Cyber Professional Development in Inquiry Science: An Iterative Evaluation Strategy

Heather Leary, University of Colorado Boulder
Tamara Sumner, University of Colorado Boulder
Cathy Ringstaff
Danielle Brown
Holly Devaul

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CYBER PROFESSIONAL DEVELOPMENT IN INQUIRY SCIENCE: AN ITERATIVE EVALUATION STRATEGY

Heather Leary and Tamara Sumner
University of Colorado Boulder

Cathy Ringstaff and Danielle Brown
WestEd

Holly Devaul
University Corporation for Atmospheric Research
INTRODUCTION

- Teachers need support for change in practice
- K12 teachers engage in professional development (PD) each year (Vrasidas & Gross, 2004)
- PD takes many forms
- Prolonged PD is more effective (Avalos, 2011)
OBJECTIVES

Overall Project Goal:
Design and study scalable, affordable, flexible, “educative”, and effective cyberlearning tools supporting districts and teachers adopting and implementing research-based curricula

Evaluation Goal:
Provide parallel, iterative, and formative evaluation for the CyberPD environment
**Project-Based Inquiry Science (PBIS)**

- Student-centered
- Middle school science curricula
- Research-based (NSF funded)
- PBIS – [http://goo.gl/eOxGeK](http://goo.gl/eOxGeK)
As Student Scientists, Project-Based Inquiry Science™ students engage in the same practices as scientists and engineers.
Students must keep track of:

- Units Big Question or Challenge
- Smaller questions in each Learning Set
- Reasons for each activity
- Results of their investigations
- Understanding of the science content
## Getting Started
One to two weeks prior to beginning PBIS.

### Readings
- Read the *Welcome Letter.*
- Read *Project-Based Inquiry Science Is Research Based.*
- Read *Introducing PBIS.*
- Read *Setting Up the PBIS Classroom.*

### Pedagogical Videos
- View *The Structure of Project-Based Inquiry Science* video.
- View *Pacing in the PBIS Classroom.*

### Equipment Preparation
- Read *PBIS Kits* and view the *PBIS Kit Equipment video.*
- Unpack your materials when they arrive and note and report any discrepancies or problems to IAT.
- Look over the *Unit Materials List* and note the items that are needed but not supplied and obtain as required.
**Research Questions**

1. To what extent do the CyberPD materials address lower and higher levels of concern for teachers?
2. In what ways do various individual resources in the CyberPD materials meet teacher needs?
3. How can features of the CyberPD materials be improved to meet teacher needs?
4. What additional features do teachers need to implement the *PBIS* curriculum?
**THEORETICAL FRAMEWORK**

- Concerns Based Adoption Model (CBAM)

<table>
<thead>
<tr>
<th>Stage of Concern</th>
<th>Expression of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Refocusing</td>
<td>I have some ideas about something that would work even better.</td>
</tr>
<tr>
<td>5. Collaboration</td>
<td>How can I relate what I am doing to what others are doing?</td>
</tr>
<tr>
<td>4. Consequence</td>
<td>How is my use affecting learners? How can I refine it to have more impact?</td>
</tr>
<tr>
<td>3. Management</td>
<td>I seem to be spending all my time getting materials ready.</td>
</tr>
<tr>
<td>2. Personal</td>
<td>How will using it affect me?</td>
</tr>
<tr>
<td>1. Informational</td>
<td>I would like to know more about it.</td>
</tr>
<tr>
<td>0. Awareness</td>
<td>I am not concerned about it.</td>
</tr>
</tbody>
</table>
SCENARIO-GUIDED DESIGN EVALUATION

- Teacher Design Advisors (n=11)
- Developed process to evaluate CyberPD materials for iterative feedback and development
- Two-step, mixed method process:
  - Targeted scenarios, real world task
  - Individual exploration with survey questions (quant/qual)
  - Group webinar-based discussion
<table>
<thead>
<tr>
<th>CyberPD Site (May 2013)</th>
<th>Interactive Pacing Guide (December 2013)</th>
<th>Getting Started Course (April 2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5 Scenarios</strong></td>
<td><strong>4 Scenarios</strong></td>
<td><strong>4 Scenarios</strong></td>
</tr>
<tr>
<td>• Experienced teacher new to <em>PBIS</em> – learn about <em>PBIS</em></td>
<td>• Experienced teacher - new teaching assignment, unfamiliar with <em>PBIS</em></td>
<td>• Teacher new to <em>PBIS</em> – explore the course</td>
</tr>
<tr>
<td>• Experienced teacher new to <em>PBIS</em> – learn about Project Board</td>
<td>• Teacher concerned about pacing</td>
<td>• Teacher new to <em>PBIS</em> – student activities, post to Edmodo</td>
</tr>
<tr>
<td>• Experienced teacher new to <em>PBIS</em> – equipment setup</td>
<td>• Experienced teacher - seeking reflection opportunity, record/revisit options</td>
<td>• Teacher new to <em>PBIS</em> – background resources, project board, other CyberPD components</td>
</tr>
<tr>
<td>• New teacher – supporting teacher content knowledge</td>
<td>• Guidance on student data, artifact management, assessments</td>
<td>• Teacher new to <em>PBIS</em> – NGSS orientation and how it relates to <em>PBIS</em></td>
</tr>
<tr>
<td>• Teacher coach – support for guiding student observations</td>
<td><strong>Survey</strong></td>
<td><strong>Survey</strong></td>
</tr>
<tr>
<td></td>
<td>• 32 likert</td>
<td>• 42 likert</td>
</tr>
<tr>
<td></td>
<td>• 8 free text response</td>
<td>• 9 free text response</td>
</tr>
<tr>
<td><strong>Teacher Design Advisors:</strong> N=11</td>
<td><strong>Teacher Design Advisors:</strong> N=10</td>
<td><strong>Teacher Design Advisors:</strong> N=9</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Survey</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 8 likert</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 21 free text response</td>
</tr>
</tbody>
</table>
EXAMPLE SURVEY QUESTIONS

Mixture of Likert and Open Ended Questions

- Using the journaling feature to record reflections is user friendly.
- I have an increased understanding of new instructional practices associated with the PBIS program.
- I have an increased understanding of how the Project Board helps students move towards answering the Big Question and/or Challenge.

- Please report any problems, issues, or suggestions.
- What are the strengths of the CyberPD site?
- What are the weaknesses of the CyberPD site?
- How can the CyberPD site be improved?
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Usability / Utility Questions</th>
<th>CBAM</th>
<th>CBAM-Level Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarah - Experienced teacher new to PBIS program</td>
<td>Rate the usability and utility of the online CyberPD environment for completing this task: It is easy to find information about the <em>Project Board</em>. The assets with information about the <em>Project Board</em> are useful. The assets with information about the <em>Project Board</em> are engaging.</td>
<td>Informational</td>
<td>After using the CyberPD environment I have an: Increased understanding of what the <em>Project Board</em> is. Increased understanding of how to introduce the <em>Project Board</em> to my students. Increased understanding of how the <em>Project Board</em> helps students move towards answering the <em>Big Question</em> and/or <em>Challenge</em>. Increased understanding of the role of the <em>Project Board</em> in helping students think and act like scientists and engage in scientific argumentation.</td>
</tr>
<tr>
<td>Scenario #2: <em>Project Board</em> and classroom management</td>
<td></td>
<td>Management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consequence</td>
<td><strong>List the assets you used to complete this task.</strong></td>
</tr>
</tbody>
</table>
RESULTS FROM SCENARIO-GUIDED DESIGN EVALUATION

- Iterative, timely and useful feedback to developers
- Scenarios provide structure to engage advisors in a productive exploration of the materials and launching point for group discussions
- Met lower CBAM levels (awareness, informational, personal concerns)
- Group discussion is beneficial PD opportunity for advisors to share ideas and practice
- Improved materials for each round of implementation studies
LIMITATIONS

- Teacher Design Advisors have “buy-in” with the curricula
- Teacher Design Advisors are not connecting with the scenarios, having trouble staying in “character” with them
IMPLEMENTATION STUDIES AND EVALUATION

- Classroom teachers (n=19)
- Four school districts; new and familiar with *PBIS*
- Mixed methods pilot studies
  - Online survey
  - Weekly teaching logs
  - Phone interviews
INSTRUMENTS

- Teacher Survey (demographics, beliefs about skills, instructional practices)
- Teacher logs – extent an asset had positive impact on teacher:
  - To implement curriculum
  - Confidence as a science teacher
  - Content curiosity
  - To implement specific instructional strategy
  - Interest in learning about a specific instructional strategy
INSTRUMENTS

- Teacher logs – extent assets met their needs based on:
  - Content knowledge
  - PBIS experience
  - Technology expertise

- Teacher Interviews – elaborate on their use of the CyberPD site and comfort with the curriculum
RESULTS FROM IMPLEMENTATION STUDY AND EVALUATION

- Most commonly evaluated assets were videos
  - 70% of logs: assets evaluated were “totally appropriate” given their content knowledge
  - 65% of logs: assets evaluated were “totally appropriate” given their experience with PBIS
  - 60% of logs: assets evaluated were “totally appropriate” given their personal teaching and learning goals
- Teachers rated most assets as having at least “moderate” to “significant” positive impact on their:
  - Confidence as a science teacher
  - Content knowledge
  - Ability to implement curriculum
RESULTS FROM IMPLEMENTATION STUDY AND EVALUATION

- Teachers preferred the online, self-paced format because of the flexibility, but missed the face-to-face collaboration offered by traditional PD; limited Edmodo use
- Teachers believed the videos in the CyberPD site were especially useful
- The “Getting Started” online course led to a deeper appreciation for and understanding of the structure of PBIS activities
- Aligned to CBAM levels: awareness, informational, personal concerns
OVERALL OUTCOMES TO DATE

- An integrated suite of cyberlearning tools
- Data on the usability and utility of the cyberlearning suite from two different sources of feedback and research
- A replicable online process – a scenario-guided design evaluation
- Instruments and protocols for conducting implementation studies of the tools
- Weblog data track actual teacher activity on the site
CONTACT US

- Heather Leary - heather.leary@colorado.edu
- Cathy Ringstaff – cringst@wested.org

References


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