Science for future elementary teachers: Views of faculty

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Rationale

NOT Highly Qualified Science Teachers (a world problem)
- KSDE report 1467 or 13.1%
- Teachers over 50 years of age increased
  - 27% in 1999-00 to 34% in 2004-05,
  - 24%(8,455) of all teachers (33,819) will be eligible to retire in the next five years,
About 8% turnover ratio

Science as Area of Concentration of Elementary Teachers
- Last 7 years - 88 of 1357 or 6%
- Current situation
  - Pre-professional - 3 of 345 or 1% (> 200 undeclared)
  - Professional - 25 of 382 or 7%

Demand & Supply Problem

Big Picture

RESEARCH STATEMENT:
The impact of the science curriculum in future elementary teachers’ area of concentration decision.

Data Source I
Faculty Interviews
& Review of Syllabus

Data Source II
Student Interviews

Data Source III
Classroom Observation

General Science Courses

Recommended Courses
Biological
- Biol 198 Principles of Biology w/ lab (4 hrs)
Physical
- Phys 106 Concepts of Physics w/ lab (4 hrs)
- Chem 110 General Chemistry (3 hrs)
Earth Science
- Geol 100 Earth in Action (3 hrs)
- Geog 221 Environmental Geography w/ lab (4 hrs)

Participants’ Profile

<table>
<thead>
<tr>
<th>Professor</th>
<th>Rank</th>
<th>Teaching Experience</th>
<th>Years at KSU</th>
<th>Course for Future Elem. Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Instructor</td>
<td>&gt; 7</td>
<td>&gt; 3</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Scholar</td>
<td>&gt; 3</td>
<td>&gt; 3</td>
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<tr>
<td>3</td>
<td>Asst. Prof.</td>
<td>&gt; 10</td>
<td>&gt; 1</td>
<td>Yes</td>
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<tr>
<td>4</td>
<td>Assoc. Prof.</td>
<td>&gt; 10</td>
<td>&gt; 5</td>
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<tr>
<td>5</td>
<td>Full Prof.</td>
<td>&gt; 15</td>
<td>&gt; 10</td>
<td>No</td>
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</tbody>
</table>

Five Natural Science Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Students per Class</th>
<th>Laboratory Integration</th>
<th>Laboratory Grade into Final Grade</th>
<th>Use of Technology</th>
<th>Human Resources</th>
<th>Pedagogy</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol 198</td>
<td>~ 80</td>
<td>Yes</td>
<td>Yes</td>
<td>Computer Sim.</td>
<td>4-6</td>
<td>Studio</td>
<td>Quiz, Tests</td>
</tr>
<tr>
<td>Chem 110</td>
<td>150 - 250</td>
<td>No</td>
<td>No</td>
<td>None</td>
<td>1</td>
<td>Lecture</td>
<td>Pass Lab, Assignment, Exams</td>
</tr>
<tr>
<td>Geol 100</td>
<td>&lt; 50</td>
<td>No</td>
<td>No</td>
<td>Clickers</td>
<td>1</td>
<td>Lecture</td>
<td>Pass Lab, Assignment, Exams</td>
</tr>
<tr>
<td>Phys 106</td>
<td>~ 90</td>
<td>Yes</td>
<td>Yes</td>
<td>Demonstration, Same/Po</td>
<td>1</td>
<td>Lecture</td>
<td>Pass Lab, Assignment, Exams</td>
</tr>
<tr>
<td>Geog 221</td>
<td>~ 100</td>
<td>No</td>
<td>Yes</td>
<td>None</td>
<td>1</td>
<td>Lecture</td>
<td>Pass Lab, Assignment, Exams</td>
</tr>
</tbody>
</table>
**Course Goals or Plan Curriculum**

**Syllabus**
- Introduce “scientific method” (2/5)
  - what and how of things
- Solve sophisticated scientific problems (4/5)
  - application from one context into another context
- Introduce real life applications or scientific issues (3/5)
  - global warming, designing of drugs, potable water, natural disasters
- Conceptual understanding (5/5)
  - geosphere, hydrosphere, processes and patterns, breadth of the science of biology
- Understanding of concepts as applied to elementary school children (2/5)

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**Teaching Strategies**

<table>
<thead>
<tr>
<th>Passive Teaching</th>
<th>Novice Teaching Asst.</th>
<th>Turn to Your Partner</th>
<th>Clickers &amp; PDAs</th>
<th>Learning Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial Notes (1/5)</td>
<td>(2/5)</td>
<td>(4/5)</td>
<td>(2/5)</td>
<td>(1/5)</td>
</tr>
</tbody>
</table>


Student Attitudes and Beliefs “making the connection”

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**Big Picture Question**

In five years what attributes would you want your students to remember from the course?

- Feeling of understanding of their surroundings better (5/5)
- Good citizens - to make wise choices through critical thinking (1/5)
  - separate facts from garbage
- Feeling of not the “evil” science class (1/5)
- Gain science confidence and bridge content and teaching (2/5)
- Transfer learning to other classes (immediate impact) (2/5)

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**Educating Future Elem. Teachers**

- No idea or will do the same (ex. studio format) - (1/5)
- Breadth of Content: “good grasped of good science” - strong foundation (1/5)
- Less is More (1/5)
- Couple content and pedagogy - Pedagogical Content Knowledge (PCK) (2/5)
  - learning styles, concept maps
  - Modeling PCK
  - Ex. Integrate science into other classes (english, math)
  - Individual Projects and Group Projects
- Build confidence (2/5)
- Connecting Science Standards into lessons (2/5)
- Science impact to daily life (2/5)

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**Teaching Kids Science**

- Feed on curiosity, be engaged, allow questions
  - What do you see, What does it mean, How do you test it?
- Foster the element of discovery
  - help students think about the world around them
  - science is something one can do
- Connection to things one has experienced

**Active Engagement & Real Life Connection**

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**Summary**

- Range of learning strategies depending on “connection” to educational background and available technological resources.
  - a) Passive vs Active  b) Pure content vs PCK
- There are tacit goals.
- There seems to be a disparity between the perception on how kids should learn science and teaching science to future science teachers.
- A question: To what degree should science faculty feel responsible in the quantity and quality of future science teachers?
Thank you !!!

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