

**HPS&ST PRESENTATIONS
ESERA 2021 CONFERENCE
UNIVERSITY OF MINHO, PORTUGAL
30 Aug – 3 Sept 2021**

THE ROLE OF EPISTEMIC EMOTIONS IN SCIENCE EDUCATION

Elisa Vilhunen (Finland)¹

1 - University of Helsinki

MECHANISTIC REASONING IN SCIENCE EDUCATION: PRELIMINARY FINDINGS OF A LITERATURE STUDY

Rayendra Bachtiar (Netherlands)¹; Ralph Meulenbroeks (Netherlands)¹; Wouter Joolingen (Netherlands)¹

1 - Utrecht University

INTERCULTURAL SCIENCE EDUCATION AS DIALOGUE BETWEEN KNOWLEDGE SYSTEMS: LEARNING FROM OVERLAPS AND DIFFERENCES

Charbel N. El-Hani, *Federal University of Bahia, Brazil*

COMING TOGETHER ACROSS DIFFERENCES: THE UNITING ROLE OF SOCIAL JUSTICE IN SCIENCE EDUCATION

Hagop A. Yacoubian and Christina Siry,

American University of Lebanon; University of Copenhagen, Denmark

BASIC RESEARCH ON DEVELOPING THE PANDEMIC VACCINE HAS PUT MORE THAN THE VIRUS UNDER THE MICROSCOPE

Sarit Barzilai, Senior Lecturer, Department of Learning, Instruction and Teacher Education, *University of Haifa, Israel*

Richard Duschl, Executive Director, *Southern Methodist University, USA*

Stein Dankert Kolstø, Professor of Science Education, *University of Bergen, Norway*

Maurício Pietrocola, Professor, *University of São Paulo, Brazil*

THE ROLE OF RESEARCH EXPERIENCES IN DEVELOPING PRE-SERVICE TEACHERS' EPISTEMIC BELIEFS

Liam Guilfoyle (United Kingdom)¹; Orla McCormack (Ireland)²; Sibel Erduran (United Kingdom)¹

1 - University of Oxford; 2 - University of Limerick

- RESPONSES TO ANOMALOUS DATA: THE ROLE OF DATA ORIGIN AND CONTEXT – A SYSTEMATIC REVIEW

Sabine Meister (Germany)¹; Annette Upmeyer Zu Berzen (Germany)¹

1 - Humboldt-Universität zu Berlin

EVOKING AWE: INCORPORATING EPISTEMIC EMOTIONS IN SCIENCE INSTRUCTION Kathryn

Rende (United States of America)¹; M. Gail Jones (United States of America)¹; Julianna Nieuwsma (United States of America)¹; Emma Refvem (United States of America)¹; Sarah Carrier (United States of America)¹; Cesar Delgado (United States of America)¹; Jill Grifenhagen (United States of America)¹; Kenya Gordon (United States of America)¹; Pamela Huff (United States of America)¹

1 - North Carolina State University

EXPLORING STUDENTS' EPISTEMIC EMOTIONS DURING PREDICT-OBSERVE-EXPLAIN (POE) CYCLES

Elisa Vilhunen (Finland)¹; Jari Lavonen (Finland)¹; Katariina Salmela-Aro (Finland)¹; Mei-Hung Chiu (Taiwan)²; Kalle Juuti (Finland)¹

1 - University of Helsinki; 2 - National Taiwan Normal University

GASPS AND CHILLS: TEACHERS' PERCEPTIONS OF AWE IN SCIENCE INSTRUCTION Julianna Nieuwsma (United States of America)¹; Gail Jones (United States of America)¹; Kathryn Rende (United States of America)¹; Emma Refvem (United States of America)¹; Sarah Carrier (United States of America)¹; Cesar Delgado (United States of America)¹; Jill Grifenhagen (United States of America)¹; Kenya Gordon (United States of America)¹; Pamela Huff (United States of America)¹
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UNDERSTANDING DIVERSITY OF SCIENTIFIC METHODS: THE IMPACT OF AN ONLINE INTERVENTION ON SECONDARY STUDENTS
Olga Ioannidou (United Kingdom)¹; Sibel Erduran (United Kingdom)¹; Jo-Anne Baird (United Kingdom) - *University of Oxford*

HOW DO SCIENCE TEACHERS FROM DIFFERENT CAREER STAGES PERCEIVE THE NATURE OF SCIENCE?
Busra Aksoz (Turkey)¹; Ebru Kaya (Turkey)¹; Sibel Erduran (United Kingdom)²
1 - Boğaziçi University; 2 - University of Oxford

SCIENCE TEACHERS' VIEWS AND ENACTMENTS OF SUMMATIVE ASSESSMENT OF NATURE OF SCIENCE IN THE CLASSROOM
Wonyong Park (United Kingdom)¹; Judith Hillier (United Kingdom)¹; Sibel Erduran (United Kingdom) *University of Oxford*

WONDER WILD: A PHILOSOPHICAL APPROACH TO UNDERSTANDING SOCIAL REPRESENTATIONS OF SCIENCE
Nicole Green Vella (United Kingdom) - *University of York*

EPISTEMIC REFLECTION AS AN EMERGING TEACHING PRACTICE IN CULTURALLY DIVERSE CLASSROOMS
Julio César Tovar-Gálvez (Germany) *Martin-Luther-Universität Halle-Wittenberg*

CONCEPTION OF BIODIVERSITY VALUES IN PRE-SERVICE SCIENCE TEACHERS ON A SOCIOSCIENTIFIC DISCUSSION
Larissa Nascimento (Brazil)¹; Alan Barbosa (Brazil)¹; Anne Freitas (Brazil)¹; Marcelo Motokane (Brazil)¹
1 - University of São Paulo

- UPPER SECONDARY STUDENTS ACCEPTANCE OF ANIMAL EXPERIMENTATION AND THEIR ANIMAL ETHICS ORIENTATION
Sonja Enzinger (Austria)¹; Christian Dürnberger (Austria)²
1 - University College of Teacher Education Styria; 2 - University of Veterinary Medicine, Vienna

THE EFFECTS OF A SOCIO-SCIENTIFIC DECISION-MAKING INTERVENTION ON GREEK STUDENTS' KNOWLEDGE AND ATTITUDES TOWARDS VEGETARIANISM
Maria Tsapali (United Kingdom)¹; Michelle R Ellefson (United Kingdom)¹
1 - Faculty of Education, University of Cambridge

HIGH SCHOOL BIOLOGY STUDENTS' USE OF VALUES IN THEIR MORAL ARGUMENTATION AND DECISION-MAKING
Tore Van Der Leij (Netherlands) - *University of Groningen, The Netherlands*

ACCEPTING EVOLUTION: EXAMINING INSTRUMENTS' VALIDITY ASPECTS USING UNIVERSITY STUDENTS AND CREATIONISTS
Daniela Fiedler (Germany)¹; Anna Beniermann (Germany)²; Alexandra Moormann (Germany)³
1 - Biology Education, IPN – Leibniz-Institute for Science and Mathematics Education, Kiel; 2 - Biology Education, Humboldt-Universität zu Berlin; 3 - Museum für Naturkunde - Leibniz-Institute for Research in Evolution and Biodiversity, Berlin

LINKING COGNITIVE AND MEASUREMENT FRAMEWORKS IN STUDIES OF EVOLUTION ACCEPTANCE

Gena C. Sbeglia (United States of America)¹; Ross H. Nehm (United States of America)¹
1 - Department of Ecology and Evolution, Stony Brook University, Stony Brook, NY

MEASURING ACCEPTANCE OF EVOLUTION IN EUROPE: FOCUS ON EVOLUTIONARY EPISTEMOLOGY

Anna Beniermann (Germany)¹; Paul Kuschmierz (Germany)²; Dittmar Graf (Germany)³
1 - Biology Education, Humboldt-Universität zu Berlin; 2 - Institute for Didactics of Biology, Justus Liebig University Giessen; 3 - Institute for Didactics of Biology, Justus Liebig University Giessen, Giessen

FROM 'BLUNT MEASURES' TO SOCIAL PROJECTION: A NOVEL METHOD FOR EXPLORING SOCIAL ATTITUDES TO EVOLUTION

James Riley (United Kingdom)¹; Will Mason-Wilkes (United Kingdom)¹; Fern M. Elsdon-Baker (United Kingdom) - *Science, Knowledge and Belief in Society Research Group, University of Birmingham*

ACCEPTING EVOLUTION: EXAMINING INSTRUMENTS' VALIDITY ASPECTS USING UNIVERSITY STUDENTS AND CREATIONISTS

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1 - Biology Education, IPN – Leibniz-Institute for Science and Mathematics Education, Kiel; 2 - Biology Education, Humboldt-Universität zu Berlin; 3 - Museum für Naturkunde - Leibniz-Institute for Research in Evolution and Biodiversity, Berlin

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THE RELATIONSHIP BETWEEN SCIENCE AND TECHNOLOGY EDUCATION IN THE NINETEENTH CENTURY

Tetsuo Isozaki (Japan)¹; Takako Isozaki (Japan)²
1 - Graduate School of Humanities and Social Sciences, Hiroshima University;

SECONDARY SCHOOL STUDENTS' TELEOLOGY AND ESSENTIALISM CONCEPTIONS ABOUT GENES

Florian Stern (Switzerland)¹; Kostas Kampourakis (Switzerland)¹; Andreas Müller (Switzerland)¹
1 - University of Geneva

SHIFTS IN STUDENTS' EXPLANATION TYPES AFTER EVOLUTION INSTRUCTION: IMPLICATIONS FOR ADDRESSING TELEOLOGY

Ross Nehm (United States of America)¹; Gena Sbeglia (United States of America)¹
1 - Stony Brook University (SUNY)

PERSONIFYING PLANTS CREATES INTEREST, BUT REINFORCES THE TELEOLOGICAL IDEA THAT EVOLUTION IS DRIVEN BY AIMS

Marcus Hammann (Germany)¹; Kathrin Schründer (Germany) - *Münster University*

DIAGNOSING TELEOLOGICAL MISCONCEPTIONS: CAPTURING DECLARATIVE AND PROCEDURAL PEDAGOGICAL CONTENT KNOWLEDGE OF BIOLOGY PRE-SERVICE TEACHERS

Julian Fischer (Germany)¹; Ute Harms (Germany)

ARGUMENTATION AND INTELLECTUAL HUMILITY IN SECONDARY SCIENCE STUDENTS' DISCUSSIONS

Hayden Godfrey (United Kingdom)¹; Dr Sibel Erduran (United Kingdom) *Oxford University*

THE RELATIONSHIP BETWEEN EPISTEMOLOGICAL BELIEFS AND MOTIVATION TO LEARN SCIENCE AMONG SIXTH GRADERS

Márió Tibor Nagy (Hungary)^{1,2}; Erzsébet Korom (Hungary)^{2,3}; Gábor Z. Orosz (Hungary)^{1,2}
1 - Doctoral School of Education, University of Szeged, Hungary; 2 - MTA-SZTE Science Education Research Group; 3 - Institute of Education, University of Szeged, Hungary

WHICH NOSI VIEWS AND EPISTEMIC BELIEFS ARE THE BEST PREDICTORS OF SCIENTIFIC REASONING COMPETENCIES?

Stefanie Lenzer (Germany)¹; Peter Edelsbrunner (Switzerland)²; Andreas Nehring (Germany)¹
1 - Leibniz University Hannover, Institute for Science Education; 2 - ETH Zürich, Department of Humanities, Social and Political Sciences

THE RELATIONSHIP BETWEEN STUDENTS' UNDERSTANDING OF NATURE OF SCIENCE AND THEIR METACOGNITIVE AWARENESS

Dilara Goren (Turkey)¹; Ebru Kaya (Turkey) - *Bogazici University*

THE NARRATIVE FRAMEWORK APPLIED TO EVOLUTION LEARNING: EPISTEMOLOGICAL AND DIDACTIC IMPLICATIONS

Jörg Zabel (Germany)¹; Catherine Bruguière (France)²; Fabienne Paulin (France)²; Julia Zdunek (Germany) *1 - Institut für Biologie, Biologiedidaktik, Universität Leipzig; 2 - Sciences, Société, Historicité, Éducation et Pratiques (EA 4148) Université Claude Bernard Lyon 1, France*

TOWARDS A HOLISTIC RESEARCH-BASED MODEL OF FACTORS AFFECTING ACCEPTANCE OF EVOLUTIONARY THEORY

Martie Sanders (South Africa) - *University of the Witwatersrand, Johannesburg*

RELATIONSHIPS BETWEEN EPISTEMOLOGICAL BELIEFS AND TRUST IN SCIENCE AMONG AMERICAN BIOLOGY MAJORS

Lisa Borgerding (United States of America)¹; Bridget Mulvey (United States of America)¹; Gregory Tinkler (United States of America)¹ - *Kent State University*

DEVELOPMENT OF PROCEDURAL KNOWLEDGE AND EXPERIMENTATION SKILLS IN SECONDARY EDUCATION

Athanasios Taramopoulos (Greece)¹; Dimitrios Psillos (Greece)²
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STORYTELLING TO INTEGRATE STEAM AND SECOND LANGUAGE LEARNING: THE SELFIE MODEL

Suzanne Gatt (Malta)¹; Charmain Bonello (Malta)¹; Rosienne Farrugia (Malta)²; Ileana Maria Greco (Spain)³; Esther Sanz De La Cal (Spain)³
1 - University of Malta; 2 - University of Malta; 3 - Universidad de Burgos

THE DEVELOPMENT OF AN INVESTIGABLE QUESTION FORMULATION TECHNIQUE (IQFT) IN INQUIRY-BASED SCIENCE EDUCATION (IBSE)

Norsyazwani Muhamad Dah (Malaysia)¹; Mohd Syafiq Aiman Mat Noor (United Kingdom)²
1 - Sekolah Menengah Agama Repah; 2 - University College London

UNDER-REPRESENTED NATURE OF SCIENCE IN THE CHINESE SCIENCE TEXTBOOKS

Xiaomei Yan (China) - *Shanghai Jiaotong University*

NORM LEDERMAN: A CONSTANT TRAVELER SUPPORTING SCIENCE EDUCATION RESEARCH

David Treagust (Australia) - *Curtin University*

THE CONTRIBUTION OF NORMAN G. LEDERMAN TO SWEDISH SCIENCE EDUCATION

Per-Olof Wickman (Sweden) - *Stockholm University*

NORMAN G. LEDERMAN: A LASTING LEGACY IN AFRICA

Meshach Oggunniyi (South Africa) - *University of the Western Cape*

THE MANY PHD STUDENTS MENTORED BY NORMAN LEDERMAN

Knut Neumann (Germany)¹; Irene Neumann (Germany) - *Leibniz-Institute for Science Education*

THE CONCEPTUALIZATION OF CRITICAL THINKING IN SCIENCE AND ENGINEERING COURSES

Carmella Shahab (Israel)¹; Miri Barak (Israel) - *The Technion - Israel Institute of Technology*

DISCIPLINING BODIES AND IMAGINARIES: TOWARDS CRITICAL PERSPECTIVES ON NATURE OF TECHNOLOGICAL SCIENCE

Sarah El Halwany (Canada)¹; Majd Zouda (Canada)¹; Nurul Hassan (Canada)¹; Minja Milanovic (Canada)¹; Jasmine Yeung (Canada)¹; Larry Bencze (Canada) - *University of Toronto*

NATURE OF SCIENCE AND CRITICAL THINKING SKILLS: AN EMPIRICAL ANALYSIS OF THEIR RELATIONSHIPS

María-Antonia Manassero-Mas (Spain)¹; Ángel Vázquez Alonso (Spain) - *University of the Balearic Islands*

KNOWING THROUGH MAKING - SOME CONTRIBUTIONS FROM THE PHILOSOPHY OF CHEMISTRY TO CHEMICAL EDUCATION

Flavio Tajima Barbosa (Brazil)¹; Joanez Aparecida Aires (Brazil) *Universidade Federal do Paraná (UFPR)*

RELATING SCIENCE COMMUNICATION TO NATURE OF SCIENCE

Rosária Justi (Brazil)¹; Monique Santos (Brazil)¹; Gustavo Elyseu (Brazil) - *Universidade Federal de Minas Gerais*

MODELING AND REPRESENTING CONCEPTUAL CHANGE IN THE TRANSITION FROM CLASSICAL TO QUANTUM MECHANICS

Giacomo Zuccarini (Italy)¹; Massimiliano Malgieri (Italy) - *University of Pavia*

USE OF MODELS IN PHYSICS LESSONS FROM PERSPECTIVES TOWARDS MODELS IN PHILOSOPHY OF SCIENCE

Ketan Dandare (United Kingdom) *UCL Institute Of Education*

DEBATES AND REFLECTIVE ACTIVITIES TO DEVELOP STUDENTS' ARGUMENTATION ON SOCIO-SCIENTIFIC ISSUES

Manuel Bächtold (France)¹; Gabriel Pallarès (France)¹; Kévin De Checchi (France)¹; Valérie Munier (France) - *University of Montpellier*

ON THE WAY TO EVIDENCE-BASED REASONING OF SOCIO-SCIENTIFIC ISSUES IN SCIENCE TEACHER EDUCATION

Tom Konrad Anton (Germany)¹; Christiane S. Reiners (Germany)¹
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REASONING STRUCTURES ON SOCIO-SCIENTIFIC ISSUES: DEVELOPING A CATEGORY SYSTEM Laurens Mecklenburg (Germany)¹; Beniermann Anna (Germany)¹; Upmeier Zu Belzen Annette (Germany) - *Biology Education, Humboldt-Universität zu Berlin*

INTRODUCING NATURE OF SCIENCE IN EARLY CHILDHOOD EDUCATION: RESULTS FROM A PROJECT IN COLLABORATION WITH TEACHERS

Lena Hansson (Sweden)¹; Lotta Leden (Sweden)¹; Suzanne Thulin (Sweden) *Kristianstad University, Sweden*

NOS FOR YOUNG CHILDREN

Fanny Seroglou (Greece) - *Aristotle University of Thessaloniki*

BUSH KINDERS: PEDAGOGICALLY PROMOTING THE NATURE OF SCIENCE

Coral Cambell (Australia)¹; Christopher Speldewinde (Australia) - *Deakin University, Australia*

MAKING ELEMENTS OF SCIENTIFICITY EXPLICIT FOR KINDERGARTEN TEACHERS

Estelle Blanquet (France)¹; Eric Picholle (France)²
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EPISTEMOLOGICAL BELIEFS ON IDEALISATIONS IN SCIENCE TEACHING - CONSTRUCTION AND VALIDATION OF A QUESTIONNAIRE

Jan Winkelmann (Germany) - *University of Education Schwäbisch Gmünd*

VACCINE HESITANCY: A ROLE FOR THE HISTORY AND PHILOSOPHY OF SCIENCE IN SCIENCE EDUCATION.

Michael Reiss (United Kingdom), *University College, London*

ORGANISMS: WHY AND WHAT TO LEARN ABOUT THEM.

Charbel El-Hani (Brazil) – *Federal University of Bahia*

HISTORY AND PHILOSOPHY IN BIOLOGY: THE CASE OF LEARNING ABOUT TRANSPIRATION.

Thomas McLoughlin (United Kingdom) – *Dublin City University*

ARISTOTLE`S WAYS TO STUDY ANIMALS: A HISTORICAL CASE STUDY TO TEACH HOW TO OBSERVE LIVING BEINGS.

Maria Elice de Brzezinski Prestes (Brazil) – *University of São Paulo*