 197, 211, 212, 214, 217, 218, 219, 222, 223, 224, 225, 226, 227, 228, 229, 271, 272, 288
Inteligencia artificial generativa 72, 74, 76, 77, 89, 96, 272

K

Knowledge translation 160, 164, 165, 166

M

Marco teórico 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 87, 88, 89, 91, 92, 93, 94, 95, 96, 97, 202

Mareas 114, 115, 116, 117, 118, 122, 123, 126

Matemáticas 230, 231, 232, 233, 234, 235, 236, 237, 240, 241, 242

Mechanical systems 16

Media representation 160, 161, 163

Microturbina 98, 108, 109

Modelo dinámico 1, 2, 3, 4, 7, 14

Modelo ECOS 194, 195, 198, 204, 205, 206, 207, 209, 210, 211, 213

Modelo SEED 268, 269, 270, 284, 285, 286, 289, 290

Modelo SERVQUAL 217, 220, 222, 224

Mundo virtual 268, 269, 270, 271, 284, 288, 289

N

Non-destructive testing 16, 20

Nuclear energy communication 159, 160, 161, 164, 166, 167, 168, 169

P

Plantas alimenticias 148, 149, 151

Plantas medicinales 148, 149, 150, 151, 154, 158

Podcast educativo 194, 195, 196, 197, 198, 213

Predictive maintenance 16

Public meaning 160, 161, 163, 167, 168

R

Razonamiento estadístico 171, 173, 175, 176

Realidad virtual inmersiva 269

Rendimiento académico 171, 178, 180, 243, 257, 259, 261, 266

Reproducibilidad 171, 172, 173, 174, 175, 176, 188, 190, 191, 243

Resolución ejercicios 230

Resonancia 114, 115, 122, 123, 124, 126, 127

RMarkdown 171, 172, 175, 176, 179, 188, 189, 191

S

Science communication 160, 162, 163, 167, 168, 169, 170

Silueta 32, 185

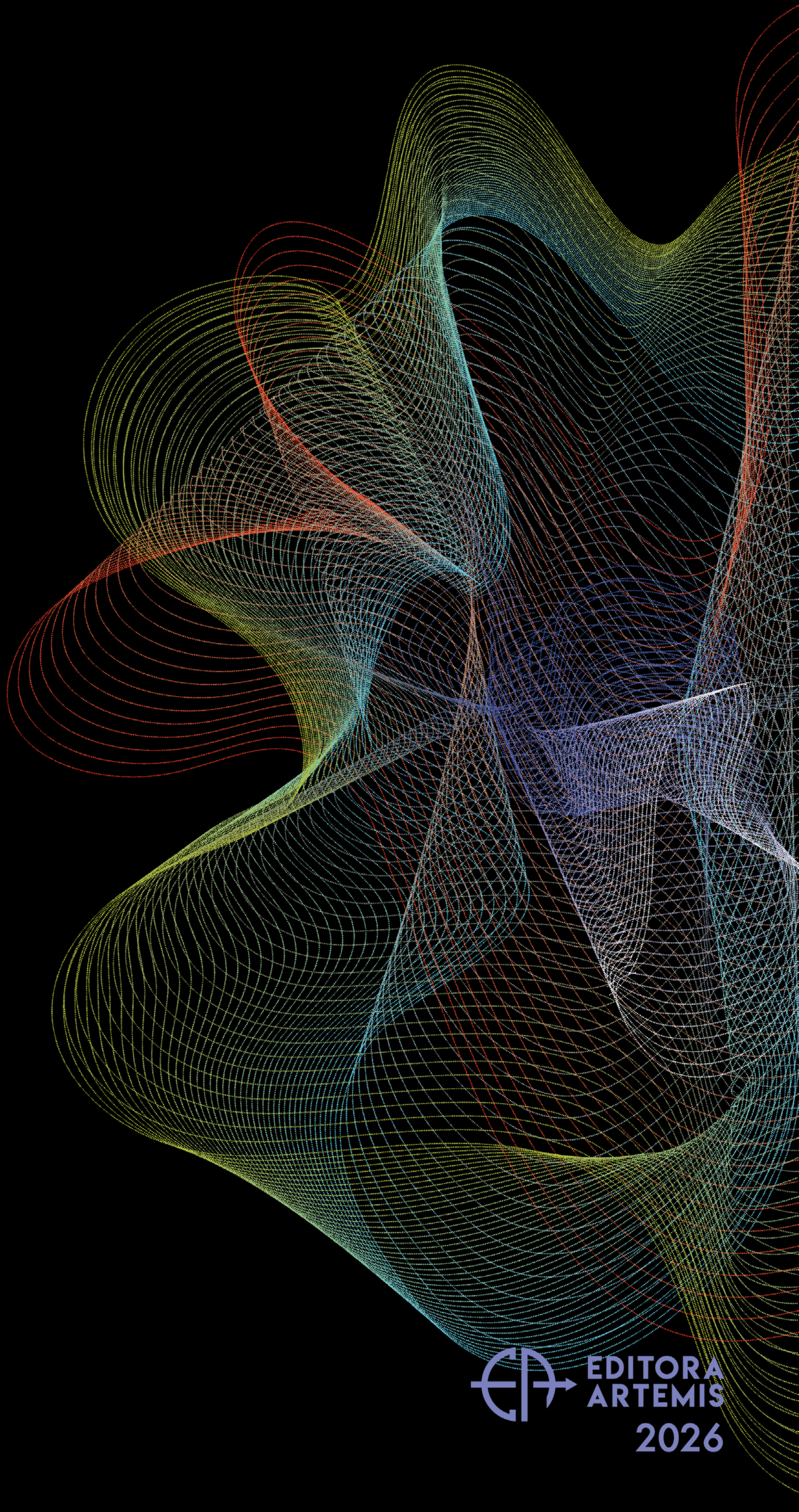
Starch 58, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71
Structural health monitoring 16

T

TPM 46, 47, 50, 51, 57
Transformación digital 217, 219, 221

V

Vibration-based identification 16
Vibration diagnostics 16, 18, 20



EDITORA
ARTEMIS
2026