Study on How College Science Courses Influence Elementary School Teachers

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AAPT 2009 Summer Meeting
Collaborators

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NASA Opportunities for Visionary Academics (NOVA)

- [http://www.novaprogram.org/Home](http://www.novaprogram.org/Home)
- >100 institutions participated
- Development or modification of “reform” science courses for elementary education majors
  - Courses incorporate an inquiry-based approach and center on student interactions
National Study of Education in Undergraduate Science

- Follow-up to the NOVA project
- Total of 30 institutions around the country over ~3 years
- Site visits
  - Class Observations
  - Interviews of college faculty, pre- and in-service teachers
  - RTOP*
  - On-line Surveys
  - Content Questions

* (Piburn and Sawada, 2000)
# The Course and Schools

<table>
<thead>
<tr>
<th>School</th>
<th>NOVA Course Description</th>
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</table>
| 1 (Public) | Content integrated with teaching pedagogy  
Taught with a 5E* learning cycle  
Hands-on/Interactive |
| 2 (Public) | Content integrated with teaching pedagogy  
Experiments that are easily adaptable to elementary classroom  
Create lesson plan for fellow students. |
| 3 (Private) | Fairly traditional lecture/lab style  
Pedagogy was not integrated  
Year-long research project |
## Views of Pre-service Teachers

<table>
<thead>
<tr>
<th>School</th>
<th>Pre-Service Teachers Interview Quotes</th>
</tr>
</thead>
</table>
| 1 (Public) | “This course is a refresher course from HS – I am learning how to teach.”  
“I understand more because it is hands-on” |
| 2 (Public) | The lesson plan activity “forced you to understand what and why first … and then figure out a way to make the rest of the class understand.” |
| 3 (Private) | “Research project – hands-on ourselves. Not just looking at data.”  
“Look at the methods lessons – all those I could teach…” |
## Views of In-service NOVA Teachers

<table>
<thead>
<tr>
<th>School</th>
<th>In-Service Teachers Interview Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Public)</td>
<td>“I learned a lot more hands-on. I liked [the NOVA] class.”</td>
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<tr>
<td>2 (Public)</td>
<td>It was “more hands-on experiments. I could see what did/did not work. It built my confidence.” My Biology course was least important because it “was more lecture.”</td>
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<td>3 (Private)</td>
<td>“The methods course … because got to do hands-on inquiry based learning that kids would get to do.” “The methods course change the way I think about science, about teaching, the way I look at the world.”</td>
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# Views of In-service Non-NOVA Teachers

<table>
<thead>
<tr>
<th>School</th>
<th>In-Service Teachers Interview Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Public)</td>
<td>“Physical science lab and my methods course. They were hands-on and showed ways to adapt and use materials at different levels… The content course was least important.”</td>
</tr>
</tbody>
</table>
| 2 (Public) | My “geology courses.”  
“Actually going into classrooms as an undergrad and teaching it.”  
“My methods course.” |
| 3 (Private) | The methods course “gave lots of hands-on teaching in classroom situations.”  
“The methods course focuses on how to teach, … how to effectively be explicit.” |
## Observations of Elementary Classes

<table>
<thead>
<tr>
<th>School</th>
<th>Observation</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>1 (Public)</td>
<td>NOVA: Interactive</td>
<td>Book-based</td>
</tr>
<tr>
<td></td>
<td>Non-NOVA: Interactive</td>
<td></td>
</tr>
<tr>
<td>2 (Public)</td>
<td>NOVA: Interactive</td>
<td>Montessori Book-based</td>
</tr>
<tr>
<td></td>
<td>Non-NOVA: Interactive</td>
<td>Management issues</td>
</tr>
<tr>
<td>3 (Private)</td>
<td>NOVA: Interactive</td>
<td>FOSS* / Management issues</td>
</tr>
<tr>
<td></td>
<td>Non-NOVA: Interactive</td>
<td>FOSS</td>
</tr>
</tbody>
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(* Full Option Science System [http://www.fossweb.com/] *)
Conclusions and Questions

- All observed elementary teachers at least attempted to teach by reform methods.
  - What role does the provided curriculum play in this decision?
- When the college content course also integrates pedagogy, it is better remembered by in-service teachers.
  - Where should the line be drawn between content and methods courses and should more effort be placed into their integration?
- Interactions between reform faculty and pre-service teachers have a positive influence.
  - What can/should be done to facilitate these interactions?