Science in the Public Interest: CCAS Annual Meeting

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November 2015 | Washington D.C.
Goals:

- Connect and explore current research on how students learn that support science in the public interest.

- Provide examples of active learning-participatory learning with civic and public interest dimensions.

- Develop strategies to change from an inert to active learning environment by leading organizational change.
The Science in the Public Interest

- Why should we put resources into creating a scientific literate society?
- What do we want them to know?
- How can we teach for learning?
Our generation cannot afford to invest in and educate a generation of students that merely acquire knowledge without understanding how knowledge can benefit society, their communities, and their nations. In fact we must teach the content and skills and values of our society by creating many diverse opportunities for our students to practice the work of being an engaged citizen. That is what we need to do every on our campuses in and outside the classroom. (Campus Compact)
Why

We must look at the mission of colleges and universities as agents of change- to prepare the next generation of involved citizens capable of advancing our culture, technology and society. It is our responsibility to provide them with multiple opportunities to do the work of citizenship. No longer can we say someone is liberly educated because they have reach the credits leading to graduation. Our overall mission is to provide the opportunity for students to use their many talents throughout their lives for the greater good of society.
We need to educate for Civic Engagement because...

- **When we do**, the responsibility for learning shifts from faculty and textbooks alone to the students themselves who engage knowledge for understanding by putting knowledge into practice to solve that problem.

- For me, and I believe my faculty, we have an obligation to prepare the next generation for life as citizens and members of their community that can look towards evidence to solve problems.
How do we teach for learning

- The future of science education and democracy is a *form following function*—democracy and a liberating learning experience go hand in hand. Our responsibility is to facilitate this transition by creating opportunities; many opportunities to work across campus and in our communities and to enable all learning in and outside of the classroom as authentic, relevant, and challenging; to assess what we do and to provide evidence of success.
How do we teach for learning

- This also means that the power of science education for our democracy requires a shift from inert learning— inert means to memorize definitions and facts with little freedom for the students to choose topics or innovative learning environments to include their community.

- **To Liberating** which is a more challenging. Students will need command both the subject knowledge and the skills needed to seek out new information. Along with the power to make decisions as to how to use knowledge for public policy, social engagement, and support our democracy.
How People Learn
Three Major Principles
Three Major National Research Council Findings: Simplified Greatly

#1 Students come to the classroom with preconceptions and revert back to them when the class is over (they are not empty vessels), unless a powerful learning event takes place (an experience).

IMPLICATIONS:

- Find out what students know
  - Prior knowledge is the most important link to new information. Use prior knowledge as a hook to attach new ideas and concepts.
  - Learning is cumulative, unlearning is harder than learning new information
  - Get to previous knowledge through seminars, reflection, practice, dialogs. Student voice (without stress).
Fish is Fish

Leo Lionni
Example: Experiential learning can be active, collaborative, cooperative and powerful

The Peanut

Take 5 minutes to explore the peanut in front of you.

Independent of others, write down all that characteristics that describe the peanut;

Next at your table share the description with others. Identify shared and unique descriptors.
peanut (p’ nut’) n.

1. Native to tropical America and widely cultivated in semitropical regions, having yellow flowers on stalks that bend over so the seed pods ripen underground.
2. The edible nut like oily seed of a peanut, used for food and a source of oil.
3. A small or insignificant person.

American Heritage Dictionary
Three Major National Research Council Findings:

#2 To Develop Competency & Expertise

- **IMPLICATIONS:**
  - A deep foundation is needed. Depth begets breadth (cover less, go deeper).
  - A context and **conceptual framework** is needed. Test for understanding, linking to knowledge and what is relevant to the students.
  - Knowledge needs to be organized to facilitate retrieval and application (provide experiences to link theory and practice and challenge students to find different applications for material (link to writing, aesthetic response, effective citizenship)).
To demonstrate how this complexity relates to learning, we will start with a test . . .

- You will be shown a series of questions, each followed by a word.
- Apply the question to the word and answer yes (Y) or no (N) on the response sheet.

Ready? . . . **GO!**
1. Does the following word mean the same as OUT-GOING?

RESERVED
2. Does the following word contain the letter A?

SPONTANEOUS
3. Does the following word describe you?

FRIENDLY
4. Does the following word contain the letter S?

REALISTIC
5. Does the following word mean the same as **CARING**?

**WARM-HEARTED**
6. Does the following word contain the letter C?

PRACTICAL
7. Does the following word describe you?

SENSITIVE
8. Does the following word mean the same as **STUPID**?

**INTELLIGENT**
9. Does the following word contain the letter D?

IMPROMPTU
10. Does the following word contain the letter **K**?

**TRUSTING**
11. Does the following word contain the letter M?

CAUTIONOUS
12. Does the following word describe you?

SUSPICIOUS
13. Does the following word describe you?

OBVIOUS
14. Does the following word contain the letter O?

LOYAL
15. Does the following word mean the same as ADULT?

MATURE
16. Does the following word contain the letter B?

PRAGMATIC
17. Does the following word mean the same as CREATIVE?

IMAGINATIVE
18. Does the following word mean the same as HONEST?

TRUSTWORTHY
19. Does the following word describe you?

SHREWĐ
Does the following word contain the letter N?

ATTENTIVE
21. Does the following word describe you?

CALCULATING
22. Does the following word mean the same as **FLIGHTY**?

**SERIOUS**
23. Does the following word contain the letter H?

SENSIBLE
24. Does the following word describe you?

RESTRAINED
25. Does the following word mean the same as **PROUD**?

**HUMBLE**
26. Does the following word describe you?

QUIET
27. Does the following word describe you?

CRAFTY
28. Does the following word mean the same as ASSERTIVE?

COMMANDING
29. Does the following word mean the same as **IMPULSIVE**?

**INTROVERTED**
30. Does the following word describe you?

SOBER
Now, turn over your answer sheet . . .

- write down as many of the **TARGET** words
  as you can remember
  in 2 minutes

Finished?
Now we’ll score the test
Score number of words remembered from this list:

spontaneous  cautious
realistic      loyal
practical     pragmatic
impromptu     attentive
trusting      sensible

--> LETTER score
Score number of words remembered from this list:

reserved
warm-hearted
intelligent
mature
imaginative

trustworthy
serious
humble
commanding
introverted

→ WORD score
Score number of words remembered from this list:

friendly       calculating
sensitive      restrained
suspicious     quiet
obvious         crafty
shrewd         sober

--> SELF-REFERENCE score
Levels of Processing Test* — typical results

What does this test mean for understanding the process of learning?

- **Letters**: shallow analysis  
  → *low* retention

- **Words**: intermediate analysis  
  → *better* retention

- **Self-reference**: deeper analysis  
  → *highest* retention

**The processing of information influences learning & memory.**

Levels of Processing Activity - Rob Milner, UMMS
There are parallels to the levels of Bloom’s Taxonomy*

Levels of learning in the cognitive domain from simplest to most complex

# Three Major National Research Council Findings

#3 A Mega Cognitive Approach is Needed to Help Students Take Control of their Learning and Promote Independent Thinking:

- **IMPLICATIONS:**
  
  Provide insight into your internal dialog, tell them why you do what you do.

  How this is important?

  What are your goals?

  Reflection and self inquiry are a practiced skill.

  *Often we need to help ourselves and our students practice these goals.*
Mega Cognition and the Reflective Practice

“Understanding of learning is what oscillates between the inward and outward: An experience, often social, is reflected upon; the record of that reflection receives feedback, which leads to improvement. That combination of personal reflection and social feedback is the reflective practice.” (Pat Hutching)
Higher order thinking will be required of our students as they enter today’s job market.

This country cannot afford to educate a generation that acquires knowledge without ever understanding how that knowledge can benefit society or how to influence democratic decision making. We must teach the skills and values of democracy, creating innumerable opportunities for our students to practice and reap and the results of the real, hard work of citizenship.

-College and University Campus Compact President’s Fourth of July Declaration on the Civic Responsibility of Higher Education

Theory and Practice
So how does this translate into the collegiate experience?
COF Center for Sustainability and the Environment

- Speaker series
- Earth Day events
- Community service
- Research symposium
- Career events/networking
- Teach-ins
- Research and travel grants
- *Environmental Forum* course**
Environmental Forum

- Developed in 2004 in collaboration with SENCER (Science Education for New Civic Engagement and Responsibilities)
- Examination of current issues:
  - Climate Change
  - Environmental Health
  - Sustainable Energy
  - Water Resources
  - Urban Ecology
  - Environmental Health
Service Learning

“... offers a unique opportunity for America's young people ......to get involved with their communities in a tangible way

....engages students in the educational process, using what they learn in the classroom to solve real-life problems.

...they become actively contributing citizens and community members through the service they perform.”

Corporation for National and Community Service (www.learnandserve.org)
Environmental Forum
“Environmental Health”

- Ecology and Human Health
- How Human Health Depends on Nature
- Mercury in the Ocean and Fish
- Food-borne illness
- Poisoned water
- Environmental Justice
- Occupational Health
- Public Health Assessment and Public Policy
- Climate Change and Public Health
Environmental Health Grading

- 25% Attendance
- 20% Class participation
- 30% Written papers (3)
- 25% Service learning project
Simmons - Scott Ross Center

- Established in 2000
- 400 student placements per year
- Assists student placements in community
- Assists faculty with “framework”
- Trains students with “service-learning”
- Stresses “reflection”
Service-Learning Placements for Environmental Health

- Earthworks
  - Greening of urban spaces and primary schools in Boston
- Healthy Resources in Action
  - Lead paint inspections
- Jamaica Plain Asthma/Environmental Initiative
  - Asthma control for children
- Boston Public Health Commission
  - Website development
- YMCA International Learning Center
  - Interviews of immigrant families
- Bright Horizons Family Center
  - Greening of low income daycare center
Reflection Questions

- Was this your first service-learning experience?
- How was this experience for you?
- How did the work you did with the community partner contribute to your learning in this class?
- Would you do another service-learning project for another class after this experience?
- What skills did you learn that you think you will be to use in the future?
- Do you think you could have gained the learning from your project in another way besides service-learning?
- Why do think service-learning is used with this course?
- What did you notice about the communities that you were working with for this project?
- Did anything surprise you about your placement?
Nicole - Boston Asthma Initiative

“For the project we went to the Jamaica Plain community center from 4 to 6 on Tuesdays and Thursdays, with the goal of improving the asthma of participating children. For the first hour we had the kids sit in a classroom so we could teach them about their condition. That they could gain a better understanding and learn how to control their symptoms. Specifically, we taught them what is happening inside their bodies when they experience symptoms, and what kinds of environmental factors trigger these symptoms. Then we spent the second hour swimming in the pool with the children, assisting them in exercises specifically designed to help their breathing.”

“I think it is very important that we students take an active role in the communities around us and I hope to continue my part of this throughout the summer.”
“On Saturday, May 24, I worked at the Hennigan Elementary School. We spent the day weeding, turning over soil, clearing out brush, and laying down compost and fertilizer. Soon that small lot will be a fully functioning garden and it will be a place where anyone can come and enjoy the locally grown produce.”

“This was the first service-learning project of this nature that I have participated in, and I was very pleasantly surprised. Working with young children was a simple yet profound way to employ my developing knowledge and understanding of environmental studies. I admire the concept of Earthworks, and I plan on continuing to be involved with them in the future.”
“We set out on the streets of East Boston with the program coordinator and surveyed over a hundred houses where the inhabitants could be exposed to lead paint. It was satisfying to see the work we had done with the LAC reinforced key objectives from our Environmental Health class, such as identifying chemical and physical agents that can impact human health.”

“Following the completion of this service-learning project, I believe I would partake in another project in the future.”
Environmental Forum
“Sustainability and Food”

► Food Creation
► Food Consumption
► Food and Health
► Food and Politics
► Food and Climate Change
Students taught elementary students vegetable card games, colored pots, planted herbs and designed a recyclable relay race.

The mission of Campus Kitchens is to engage young leaders in working to combat hunger and food scarcity (partnering with local farms and using volunteers).

Students plan, cook, and deliver meals in addition to providing outreach support such as teaching nutrition lessons to young mothers and families.
Summary - Integration of Service Learning

- Increases student involvement in the course subject matter (student reflection)
- Increases integration of course content (student reflection)
- Key role of Scott-Ross Center for training and facilitation of community contacts
Student Reflections

- “Learned creative ways to recycle food and reduce food waste”
- “Seeing waste reduction in action”
- “Take knowledge from classroom to community”
- “Teaching plant growth and where food comes from”
- “Education is the Key to awareness of sustainability”
- “Learned how organizations manage sustainability”
How can deans and other academic leaders collaborate with faculty to encourage and support a new pedagogical approach in the classroom?
People resist the personal and organization change that must be made to alter a reality. Leaders capture the natural energy that comes from holding a picture of what might be.
The Eight-Stage Process of Creating Major Change

*Modified from Kotter: Leading Change*
Thank You