Science for future elementary teachers: Views of faculty

Charles Mamolo and Dean Zollman
Kansas State University
Physics Education Research Group

Rationale (1of 4)

NOT Highly Qualified Science Teachers (a world problem)

- KSDE report 1467 or 13.1%

Kansas 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.

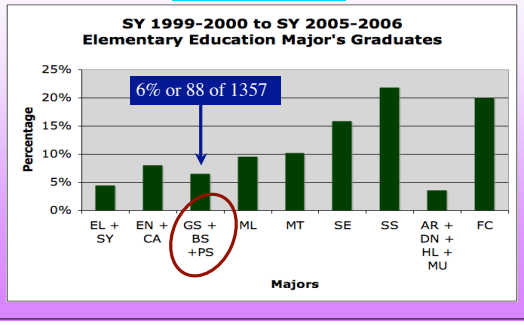
About 8% turnover ratio

Demand Problem

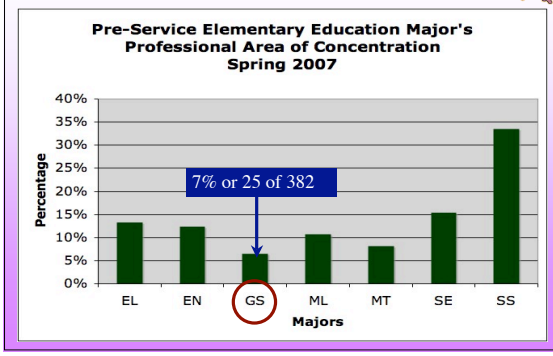
Rationale (2 of 4)

@ K-State

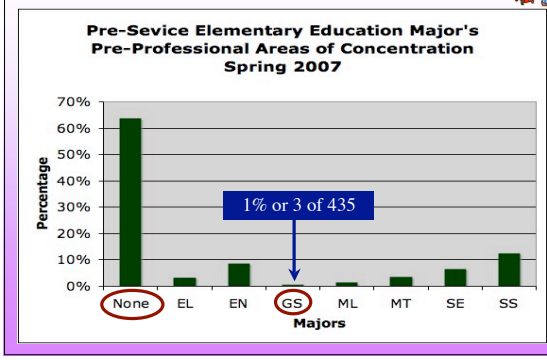
Supply Problem



Rationale (3 of 4)



Rationale (4 of 4)



Big Picture

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

Data Source I
Faculty Interviews

Data Source II
Student Surveys

Data Source III
Student Interviews

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)

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Participants' Profile

Professor	Rank	Teaching Experience	Years at KSU	Course for Future Elem. Teachers
1	Instructor	> 7	> 3	No
2	Scholar	> 3	> 3	No
3	Asst. Prof.	> 10	> 1	Yes
4	Assc. Prof.	> 10	> 5	Yes
5	Full Prof.	> 15	> 10	No

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Five Natural Science Courses

Course	Students per Class	Laboratory Integration	Laboratory Grade into Final Grade	Use of Technology	Human Resources	Pedagogy	Evaluation
Biol 198	~80	Yes	Yes	Computer Sim.	4-6	Studio	Quizes, 7 Exams
Chem 110	150 - 250	No	No	None	1	Mostly Lecture	5 Exams
Geol 100	~ 50	No	No	Clickers	1	Demo-Lecture, Some PCK	2 Projects, 2 Exams, Clickers
Phys 106	~ 90	Yes	Yes	PDAs	1	Demo-Lecture, Some PCK	1 Project, 5 Exams, Exploration, Application, PDAs
Geog 221	~ 100	No	Yes	None	1	Mostly Lecture	Pass Lab, Assignments, 4 Exams

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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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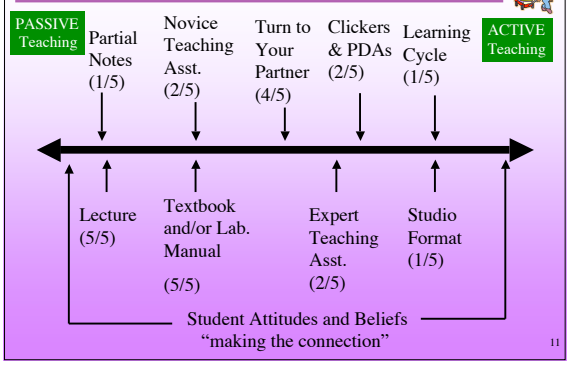
Teaching Strategies



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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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Future Course Improvements

- Separate majors and non-majors (1/5)
- Allow more active engagement (smaller class size and unbolted chairs and tables) (1/5)
  - Ex. answering worksheets in class
  - peer collaboration
- Teaching Assistants' Professional Development
  - Study the avenue of getting assistants from COE who have done the course previously (1/5)
- Incorporate metacognition (few questions) (1/5)
- Scout for inexpensive readily available materials for class use that students can replicate when they are already teaching. (1/5)

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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?

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Thank you !!!

Email: cbmamolo@phys.ksu.edu

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