Developing Critical and Creative Thinking Through the project of 'Science Beyond a classroom Setting'

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What is this presentation about?

Share the experience (observation and reflection) I had when working with local schools on a project of 'science beyond a classroom setting'.

Reflect on how the experience contributed to the development of critical and creative thinking among pre-service teachers. (PSTs)

Open up the discussion on how the experience might be applied to a broader educational contexts.

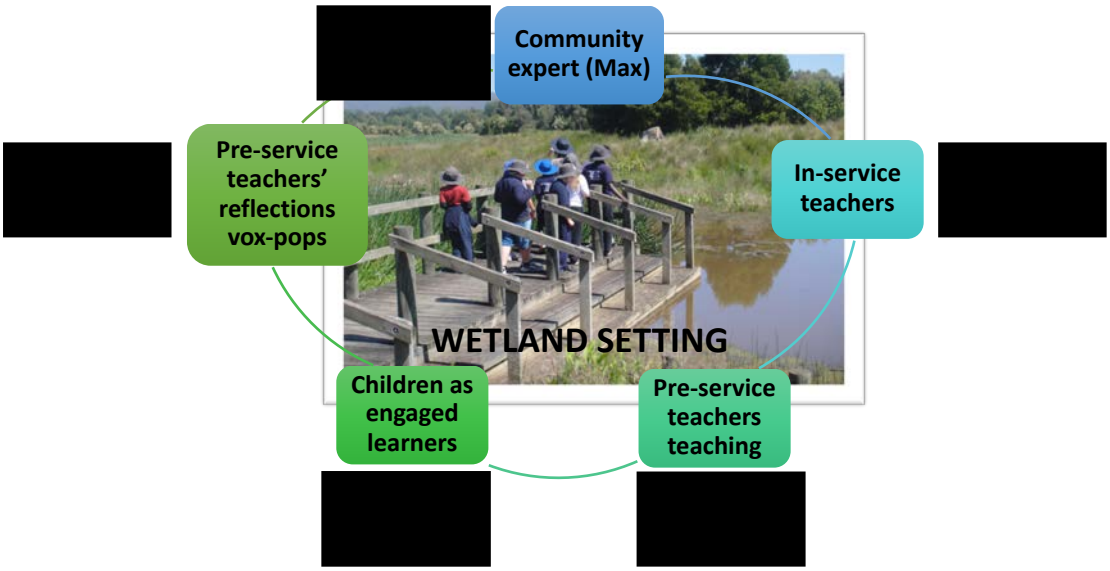
PROJECT BACKGROUND

- Teaching & learning course: **EDBED2009 Science Education** (2016, 2017,2018)
  - **Established University-school partnerships** between the School of Education and three primary schools in the Latrobe Valley and one school in Berwick.
  - **Features of the course:** pre-service teachers (PSTs) were mentored to deliver science lessons to students from the schools. The teaching opportunity also involved teaching science outside the traditional classroom setting (e.g. school ground and wetland).

The structure of school sessions

1) S2, 2016	**A local wetland**	**One day with rotations**	**Adaptation (a tuning-in session for the school's inquiry project)**
2) S1, 2017	School yard	One day with rotations	Choice of their own (science topics)
3) S2, 2017	School yard	One hour per week over three consecutive weeks	Biological science aligned with the school curriculum
4) S1, 2018	School yard (X3)	One hour per week over three consecutive weeks	Chemical science
			Chemical science (designated activities)
			Physical science

Pedagogical possibilities and outcomes from in-the-field videos



Define critical and creative thinking

Critical and creative thinking involves students thinking **broadly and deeply** using skills, behaviours and dispositions such as **reason, logic, resourcefulness, imagination and innovation** in all learning areas at school and in their lives beyond school.

Though the two are not interchangeable, they are **strongly linked, bringing complementary dimensions** to thinking and learning.

Questions and Possibilities strand focuses on:
Explore the nature of questioning and a range of processes and techniques to develop ideas.

Australian Curriculum
https://www.australiancurriculum.edu.au/f-10-curriculum/general-capabilities/critical-and-creative-thinking/

The discussion framework: **Nurturing Creative Thinking**
By Kampylis and Berki (2014)

In this booklet, they suggest the following strategies:

* **Influence creative thinking through well-designed learning spaces**
* **Increase the use of open-ended questions**
* **Engage learners in meaningful and authentic activities**
* Collaboration enhances creativity
* Make efficient use of educational technologies
* **Allow for mistakes and sensible risk-taking**
* Learn how to assess and reward creativity

* **Influence creative thinking through well-designed learning spaces**

We ended up going with just exploring and trying to decide what's living and what's not living in our current environment and around – we sent one out to the garden, one out to the playground and one just off to the oval to see, and it actually came up with lots of good questions, like kids were unsure about whether the mould was living, whether the fungus was living, they wanted to talk about mushrooms and one of them saw power, he wanted to talk about electricity and whether electricity was living, and it brought up lots of good points, like we wanted to bring in things like fire and electricity and moving things like cars to see if they've got that misconception that because it moves, it's alive, and we didn't have to force those – because they'd found them themselves in their environment. (17-GR)

* **Engage learners in meaningful and authentic activities**

Some of the things the kids got into was amazing. It went further than science. They were looking at the different trees and how they grow and things like that, but then they took it on, they did art and they were writing stories about it. It was amazing to see where it went. I always thought that literacy and math were sort of those base subjects where everything went off that, but then I saw how science just bounded into all these other areas. (Ella)

- **Increase the use of open-ended questions**
  (We encouraged our PSTs to ask open-ended questions in their teaching)

The PST was talking about their teaching about 'water filter system':

I think the whole idea about our activity was that there was no right or wrong answer because the materials that we had supplied weren't obviously going to filter it to the cleanest of its ability and so that's why we were like, 'oh well if these don't work, what else do you think would work and using your surroundings'. … I just think they're thinking creatively. So they're just not stick, they're not in the box. They're outside the box, looking around, trying to find out answers and they're thinking critically and logically about what could work. Why wouldn't sand work if you put that in a filtering system. Would it make it sandier or would it make it cleaner. (Un 17-28)

* **Allow for mistakes and sensible risk-taking**

Some of my observations and reflections

In one school, the PSTs were asked to teach based on the textbook 'Primary Connections' – They didn't have to come up with their own ideas, only need to follow the procedures in the book.

At the debriefing session after week 2 teaching, PSTs

- Criticised that the activities in the textbook were boring;
- Asked if they could modify the activities;

In week 3 teaching, I observed lots of creative activities designed by PSTs. They became more critical toward teaching materials and resources; and became more creative and resourceful in designing teaching activities.

Thank You !

Questions and Comments?