

Evaluating I2S2: An inquiry-based Indigenous science program for Years 5 to 9

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Program overview

The Indigenous STEM Education Project, funded by BHP Billiton and implemented by CSIRO, aims to increase participation and achievement of Aboriginal and Torres Strait Islander students in science, technology, engineering and mathematics (STEM) education and career pathways. It consists of six programs that cater to the diversity of students as they progress through primary, secondary and tertiary education and into employment. One of these programs is I2S2 (Inquiry for Indigenous Science Students).

I2S2 is an inquiry-based science program for Years 5 to 9 that has involved over 7600 Aboriginal and Torres Strait Islander students and 1154 teachers since 2016. It aims to engage students in STEM by using a strategy centred on the combination of knowledges, multimodal learning and alternative assessment techniques. These techniques allow all students to demonstrate their higher-order thinking skills in diverse modalities. The CSIRO I2S2 coordinators also work with schools to train and support science teachers in their delivery of authentic learning inquiries, and deepen their understandings about broader Aboriginal and Torres Strait Islander cultures.

Background

Research shows that students achieve better learning outcomes in school – that is, they are more engaged, achieve higher academic results and have improved attendance levels – when they are active learners in contexts that are authentic and related to their everyday lives (e.g. McInerney et al., 2011). For Aboriginal and Torres Strait Islander students, then, drawing on both Indigenous and Western knowledges has shown to improve learning outcomes and is particularly relevant for STEM subject areas (e.g. Throsby & Petetskaya, 2016).

Central to the program is the strength and value of Indigenous knowledges, which are often drawn from local languages and cultures. They are strongly place-based and ecological (Yunkaporta & McGinty, 2009) and consider evolving meaning making via inquiry practices in place (Nakata et al., 2014). Capel (2014) notes that Indigenous knowledges tend to be retained within particular communities due to their origins in the

local context, whereas Western science and pedagogy are considered universal in comparison. I2S2 provides an opportunity to support the long-term continuation of both areas of knowledge for current and future students, teachers and communities, so that they are relevant to a broad range of contemporary social contexts. As part of this process, professional learning sessions are organised in order to share pedagogies and practices that have been shown to improve engagement and knowledge building.

Methodology

The evaluation of the I2S2 program involved the collection and analysis of student results (grades), engagement (on a scale of 1 to 5) and attendance (percentage of classes attended) in the term prior and term during inquiry delivery. Jurisdictional administrative data from Queensland (i.e. grades, attendance and engagement or effort measures) for participating and matched comparison schools have also been collected to support findings.

Findings and conclusions

Results from the evaluation of the program reveal that schools participating in I2S2 experienced an increase in student engagement in classrooms and many students demonstrated improved academic achievement, after they had participated in the program. These improvements were apparent for Aboriginal and Torres Strait Islander students and non-Indigenous students; however, the largest improvement was seen for students assessed as 'low-achieving' prior to their participation in the project. Student attendance in I2S2 classrooms was also measured, but no apparent positive influence on student attendance was observed. Taking into consideration that I2S2 lessons constitute only a portion of total class time over a year, and the potential influence of a range of factors on attendance not related to classroom activities, this indicator may not provide the most robust measure of I2S2 success.

The I2S2 program provides an opportunity for schools within a region to collaborate and share knowledge and experiences, therefore developing or enhancing relationships between teachers and their school communities.