

- 1. Learning Science: Conceptual Understanding**
Theories, models, and empirical results on conceptual understanding, conceptual change and development of competences; methodology for investigating students' processes of concept formation and concept use; strategies to promote conceptual development.
- 2. Learning Science: Cognitive, Affective, and Social Aspects**
Cognitive, affective, and social dimensions in learning science. Design of in-school and extra school learning environments and study of teaching/learning processes. Representational languages and knowledge organisation. Collaborative construction of knowledge.
- 3. Science Teaching Processes**
Relations between teaching practices and students' cognitive and affective development, design of teaching interventions. Research based intervention and its role for curriculum planning, instructional paths and learning outcomes. Laboratory-based practice. Video studies in science education.
- 4. Digital Resources for Science Teaching and Learning**
Design, evaluation and characterization of resources and environments for teaching/learning science: ICT and TEL in science education. Online learning environments, simulation and modelling tools, virtual laboratories. Self-regulation, reflection and collaboration in digital learning environments.
- 5. Teaching-Learning Sequences as Innovations for Science Teaching and Learning**
Design of teaching and learning materials. Classroom implementation, refinement and evaluation of teaching sequences. Exchange and adaptation of teaching-learning sequences. Adoption and transformation of teaching materials. Factors that influence teacher ownership.
- 6. Nature of Science: History, Philosophy and Sociology of Science**
The implications of nature of science, its history, philosophy, sociology and epistemology, for science education. The significance of models and modelling for science education as reflected in the particular importance attached to the use of metaphors, analogy, visualization, simulations and animations in science.
- 7. Discourse and Argumentation in Science Education**
Understanding, supporting and promoting use of evidence and argumentation discourse in science education. Scientific practices related to knowledge evaluation and communication.
Supporting the development of critical thinking. Discourse analysis. Talking and writing science in the classroom. Meaning making in science classrooms.
- 8. Scientific Literacy and Socio-scientific Issues**
Teaching about scientific literacy, science and citizenship education, science and media education, information literacy, informal reasoning and critical thinking, decision making, debates on socio-scientific issues (SSI), discourse communities, social dimension of science and techno-scientific practices, public engagement in science, schools', students' and teachers' engagement in socio-scientific issues.
- 9. Environmental, Health and Outdoor Science Education**
Ecological and Environmental Education, Education for Sustainable Development, environmental health, health education and health promotion. Lifestyles and attitudes

towards health and the environment. Developing and evaluating the impact of programmes and experiences outside classrooms, including those organized by institutions other than schools.

10. Science Curriculum and Educational Policy

Curriculum development. Reform implementation, dissemination and evaluation. International comparison studies such as TIMSS and PISA. Evaluation of schools and institutions. Policy and Practice issues: local, regional, national, or international issues of policy related to science education.

11. Evaluation and Assessment of Student Learning and Development

Development, validation and use of standardized tests, achievement tests, high stakes tests, and instruments for measuring attitudes, interests, beliefs, self-efficacy, science process skills, conceptual understandings, etc.; authentic assessment, formative assessment, summative assessment; approaches to assessment. Monitoring student learning and implications for teaching.

12. Cultural, Social and Gender Issues in Science and Technology Education

Equity and diversity issues: Sociocultural, multicultural, bilingual, racial/ethnic, gender equity studies and science education for the special needs.

13. Pre-service Science Teacher Education

Professional knowledge of teachers, pre-service teacher preparation, instructional methods in pre-service teacher education, programs and policy, field experience, relation of theory with practice, and issues related to pre-service teacher education reform.

14. In-service Science Teacher Education, Continued Professional Development

In-service science teacher education, teachers as lifelong learners; methods, innovation and reform in professional development; evaluation of professional development practices, reflective practice, teachers as researchers, and action research.

15. Early Years Science Education

Emergent science, science pedagogy and learning in the early years, cognitive resources for science learning, early years science and technology curriculum, innovative teaching practices in the early years, children's learning, preschool science, early years teacher education in science.

16. Science in the Primary School

Procedural skills in science, science investigations, science teaching and learning sequences.

17. Science Teaching at the University Level

University pedagogy. Teaching and learning at the university level.

18. Methodological Issues in Science Education Research

Aspects of epistemology, ontology and axiology.