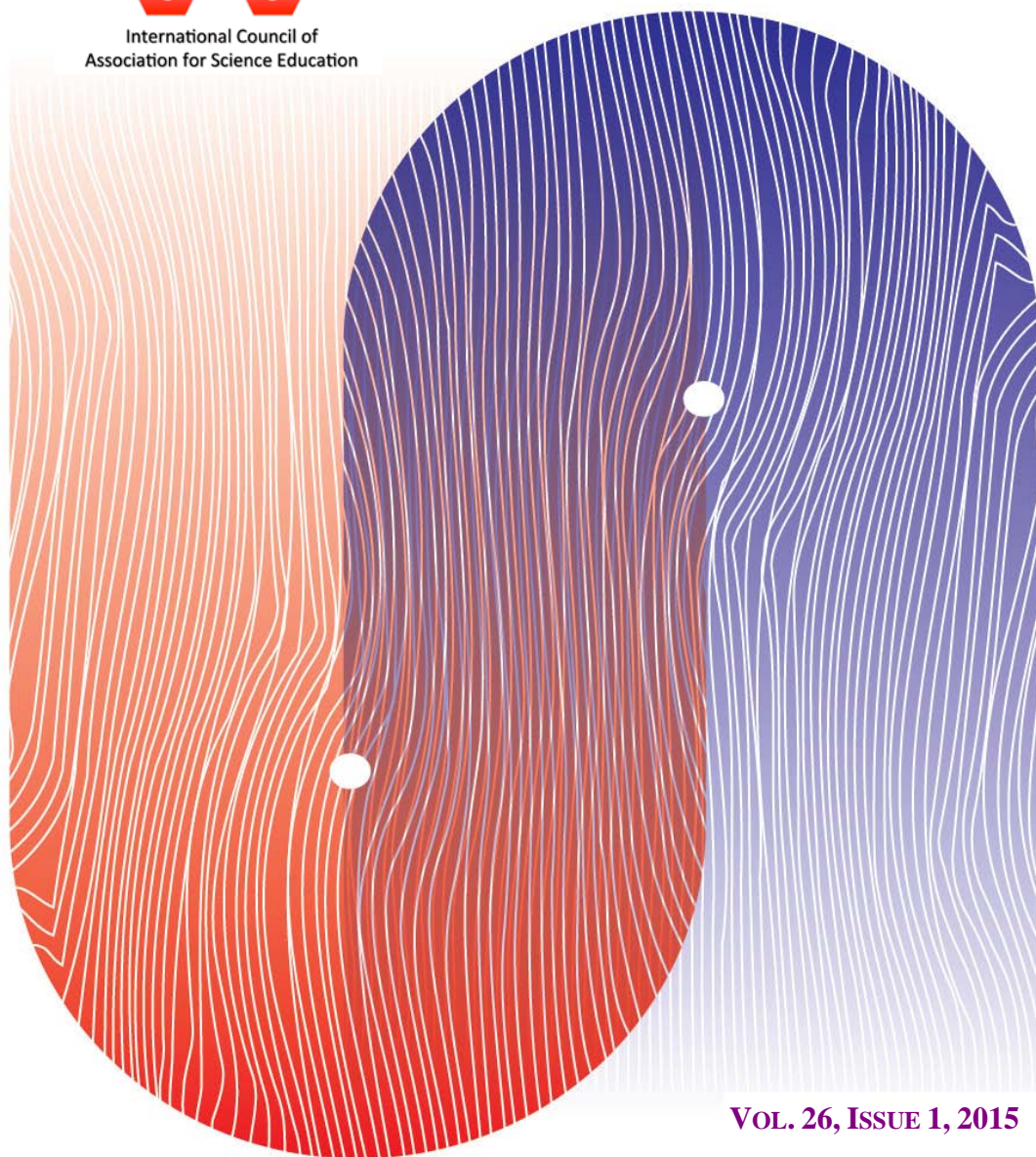


SCIENCE EDUCATION INTERNATIONAL



International Council of
Association for Science Education



VOL. 26, ISSUE 1, 2015

SCIENCE EDUCATION INTERNATIONAL

Year 2015
Volume 26, Issue 1

Jack Holbrook
Editor

ISSN: 2077-2327

Science Education International (SEI) is published by International Council of
Associations for Science Education (ICASE).



International Council of
Association for Science Education

Editor: Jack Holbrook, *Estonia*

Assistant editor: Yasemin Ozdem Yilmaz, *Turkey*

Kader Bilican, *Turkey*

Editorial Board:

Ben Akpan, *Nigeria*

Beverley Cooper, *New Zealand*

Bulent Cavas, *Turkey*

Christiane Gioppo, *Brazil*

Christine McDonald, *Australia*

Declan Kennedy, *Ireland*

Elaine Horne, *Australia*

Jack Holbrook, *Estonia*

Janchai Yingprayoon, *Thailand*

James Kaufman, *USA*

Michael Padilla, *USA*

Miia Rannikmae, *Estonia*

Mamman Wasugu, *Nigeria*

Norman Lederman, *USA*

Steven Sexton, *New Zealand*

Teresa J. Kennedy, *USA*

SCIENCE EDUCATION INTERNATIONAL

Volume 26, Issue 1, 2015

Table of Contents

Editorial <i>Jack Holbrook</i>	1
Personal Beliefs as Key Drivers in Identifying and Solving Seminal Problems: Lessons from Faraday, Maxwell, Kepler and Newton <i>I. S. Caleon, Ma. G. Lopez Wui, Ma. H. P. Regaya</i>	3
Examination of Science Learning Equity through Argumentation and Traditional Instruction noting differences in socio-economic status <i>O. Acar</i>	24
Ensuring New Zealand's future prosperity: A Professional Learning Development initiative to bridge the gap between theory and practice <i>I. Kennedy, P. Smith, S. S. Sexton</i>	42
The Effect of POGIL on Academic Performance and Academic Confidence <i>S. De Gale, L. N. Boisselle</i>	56
Identifying Estonian Stakeholder Views as the Bases for Designing Science Teachers' in-Service Course which Support Promotion of Competence Based Curriculum Goals <i>A.Lauis, A. Post, M.Rannikmae</i>	62
Science Teacher Candidates' Attitudes towards Distance Education <i>T. Kisla</i>	72
Investigating the Relationship between Pre-Service Teachers' Scientific Literacy, Environmental Literacy and Life-Long Learning Tendency <i>D. Saribas</i>	80

Editorial

J.HOLBROOK

Welcome to the March 2015 issue of *Science Education International* (SEI). This issue consists of 5 articles, coming from New Zealand, Singapore, Turkey (2) and the West Indies.

The first article is unusual as it explores the impact of religion on the work of 4 famous scientists - namely Maxwell, Faraday, Kepler and Newton. Recognising the value of the inclusion of history of science in the school curricula, this paper provides an enlightening resource for teaching related to 4 prominent scientists and the manner in which their beliefs provided insights into their problem solving approach from both religious and philosophical perspectives. Through an analysis of the key seminal works by these eminent scientists the article discusses the evidence that rationality and religion need not necessarily lie on opposite fences and suggest both can serve as useful resources to facilitate the fruition of notable scientific discoveries.

The second article explores the effectiveness of two approaches to science teaching by compared student scientific reasoning and conceptual knowledge through short-term, argumentation-based and traditional instruction, taught in school regions with low and high socio-economic status. By means of validated instruments, the concrete and formal reasoning students' scientific reasoning and conceptual knowledge were also compared. According to the results, students who received argumentation-based instruction developed their scientific reasoning and gaps between formal and concrete reasoning students, who received argumentation-based instruction, became less pronounced.

The third article draws attention to an approach to professional learning development undertaken by the Sir Paul Callaghan Science Academy in New Zealand. The programmes are designed to provide teachers of primary and intermediate students (aged 5 to 13) with the knowledge, materials and support needed for enactment of the New Zealand Curriculum, promoting relevance, useful and meaningful classroom practices. Based on findings from two years of operation, this article reports on surveys undertaken with participating teachers after their learning experiences, which investigate the classroom impact of the programmes ran by the Academy. After the Academy's first two years, results indicate that The Academy has shown how relevant, useful and

meaningful education through science can impact on both individual classroom teacher's practice and entire school programmes.

The fourth article uses an action research approach to address the difficulty in teaching organic chemistry. Initially it introduces POGIL (Process Oriented Guided Inquiry Learning) as a learning technique that employs guided inquiry within a cyclic system of exploration, concept invention and application. Data is gathered on students' academic performance and the effect of POGIL on their academic confidence. While academic performance was measured using summative assessment at the end of the study, academic confidence was measured using a pre- and post- test questionnaire. Tests of significance indicated an improved level of academic confidence among the students involved. This study further intends to serve as a platform for the use of more student-centred pedagogies in organic chemistry teaching.

The fifth article compares students' needs, expressed through stakeholder expectations, with the current learning situation of gymnasium graduates.

The sixth article examine science teacher candidates' attitudes towards Distance Education (DE), based on selected independent variables (i.e., gender, major, time spent on the Internet, computer experience, participation in DE).

The last article investigates links between scientific literacy, environmental literacy and a tendency to appreciate life-long learning by using 3 validated instruments with pre-service teachers. The paper suggest that a correlation should exist between these attributes for teachers. The findings show that most students did not score highly on the tests but that scientific literacy indications correlated with four dimensions of environmental literacy, identified as environmental knowledge; environmental attitudes; perception of environmental uses, and environmental concern and to some extent with a tendency towards recognising the need for life-long learning.