

When Science meets the Arts: Bridging the subjective-objective divide

Rosanne Quinnell, Margaret Wegener, Rebecca LeBard, Stephanie Beames

The papers selected for this Special Issue focus on the scholarly, personal and scientific value of creative works generated formally within the curriculum, and informally. Poetry, visual arts, music, reflective prose and storytelling - the papers showcase “When Science meets the Arts”, offering examples of how our colleagues across science and mathematics have blurred disciplinary boundaries to better support student learning. It is exciting to see the broad range of educational situations where this is occurring. Science, technology and mathematics disciplines addressed here include mathematics, biomedical science, botany, chemistry, microbiology, physics, psychology and zoology.

In the place where science and art meet, the edges of both science and science education soften and invite authenticity and vulnerability. Some of these papers offer examples/exemplars of pedagogic and professional practices that encourage students (and educators) to look within themselves and express their understandings in ways that are not usual in science. Others have highlighted the pedagogic value and impact of partnerships between science and creative disciplines. Enriching science students’ experiences by including approaches and content that sit outside of science can address the challenges of engagement that are particular to science and mathematics education. Exploring what it means to *do* science or mathematics, exposing the tacit, can deepen understandings of what science (or mathematics) is.

What have we learned as the guest editors?

Whilst reading the submissions for this special issue, we questioned the nature of scholarship in this space spanning art and science. As scientists we have developed understandings of science research, and of the scholarship of teaching and learning (SoTL) starting from a science point of view. From our experiences as guest editors we question how agile our understandings of scholarship are. How readily do we accommodate scholarly approaches informed by disciplines outside science? Beyond science and science education, what does scholarship look like?

We advocate pushing the boundaries of what is considered appropriate scholarly work in science education, i.e. accommodating methods other than those based on numbers, such as ethnography, and supporting those who are currently using the arts in science or mathematics education to discuss their contributions using the full spectrum of scholarly approaches. Scholarly practices from disciplines beyond science and mathematics foster critical reflection on our science discipline norms. If we look to science research, we see that we are not alone in our efforts to blur disciplinary boundaries between science and the arts. Transdisciplinary research across science and art lends legitimacy to approaches in science education to bridge

the subjective - objective divide. The use of “big data” brings a need to visualise data, requiring researchers skilled in visual literacy. We commend to you these papers that document and explore science and mathematics education mixing with the arts. May you be open-minded, inspired, and encouraged as science and maths educators to try using the arts in your teaching practice.

When Science meets the Arts in two parts

This special issue is offered in two parts, and the pedagogic practices offered by the authors spanning these two parts acknowledge the human condition. That is, as humans we are emotional, curious creatures; we are motivated by factors other than extrinsic, rigid scientific practices. Setting the scene for this, the lead paper “Shifting from STEM to STEAM - Reflecting on Academic Identity and Scholarship” reflects on academic identity, and how periods of creativity and curiosity can help form and reaffirm this in times of change. In many of the papers selected, you will see the authors describe ‘why’ they chose the artistic media they did, as when bringing the arts into science we bring parts of our identity that we may be unused to sharing as science professionals. This lead paper may prove useful to those wishing to map their own teaching and research practice across science, technology, engineering and mathematics.

A trilogy of papers focus on the visual arts being experienced by biologists – “Botany through the looking glass: the synergy of art and science and its role in Botanical education”, physicists - “Light Play: Ideas, Optics, Atmosphere”, and chemists - “Looking through the Nano Lens: Art, Science and Nature”. The first of these introduces the neuroscience behind our responses to art and offers imagery from plant anatomy. The latter two are collaborations with museums that extend the learner cohort to include the general public and school students. We conclude the first part of the special issue with a paper that draws together maths and music – “An arts-integrated approach to learning mathematics through music: a case study of the song ‘e is a magic number’”. This final papers offers reflection on ‘why’ the music, lyrics and images were chosen, again showing how incorporating the arts involves incorporating ourselves, as well as a scholarly analysis of the song’s reception that will be useful to educators interested in how science meets the arts in online environments.

We begin the second part focused on papers that have used ‘embodiment’ to enhance student engagement. “The Performing Sciences: Developing affective engagement in science education through performative pedagogies” describes a collaboration between the disciplines of theatre studies and biochemistry, and “Dancing like Bacteria! Embracing Microbiology through Science & Art” describes a school outreach program for microbiology that utilises dance, song, animation, peer learning, art and baking. Shifting to the written word, we offer a paper that describes “Poetry as Disruptive Pedagogy: Raising Therapists in the Faculty of Science”. Multimedia and animation offer a storytelling mechanism for mathematics learning in “Digital Storytelling and Mathematical Thinking: An Educational Psychology Embrace”. Storytelling also features in the final paper of the series, “Creating Stories of Science” with fiction and fact, and with the first and last papers of this special issue in two parts we come full

circle with both papers sharing the sentiment that the STEAM space is one where joy can be found.

We encourage STEM educators to look to the arts to lend creativity and empathy to our scholarship, develop our academic identities, and so inform our practices.



Assoc Prof Rosanne Quinnell

School of Life & Environmental
Science, University of Sydney

rosanne.quinnell@sydney.edu.au



Dr Margaret Wegener

School of Mathematics &
Physics, Faculty of Science,
The University of Queensland

m.wegener@uq.edu.au



Dr Rebecca LeBard

School of Biotechnology
& Biomolecular Sciences,
University of New South Wales

r.lebard@unsw.edu.au



Ms Stephanie Beames

Project Manager,
Faculty of Science, The
University of Queensland

s.beames@uq.edu.au