Aquatic Science, Hybrid Structure, and Metacognitive Strategies

Innovative Aspects of a Science Professional Development Program

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Program Goals

1) Increase teachers’ content knowledge in aquatic science

2) Improve teachers’ science process and pedagogical knowledge

3) Improve student content and nature of science knowledge
TSI Aquatic Cohorts

Kaua‘i
★ 2012–13

O‘ahu
2010–12
★ 2012–13

Maui
2012–13

Hawai‘i
2012–13

☆ 2012–2013
28 teachers
~480 students

Introduction | Aquatic Science | Hybrid Structure | Metacognitive Strategies | Discussion
Introduction

**Aquatic Science**

Hybrid Structure

Metacognitive Strategies

Discussion

Physical Science

Chemical Science

Biological Science

Ecological Science

A minimum of 12 aquatic science activities implemented
Aquatic Science Results

• Teacher and student gains in pre-post aquatic science knowledge

• PD reached teachers of wide range of subjects

• Positive correlation between teacher perception of extent of ocean connection and student engagement
Hybrid Structure

Interactive Online Learning Community (OLC)

- Workshop 2-day (16 hr)
- Follow-up 3 hr
- Follow-up 3 hr

X 4

In-Person | Online Synchronous | Online Asynchronous
Hybrid Structure Results

Website

• Using 1 yr after PD

Online community

• Propinquity

• Longer exposure increased likelihood of interaction

• Teacher choice key to engagement
Metacognition

“the process of reflecting on and directing one’s own thinking”
(National Research Council, 2001)

How Learning Works: 7 Principles for Smart Teaching
San Francisco: Jossey-Bass
Teaching Science as Inquiry (TSI) Framework

(Based on Pottenger, 2007)
Metacognitive Strategies

TSI Phases of Inquiry: Multi-directional teaching & learning cycle
**Metacognitive Results**

Metacognition

- Concept engaged teachers

- Served as reminder to facilitators to model good teaching practices

Teaching metacognitive strategies best approached with patience and repetition
Metacognitive Assessment

Administered to Teachers & Students

I have control over how well I learn.
I can motivate myself to learn when I need to.
I am aware of what strategies I use when I study.
I reevaluate my assumptions when I get confused.

Metacognition Awareness Inventory (Schraw & Dennison, 1994)

Scale Responses to Statements

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<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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</tbody>
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Administered to Teachers

I have a specific reason for choosing each technique I use in class.
I set specific teaching goals for myself before I start teaching.
I am aware of what teaching techniques I use while I am teaching.
I use different teaching techniques depending on the situation.

Metacognitive Awareness Inventory for Teachers (Balcikanli, 2011)
Implications

Aquatic Science

• Cohesive content makes program accessible to variety of disciplines

Hybrid Structure

• Allows Interaction with material in variety of ways
• Need explicit instruction and support

Metacognitive Strategies

• Use of pedagogical vocabulary makes strategies “sticky”
• Need for better measures of metacognition
References


