INTRODUCTION

Science teaching and learning needs a makeover. It needs to move from seeing learning Science as learning only about the history of Science to include learning about Science for the present and future. It needs to move from seeing the teaching of Science as something that happens within four walls, to a wall-less environment that harnesses collective intelligence. And while the issue raised in the quotation below, is probably fair, it still fails to recognise that formal Science teaching and learning environments need to do more with technology than have only teachers who integrate it, in some form, into their existing Science classroom activity.

‘It seems likely that children from most, if not all, social and economic strata will ultimately come to have reasonable levels of access to communications and information technologies in their schools…Less clear, however, is the likelihood that they will have access to teachers who know how to use that technology well to support 21st Century learning and teaching.’ (Lawless & Pellegrino, 2007: 578).

In this chapter, it is not my intention to dwell on documenting teacher ability to use the technology well within a traditional teaching context. Instead I wish to consider technology influenced innovative learning contexts for Science education that harness collective intelligence, for as Bacon said:

“He that will not apply new remedies must expect new evils: for time is the greatest innovator”. Francis Bacon (1561-1626)

Statements such as ‘Unfortunately, the evidence suggests that technology is often poorly integrated with other classroom instructional activities.’ (Lawless & Pellegrino, 2007:580) further illustrate that teachers are not alone on their side of the digital divide. Unfortunately those keeping them company are not the learners. At present, most school learners spend much of their leisure time instant messaging, or playing computer games (Simpson, 2005) and in recent years there has been a change in ontology, as many have taken to ‘ twittering ’ or communicating via a social networking site. As a consequence they might be described as tapping into a collective ‘intelligence’ that exist within these social online environments. As such, these social online environments have encouraged the development of new types of behaviours.
Most learners in their informal environments have already embraced online social networks, email, the web, and mobile technologies including smart phones, iPads™, and iPod™/MP3 players. A 2006 reported survey from the University of Melbourne (Kennedy, Krause, Judd, Churchward & Gray, 2006) of students born after 1980 showed that 96% had a mobile phone and 94% used their computers to email, while 80% used their computers to communicate via instant messaging. Since then, wikis, tweets, podcasts, videoblogs, mashups (recombined sources resulting in derivative work) and folksonomy (collaborative or social tagging) are commonly used by young people (Oblinger, 2007). Therefore it is not a question of integration, but a question of immersion and in essence, changing our way of ‘being’ when it comes to formal Science learning environments. For as Squire, Giovanetto, Devane and Shree (2005) suggest, learners who are removed from these new environments may consequently lack motivation and attentiveness in formal learning environments.

In their everyday lives, learners have not merely replaced one form of communication with another. They have changed their style and way of communicating, networking and being: Tweeting, blogs, and wikis have no comparable low-tech previous experience. So it could be argued that technology is encouraging changes in ontology and epistemology.

The ontological distinction, or what we could call the difference between the categories of being in formal and informal environments, is widening. For many young learners their ‘online’ lives are very real. These are existent environments for these learners. In contrast, for those born decades earlier there exists a chasm between these online environments and what are often called face-to-face or ‘real’ environments. Social networking sites, while they adopt face-to-face socialising elements, also enable different types of behaviours. How many of us would contemplate asking a stranger to be our friend? Yet, social networking sites rely not only on a personal contact friendship base, but on the opportunity to ‘talk’ to people we do not know.

From an epistemological perspective, what we accept as knowledge, and what counts as knowledge, as well as how it is acquired and how we come to know what we know is also changing for many learners. The demise of news disseminated via a paper-based medium is one example of this changing knowledge base. Another example of this changing knowledge base can be seen in the growth in upload of image, text and voice provided just in time, at the time and online, by experts and novices alike. The growth of Wikipedia™ is another example of co-constructed knowledge bases where we have come to accept community harnessing and community policing of collective intelligence.

Further, while school-based science classroom practice that integrates technology in the form of learning objects is now fairly common, school-based science classroom practice that is lived through technology is less common, if present at all. To a certain extent, we are asking learners to live in two cultures - their formal learning environment and their outside school environment.

In this chapter the focus is on learning environments that incorporate formal learning and informal learning outside school environments. The chapter will