

Conclusions

The aim of this book is to document and to try to understand how science and the arts can shed new light on each other when juxtaposed in fresh ways. The book focuses on how this happens within educational contexts in which approaches to both young people's science and arts education respond to emerging ideas about what it might mean to be a citizen in the 21st century.

The contributors to the book are all working in different contexts and are driven by a range of motivations. Arts educators or youth workers may be inspired by a fresh engagement with a topic they had not studied since they were at school. They might regard the science as unusual material for building on students' facility with a particular art form, be driven by socio-political beliefs or countless other motivating factors. Science educators may be particularly concerned with producing the next generation of elite research scientists. They may hope to pass on their personal passion for science as a rewarding body of knowledge. They may feel they are contributing to a future scientifically literate workforce which will ensure national economic competitiveness or see science education as key to students' political empowerment. Various combinations of these and other motivations may inform the broad range of practices.

There are also simple practical differences between the educational approaches appropriate within the structures and institutions of formal education and arts or science activities where young people participate in their own time. Given this diversity it could never be proposed that all the challenges facing science education for young people could be met by interdisciplinary collaboration or creative activity. Yet these intertwining strands suggest that creative encounters may become an established feature of the formal or informal education landscape. Hence, in the interests of stimulating further discussion, it might be worth laying out in a clear though admittedly reductive format, what some of the lessons learned by the practitioners writing in this book might be boiled down to.

The art of creative encounters

Creative encounters will often involve non-linear thinking, moving around a problem and looking at it from different perspectives. The introduction to this book and the start of the conclusion have circled the same issues and had to tread with trepidation on territory outside the natural habitat of its editors, roaming across politics, management, science, education, art and ethics. This is a risky business. Similarly, projects that cross disciplines are likely to require more effort, time, energy and maybe resources than work which remains within domain-specific patterns of interaction.

Creative encounters will therefore sometimes fail. The accounts in this book may understandably give an impression that interdisciplinary education always transforms learning and leaves a warm glow. Mostly it does, but not every artist will be able to develop a successful working relationship with a scientist and not every scientist will be able to inspire young students. Some projects funded by the Pulse initiative were not as successful as anticipated because scientists and artists were not able to develop a fruitful dialogue. As hard as it might be, it is probably as important for these ‘failed’ encounters to be documented and evaluated as some of the more obviously successful ones. It could be here that the most significant learning will be found.

Creative encounters are necessarily collective rather than individual achievements. The collective also necessarily needs to include different skills and different ways of seeing the world. These might be divided by generation, discipline, cultural background or language. Not only does this contribute to the assessment challenges, but this also means there will inevitably be communication difficulties and misunderstanding. The biggest successes are generally achieved not by a consistent and cosy level of agreement but by accommodations, tolerance, persuasion and occasionally agreeing to disagree. It may not be a process of consensus but one of productive tensions.

Creative encounters will not be easy to measure and will present serious challenges for many forms of evaluation used by policy makers and assessment prevalent in formal education. This is in part due to their tendency for collective, rather than individual, activity, the mixture of subjective and objective approaches and the bringing together of different value systems. This will need to be addressed in a number of ways. It demands innovation on the parts of educators and policy makers to develop means of assessment versatile enough to deal with complex learning outcomes. This in itself might require a high level of interdisciplinary collaboration. It requires sensitivity on the part of artists and scientists to the pressures on educators. Perhaps this also means there should be sensitivity on the parts of educators to the pressures on policy makers – but not too much sensitivity.

In the introduction and in the articles, this book has tried to illustrate some commonalities in which creative encounters can be recognised: where there is both dialogue and productive tensions between collaborators and participants, where there are new, shared and sometimes strange ways of seeing the world prompted possibly by participants responding to limiting definitions, where there is a collective realisation of the need for change.

A creative encounter is thus often about the questioning of authoritative opinion, and the social consequences that flow from such entrenched ways of looking at the world. The transgendered young people in Catherine McNamara and Alison Rooke's article expose the inadequacies of conventional medical definitions of gender and envision means of collective support and self-realisation. In Angela Calabrese Barton and Tara O'Neill's piece, young people in a deprived inner-city neighbourhood disembed science from their school and take it onto the streets. Projects such as these draw attention to the limits of science and science education, and open opportunities for fresh collaborations between scientists and artists to provide a richer and more complete understanding of life-as-lived.

Creative encounters might take place in classrooms, laboratories and theatres. They might just as well take place in former underwater weapons establishments or virtual worlds. Learning spaces will need to change or be reimagined, but as Stephen Heppell points out, there are grounds for optimism and these changes will happen. Schools will continue to be important sites for creative encounters but the boundaries of physical spaces will need to adapt alongside the boundaries of disciplinary spaces. When some young people have, for whatever reason, become disillusioned by traditional learning spaces or contexts, creative encounters in unconventional learning spaces may enable them to reconnect on their own terms. Calabrese Barton and O'Neill's example refers to young people "reauthoring their own place in the world of science". Through their video project the students ended up doing some activities which might be considered to be fairly traditional school science, but the change of context – time and space – was enough to change their relationship to the activity.

Creative encounters happen when scientists, artists, educators and young people permit themselves and each other a sense of wonder. The famed 'wow' factor can still be found in science and art. Moments of revelation seem to be at the heart of Beau Lotto's work on how illusions can help students 'redefine normality' and Joe Winston's discussion of science theatre for children, which aimed not so much to explain but to inspire awe, charm or encourage play. It works both ways. A scientist involved in *All Change Arts' Skin Deep* project brought on board to give some advice on the accuracy of science content ended up contributing his artistic as well as scientific opinion to the project, not to mention more time than he originally planned, and discovered a passion for and wonder at theatre, not just as a means of science communication but for its own sake. He is still involved with the organisation several years and projects later. The denial of this instinctive sense of wonder risks leaving scientists without their passion and students shorn of their curiosity.

Creative encounters may be deeply surreal and involve hybrid dolls, dancing synapses and ghostly pillow-headed figures. However, they also need a root in real human experience, a sense that they have a real or important rationale or an authenticity outside the context of the learning situation. This could be found in the moving personal narrative inspiring the art work, such as the story told by the young man with cystic fibrosis who initiated the *Visiting Time* project at Dorset County Hospital, or the experience of the group of transgendered young people. It could be related to the very excitement of working with a cutting-edge area of science such as epigenetics. Or it could lie in the social space of public performance or exhibition.

Creative encounters may well be a luxury, the icing on the cake of robust disciplinary knowledge. However, the world changes fast and it could also be that challenges such as climate change need our intellectual and human resources to work in new, flexible and ever-shifting configurations. In what Manuel Castells (2000) calls “the network society” where social connections cross geographical and disciplinary borders in all directions, soon (or even now) a writer in Kenya might be collaborating with an epidemiologist in the UK and a social scientist in Brazil to empower communities in all three places to respond to the health consequences of climate change. This collaboration will require on all their parts an ability to make sense of the world in different ways. In an afterword to Castells, echoing the educational theory of Jerome Bruner, Rosalind Williams (2004) makes the point that: “One of the fascinating complexities of the human mind is the persistent coexistence of two very different modes of structuring human experience: through logic and through narrative.” Both of these modes are needed interchangeably in facing up to the implications of new problems and new technologies collectively and creatively. Providing opportunities for young people to experience creative encounters today may mean they recognise them when they need them tomorrow.

Bibliography

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Williams R. Afterword to Castell's *The Network Society: A cross-cultural perspective: An historian's view*. <http://web.mit.edu/~rhwill/www/writing/castells-afterword.html> [accessed 29 April 2008].