Exploring the implication of science communication practices on a model for teacher professional development: Serving up the Pierian Waters

Pettikirige Sean Francis Perera

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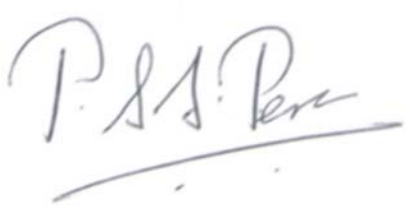
Declaration

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text. The empirical work within was not carried out with any other person.



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Abstract

Science communication, over the last two decades, has shifted its onus from public understanding to public engagement. These efforts have been paralleled in science education, which strives to promote continued student engagement with science. Persistence with more traditional forms of pedagogy by teachers in middle school is a chief deterrent to this endeavour. Since many teachers' inadequate understanding about science is regarded as inhibiting their use of inquiry-based pedagogy, professional development based on constructivist principles has been identified to remedy this problem. This study investigates the constructivist basis for a model of short-term professional development, which has not been addressed in the literature. The one-day workshops offered to middle school science teachers in Australia and overseas by the Centre for the Public Awareness of Science (ANU, Canberra) are investigated here. While the workshops did facilitate conceptual change in the teachers, it was found that the constructivist principles which were incorporated into the workshops' design and delivery were underpinned by science communication practices. The conclusions presented include: the possibility of a constructivist framework for short-term professional development; the need for greater involvement of science communication in science education reform; and the unique challenges which confront science teachers from non-Western cultures.

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I wondered through a mire:
The literature; deep and waywardly,
To find an un-hewn precious stone,
One that I could polish and make my own.
Since then I've spent years,
Sometimes laughing, through often in tears.
With a shining beacon at my side to be my guide,
I laboured to make that stone shine:
Refining my questions
And shaping my arguments.
Along the way a shard may have been cast aside,
Which may one day be another's.
And now before you I lay my labours:
My thesis, a diamond in my eye.
(The author)

Prologue

Drink deep, or taste not the Pierian spring:
There shallow draughts intoxicate the brain,
And drinking largely sobers us again.
Fir'd at first sight with what the Muse imparts,
In fearless youth we tempt the heights of Arts,
While from the bounded level of our mind
Short views we take, nor see the lengths behind;
But more advanc'd, behold with strange surprise
New distant scenes of endless science rise!

(Alexander Pope, *Essay on Criticism*)

The *Waters of Pieria* have long been the fabled seat of the Muses of mythical Greece. In the extract above, Pope refers to the *Pierian Spring* as a source of inspiration and deep understanding. The short-title of this thesis draws on that meaning. The following pages describe a study which has explored how science communication can participate to develop deeper understandings about science, and thereby inspire more effective science teaching. The model of teacher professional development described here, acts as a metaphorical pitcher with which science communication serves up the *Pierian Waters*.