SCIENCE EDUCATION INTERNATIONAL

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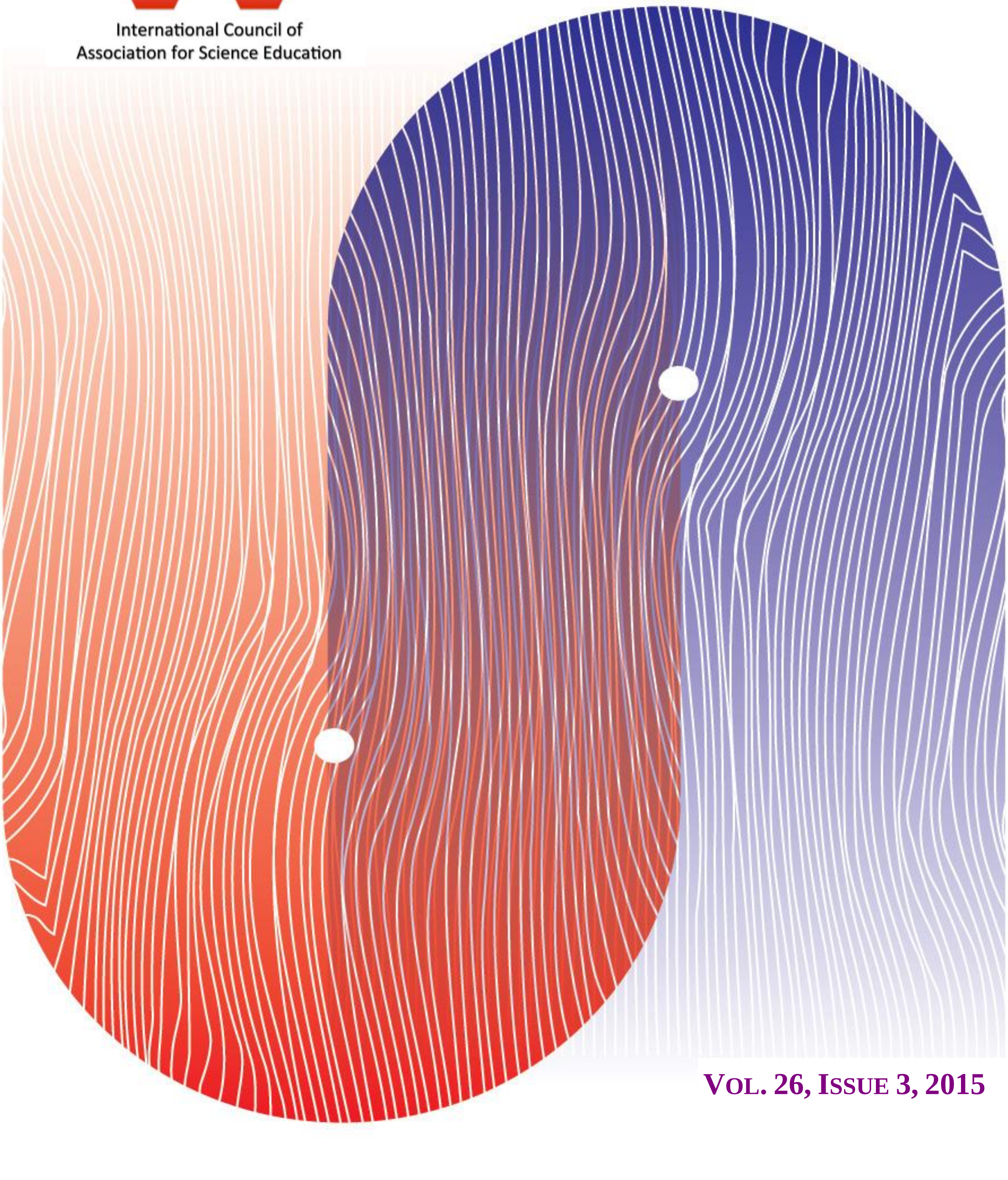

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Editorial

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The third issue of the SEI journal for 2015 comprises 8 articles from Estonia, Greece, Turkey, Singapore, USA, Portugal, and Thailand focusing on secondary and primary science, or environmental education. The diversity of papers from different countries promotes a range of theoretical and practical perspectives.

The 1st paper addresses a concern related to learning through science at the upper secondary level in Estonian schools. Concentrating on data collected using a test instrument constructed on SOLO taxonomy, the study recognized that while there were gains in scientific knowledge, there was scant progress in giving scientific explanations, problem solving and justified decision- making. The main outcomes showed that despite two years of schooling, grade 10 and 11 students exhibited little effect size gains in components of scientific literacy. It suggest that science learning at the upper school level is very much subject driven and has little emphasis on attribute seen as important in today's society – these being responsible citizenship and employability skills. Certainly, the poor attention to developing problem-solving skills and making justified decisions in a socio-scientific context are matters of concern. And this is in a country where PISA outcomes for 15 year old students are, in general, well above the OECD average. One recommendations from the study is that there is a need to focus more on learning progression in operational scientific skills development. This can support the situation where more students are capable to solve scientific problems in their lives and make reasoned decisions in everyday life situations.

The 2nd paper explores Greek students' logic, convergent and divergent thinking associated with chemical phenomena through structural equation modelling (SEM). It is claimed that the theoretical analysis and interpretation of the results contributed significantly to an understanding about the role of individual differences in learning secondary school chemistry. Also SEM analysis supports the hypothesis that a sufficient level of logical thinking is necessary for students to understand the nature of matter and chemical changes. Implications from the study suggest science teachers need to realize that learning difficulties in understanding chemical phenomena may originate from individual differences, and that the various cognitive styles, which determine the way a student approaches a learning task, suggest different learning strategies study demonstrates the usefulness of SEM modelling in assessing and explaining students' achievements in science education research.

In Paper 3, Tang from Singapore aims to set the issues of literacy in science education in a broader context and presents a model that synthesizes various research areas in New Literacies for the development of new pedagogy and classroom practices in the nexus of literacy and science education. While ICASE and Science Education International have promoted STL (Scientific and

Technological Literacy) in terms of widening the learning in science lessons to encompass cognitive, personal and social competences, including language, this study brings a New Literacies focus for science learning through three phases: harnessing youth cultural practices, scaffolding multimodal practices, and hybridizing a third space. It is claimed that in this confluence, the science classroom becomes an increasingly important research site for diverse ideas to be hybridized, studied, tested, debated, and revised. It is further claimed that the use of the science classroom as a research site can also benefit researchers interested in New Literacies due to the unique conditions that academic science presents. In this, preparing for this new age is not simply about the de-contextualized ability to use technologies, but more about adapting to the changing economic, social, and cultural practices made possible by technologies in the new era.

The 4th paper explores the difficulties Turkish students experience in studying physics topics, in this case, optics. The study aims to determine students' conceptual understanding levels relating to lenses in geometric optics using a cross-sectional design, involving primary, secondary and higher education levels. The results show that students from all groups lack knowledge and experience conceptual problems about lenses, although they learn this topic in school. The study shows that there are significant similarities between students' learning at different levels. It is worrisome that the group who are going to become future physics teachers still have conceptual problems with image formation and functions of convex and concave lenses.

The 5th paper explores the perceived effectiveness of instructional activities by teachers in Turkish primary science classrooms compared to observe student-centred and teacher centred activities. Findings derived from video recordings compared to teacher questionnaire results suggest that the teachers primarily use teacher-centred instruction, but that they misidentify almost half the teacher-centred activities as student-centred activities and indicate these activities are more effective. Teachers who were more aware of student-centred activities spent less time on teacher-centred activities, However, teachers who suggest they find teacher-centred activities more effective di in reality tend to spend more time on teacher-centred activities. The findings address instructional design in classroom in general instead of simply the instructional design of science class activities and it may be interesting to see how science lessons compare to the teaching and learning in other subjects.

Paper 6, undertaken as part of the Policy Research Initiative in Science Education (PRISE) project at the state of Texas in the US, recognises that science teachers' job satisfaction is identified as a major factor that affects the quality of science programmes. The study examines the relationships between the schools' curriculum support, the number of science teachers, and the levels of their job satisfaction. Findings suggest teachers' job satisfaction is not related to the number of science teachers and school size. However, this result shows that the levels of curriculum materials support to science teachers are related to school size and that teachers working in large schools indicated that they are more satisfied with their jobs than those working in smaller ones. It indicates that the schools' curriculum materials or extracurricular support for teachers play a significant role in relation to their job satisfaction. This result supports the findings of previous studies that a school's supportive environment is an important factor that relate to teachers' job satisfaction, The study suggests four things to increase science teachers' job satisfaction and their retention rates in Texas. 1. Provide more curriculum materials or extracurricular activities; 2. Build cooperative relationships among all teachers and parents to increase new teachers' job satisfaction; 3. Provide more professional development opportunities; 4. Reduce factors like unpaid hours of work on grading testing and evaluation standards, cultural differences, and communication with parents. [Again, this paper does tell the characteristics of science in relation to its questions and answers.]

The study in article 7 is carried out with rural school students in a remote area of Thailand, where teaching approaches are problematic and students gain little experience of science from school. Based on this situation, the purpose of this research is to study primary science students' conceptual development as it relates to their understanding of materials and their properties: in particular, to determine how and why some students change their concepts while others do not. The results show the influence of instructional activities that challenge students' preconceptions and encouraged students' conceptual change, indicating the effects of affective, social, and language factors on students' conceptual development. Interestingly the paper describes an issue regarding the differences between the meanings of scientific terms as presented in the central Thai language textbooks and the meaning of the same words in the local dialect. A further area of interest identified in the preliminary survey is that most students do not pay attention to certain materials' properties. For example, most students understand "hardness," but they do not realize that this property is important when choosing material for a task. The implications of this study indicate that it is important for science teachers to be concerned with affective and social factors when developing learning strategies to facilitate conceptual change. This is especially important when teaching materials are used cross-culturally.

Article 8 reflects on the effectiveness of the world's largest environmental education program- Eco Schools and whether the spread of these are appropriate without more attention to determining their effectiveness. The paper indicates that the main goal of environmental education is to improve environmental literacy, including not just more knowledge but also a better attitude toward the environment and a higher prevalence of pro-environmental behaviours. Results show that environmental literacy among 9th grade Eco-School students from Madeira Island, Portugal is not significantly higher than from ordinary schools in the region. This suggests that the Eco-School Program is not really a better environmental education strategy than other strategies adopted in ordinary schools according to this study in Portugal.