

Learning
Proactive ~~Teaching~~ and Community-
based Learning for Chemical
Quantitative Analysis

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Opening Workshop for New STEM Educators

Acknowledgement

- Funding for course redesign project from the Woman and Science Program
- 2010 Spring Quant Class
- Steven Steiner, Ph.D.
- Kari Frederick

Chemical Quantitative Analysis (Quant)

- Measurement techniques
- Statistical Analysis
- Sample preparation
- Classical analytical methods
- Instrumental methods
- In-depth equilibrium problems

Proposed Course Redesign

- Student's attitude towards learning
 - Proactive learning: be ready for; anticipatory
 - Come to class prepared
 - Able to search literatures, digest/filter the information, and share information with peers
- A different pedagogy to engage students
 - Community based learning
 - Able to use the knowledge learned in class and help general public.

Challenges for Proactive Approach

- Students tend to do only the minimum
- Students perceive literature search as extra work instead of a way to broaden their knowledge
- Students tend to copy the work of others posted on internet without pondering the credibility of the sources



Possible Solutions

- Better reward system
- Set up a competition
- Reminder on the role of scientists in our society

Model for Quant



Pioneer Engagement
Project funded by
PACCE

Community based
learning

Guided experiments

Basic knowledge

Community Based Project

- Possible Projects
 - Soil testing for community partners
 - Water quality in the local creeks
 - Reliability of consumer products
- Student's Outcomes
 - Able to use the knowledge learned in class
 - Able to serve the community and develop social skills
 - Able to obtain a positive attitude
 - Stimulate their interest to do more

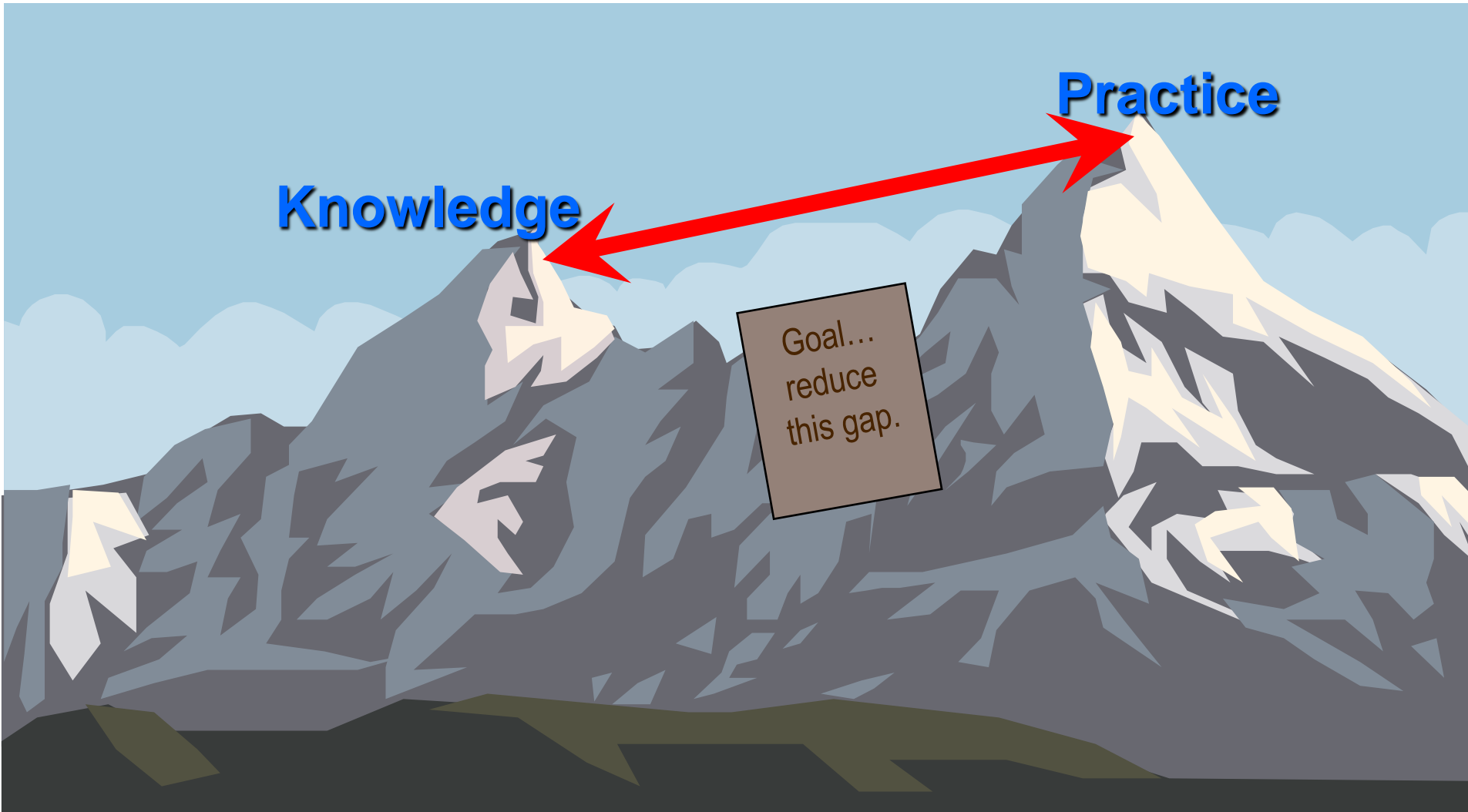
Community Based Project

- Faculty Outcomes
 - Better aware and understanding of community issues
 - New career and scholarship opportunities
 - New way of teaching
 - Get some fresh air and extra sunlight

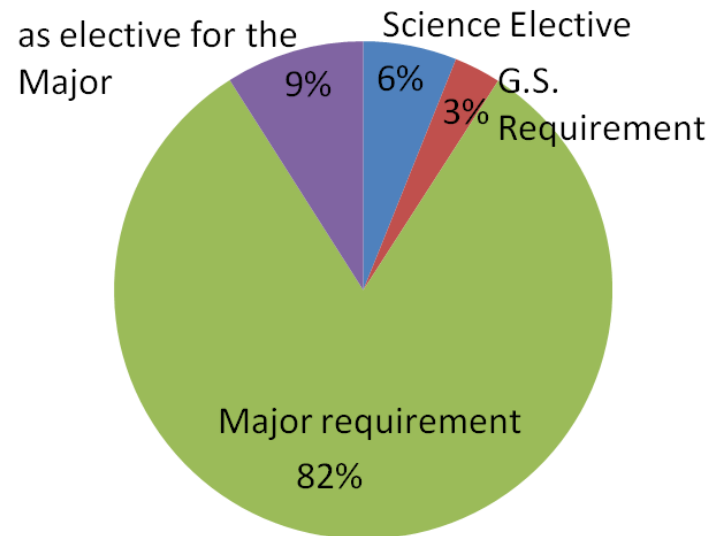
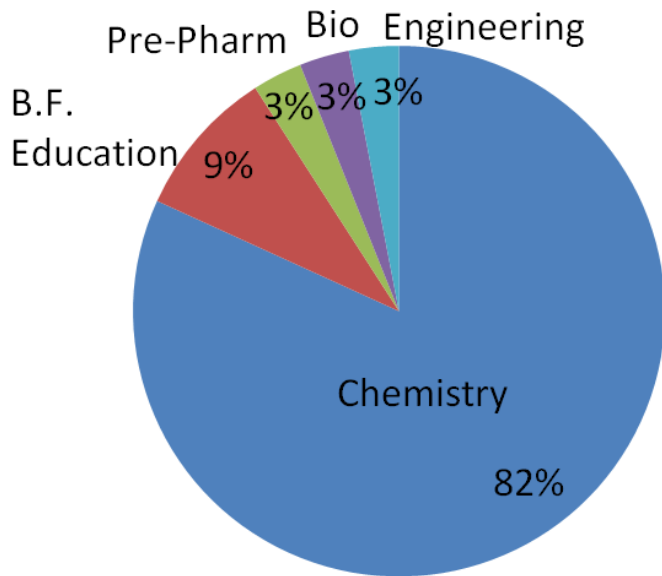
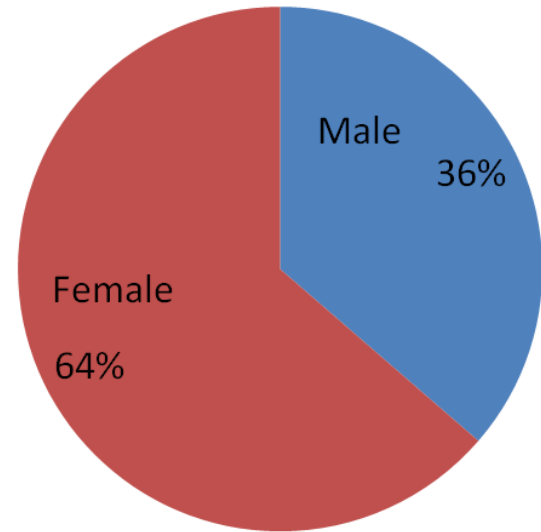
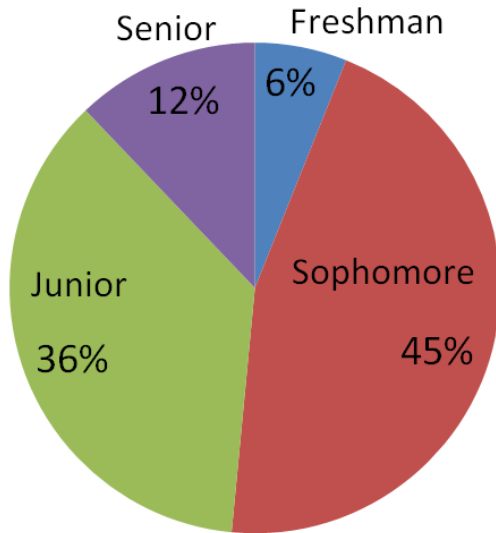
Vision for Community Based Learning

- To foster partnerships between communities and educational institutions that build on each other's strengths and develop a unique and effective pedagogy to meet the needs of our students
- Their needs
 - Interesting /memorable experience
 - Solving real problems → develop “can-do” mentality
 - Sense of worth → “I can help.”

Large Gap Between Knowledge and Practice



Class Statistics



Entrance Survey

- Have you participated at least one community service activity? **79% yes**
- Are you currently involved with at least one community service? **30% yes**
- Do you feel you are important in this society? **91% yes**
- Have you ever written a scientific proposal? **39% yes**
- Do you think writing is important part of science? **88% yes**
- Have you heard the community based learning? **58% yes**

Entrance Survey

- Do you know the content of this course Quantitative Analysis? **52% yes**
- From you past experience, can you relate the materials learned in the classroom to the real problems in life? **88% yes**
- Are you competent in solving problems? **94% yes**
- Have you had any experience in gardening? **67% yes**

Entrance Survey

- How much knowledge about soil do you have?
21% None; 58% little; 21% some; 0% extensive
- Do you wish to know about soil? **73% yes**
- Do you care for our environment? **100% yes**
- If there is an opportunity in this class to help our community and save our environment, would you like to participate? **94% yes**

Soil Analysis

- Community Partner: a local farm
- Targets: Phosphate, nitrate, and lead
- First two labs: training
- Another two labs: actual analysis
- First year: establish methodology
- Second year: field work

Exit Survey

- The aim and objectives of this course were clear to me. **88% yes**
- The course design stimulated my thinking. **79% yes**
- Through this course I can relate class materials to real situation. **100% yes**
- Did you find the soil analysis project useful? **61% yes; 30% Neutral; 0% No; 9% Blank**
- If we do not have enough resources, would you be willing to offer your time and knowledge and write a proposal to get funding from the local government? **52% yes**
- I prefer the traditional lab setting than community project. **21% yes (majority freshman and sophomore)**

Closing Reflection

“I cannot know what your destiny will be, but one thing I do know is that the truly happy among you will be those who have learned to serve.”

Albert Schweitzer