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SPECIAL ISSUE ON SCIENTIFIC LITERACY
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Exploring International Perspectives of Scientific Literacy: An Overview of the Special Issue

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Scientific literacy has become something of a catch cry in science education circles worldwide. The nature of scientific literacy and how scientific literacy is developed and enacted in classrooms is explored in this special issue. An overview of the papers presented in this special issue suggests that many authors struggle to clearly define scientific literacy, and that its use in science education is muddled. We argue here that educators and curriculum developers first need to contextualize the notion of scientific literacy in their own particular educational setting before considering how it might advance science education.

Key Words: Scientific literacy, international experiences, social context.

Introduction

Many authors worldwide argue that a key goal of science education is scientific literacy (see, e.g., Laugksch, 1991). The usual reason proffered is the increasing impact of science and technology on everyday life. Science now impacts on virtually every citizen in some way and many scientific issues are now highly political in nature (Gauld, 2005). Examples include debates over the fluoridation of municipal water, vaccination programs, and the production and consumption of GM or GE foodstuffs (Coll & Taylor, 2008).

There have been numerous publications in the science education literature reporting on a variety of aspects of scientific literacy. It seems that many authors feel that their education systems are not producing scientifically literate citizens, and comment that alternative, non-scientific beliefs - including superstitious and 'new age' beliefs, are highly prevalent (Preece & Baxter, 2000; Yates & Chandler, 2000). This led Matthews (1998) to observe that years of science education seems to have 'washed over' students in our education systems.

The editors of this special issue put a proposal to the IJESE editorial board that the *journal* should explore the notion of scientific literacy internationally. This special issue thus attempts to develop an understanding of the current issues to do with scientific literacy in a variety of educational contexts. The proposal thus was to prepare a special issue of the Interna-

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tional Journal of Environmental and Science Education dedicated to scientific literacy, with authors from a variety of educational contexts who would present a synopsis of scientific literacy in their setting. A suggested format/structure for each contribution was:

- How is scientific literacy conceptualized in your setting?
- How does scientific literacy feature in formal curriculum documents, in the implemented curriculum, and in the student-experienced curriculum?
- What pedagogies are employed to present scientific literacy?
- What is the current status re scientific literacy in terms of educational outcomes in your setting?

The special issue begins with **Dillon** exploring notions of scientific literacy, arguing that uncritical use of the term scientific literacy masks the existence of deep-seated philosophical clashes that hinder the reform of science education worldwide. He goes on to suggest we need to think in terms of plurality in our understating of scientific literacy, which can be seen as threefold in nature; practical, civic, and cultural scientific literacy. Dillon concludes that by breaking down scientific literacy into 'bite-sized chunks' we might find ways to organize the curriculum to meet the needs of different students throughout their time in and out of school.

Haight and González-Espada provide an interesting insight into scientific literacy in an economically and socially depressed rural sector of the USA. They describe how research sought to link notions of scientific literacy to local contextual issues, and linked together content knowledge from biology, chemistry, geology, physical science, social studies and practical living, and mathematics.

Marks and Eilks describe how a sociocritical and problem-oriented approach to chemistry teaching is employed in Germany. The use of controversial issues seeks to promote reflection on scientific questions within the framework of their socioeconomic, and ecological consequences.

Preczewski et al. explore differences in scientific literacy between German and USA secondary school students, reporting on their conceptions of scientific interactions in everyday life and their ideas about scientific literacy. Common themes emerge, but interestingly German students mention practicing science in 'nature', in contrast to their American counterparts.

Baker et al. describe the *Communication in Science Inquiry Project*, which aims to enhance scientific literacy through classroom discourse. The project attempts to broaden teachers' understanding of the nature of science, beyond the need for evidence to support claims, and delves into how arguments using evidence and claims are actually constructed. The authors argue that helping students to craft scientific arguments is an essential component of scientific literacy.

Holbrook and Rannikmae attempt to distill out scientific literacy as to whether emphasis is placed on the *science* or the *literacy* aspect. Here the authors reject the view that scientific literacy is related to an emphasis on acquisition of science content, and argue that emphasis should be placed on an appreciation of the nature of science, the development of personal attributes, and socioscientific skills and values. A key component of scientific literacy, in their view, is relevance, and relevance is very much geared to the view that scientific literacy is best taught by seeing science education as 'education through science', rather than 'science through education'.

Dani considers aspects of scientific literacy as framed by the work of BouJaoude, and the purpose for teaching science as conceptualized by science teachers in Lebanon. She argues

that purposes for teaching science act as filters for what are deemed acceptable learning and teaching activities. These teachers' purposes for teaching science correspond with 'the knowledge of science', 'the interaction of science, technology and society', and 'the investigative nature of science', but do not address 'science as a way of knowing'.

Liu seeks to move beyond scientific literacy, to consider science and the public. This is examined first by considering definitions of scientific literacy and the status of scientific literacy in the US, before arguing for a conceptualization of scientific literacy based on life-long participation in science. This, it is argue necessitates two new approaches to achieving a 'new' scientific literacy; namely, bridging formal and informal science education, and training science and public educators through graduate programs in 'science and the public'.

Webb reports on ways to integrate learning strategies in order to promote scientific literacy in South Africa. The approach includes classroom discussion, argumentation and writing strategies to learn science, and seeks to stimulate learners to develop their own investigable questions, plan and execute investigations, and present their findings. The focus here is on the literacy aspect of scientific literacy, and Webb argues that other issues of 'social capital' such as Yore and Treagust's 'three language' issue (home language, instructional language, and science language) also play a role in learner achievement in this educational context.

Finally, **Yuenyong** and **Narjaikaew** talk of scientific literacy in the context of Thailand. Scientific literacy is a key aspect of the (relatively) recent educational reforms. However, local research suggests that science education in Thailand places considerable emphasis on scientific achievement, with little concern on science as a way of knowing. Recent work in Thailand has tried to organize science learning around Yager's STS approach, and to develop a localized notion of scientific literacy that is consistent with local wisdom, specifically the Monarch's notion of a sufficiency economy.

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Editors

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