2014 Life Discovery – Doing Science Education Conference

Networking Session Report

This report lists the challenges, recommendations and resources identified by participants at the 2nd Life Discovery – Doing Science Education conference through a facilitated networking session. Part I of the session took place on Friday afternoon where participants were divided into groups based on their interests indicated during the registration process. Eight groups were formed. Facilitators were also pre-identified during the registration process. Each group reported on their group's reflections. On Saturday, participants were given the opportunity to browse through all the group reports and to prioritize these ideas. Each participant was given five dots that they could place to indicate the relative importance of the ideas that emerged. The numbers in parenthesis at the end of some ideas represent the number of dots received. Items receiving 6+ dots have been highlighted in maroon font.

Networking Topics

A. Community College
B. Grades 9-12 audience
C. Incorporating research into curriculum
D. Minority-serving Institutions
E. Lower division undergraduate (2 yr or 4 yr institutions) audience
F. Enhancing labs
G. Incorporating sustainability and social sciences into biology
H. Enhancing quantitative skills in biology

A) Community College

Challenges:

1) Limited Resources to help student engage in meaningful research (3)
2) Diverse students with wide breadth of experience, limited resources and access to technology and materials (3)
3) Limited understanding of who community college is serving:
    - Don't have same access to professional development (1)
    - Administrators don't always have the support they need to support change (1)
    - Don't have a strong voice in reform that is supported by research

Resources—URLS models, best practice

- Partner with a researcher at a nearby R1 institutions e.g. to gain access to Field stations and labs
- CCURI.org(NSF funded)
- Partner Higher Education with industries hiring STEM graduates to assess needs and deficiencies.
- Professional societies find ways to make membership relevant and inviting.

B) Grades 8—12

Challenges

1. Time: processing and developing new lessons / curriculum (2)
2. Differing levels of teacher and district buy-in, resulting in "flavor of the month?" patterns of implementation
3. Managing the change: common core, NGSS (4)
    - transition years?
    - Non-adoption: socio-political factors

Grades 9—12 Big challenges

1. Integration - vertical and horizontal (2)
2. NGSS is misunderstood as a curriculum
3. Teacher training: pre-service and in-service (7)

Resources-URLs models, best practices

- ENSIWEB www.indiana.edu/~ensiweb (Evolution/NOS lessions, Resources, Unit plans). See the following on ENSIWEB home page
    - Science surprises (grades 7-10 – any science: Exploring the Nature of Science- Text supplement
    - Debunking myths –free online
- iBiology-video (tutoring use of think pair-share) excellent—active learning
- John Hattie and Greg Yates, 2014, Visible Learning and the Science of How We Learn (Results of massive meta study)
- Understanding science http://undsci.berkeley.edu/
- Understanding evolution http://evolution.berkeley.edu/
- Talk origins
- Professional societies vet NGSS materials and "endorse" to help K-12 make good choices.
- Build strong higher Ed partnerships within higher education to build K-12 support partnerships between content science and education/pedagogy specialists

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C) Incorporating Research into Curriculum

Challenges

- "Supply and demand" (1)
    - Feedback
    - Teacher vs student work
    - Timing (1)
- Handing the unknown (2)
- Process &content (1)
- Engaging all students (8)
- Clear learning outcomes, rethink &prioritize, agreeing on curriculum, removing a portion of "expected " content from curriculum. (1)
- Sustaining interest and avoiding blowback ("exploitation" rumors)
- Student buy-in /quality of data
- Integrating across curricula/expected skills, and sustaining it (1)
- Assessment and rewards to use research (funding) (3)

Resources—URLs models ,best practices

- Nature's notebook. www.nn.usanpn.org
- Avida-ED digital evolution platform materials and software download www.avida-ed.msu.edu
- Data nuggets curriculum materials http://datanuggets.org/ (1)
- HHMI-Biointeractive
- -CURE,SURE, RISE surveys @Grinnell
- http://cuny.is/scienceforward
- Cornerstone courses at University of Oklahoma (schlupp@oa.edu) http://www.ou.edu/cas/biology.html
- CureNet.org.
- PCAST report (2012)
- University Research Opportunities Center (UROC) Cal State Monterey Bay http://uroc.csumb.edu/ (including emphasizing minority research)

D) Minority-Serving institutions

- Discuss importance of diversity in science in intro classes (6)
- Show examples of careers in ecology, environment, science, etc (4)
- Have paid internships in our fields (3)
- Bring in people in research or applied careers as a role models into classes (3)
- Have field experience early on (3)
- SEEDS, REUs and other minority focused mentorship program, research program (3)
- Challenge: developmental math students unprepared. One solution is a Boot camp but there are cost issues (living on campus?)(2)

- Learning community to address course related and career issues(3)

Resources—URLs models, best practices

- Biology undergraduate student program (BUSP) @ UC-Davis
- US Forest Service careers
- Diversity courses
    - in house
    - CIRTL

E) Lower Division Undergrad

Problem	Solution
Class Size (6)	Flipped / Blended
Faculty Resistance (6)	Incentives, Incremental Change
Inertia (4)	Support, Energy

Resources—URLs

- http://cuny.is/scienceforward
- groups in large classes: www.catme.org

F) Enhancing Labs

Challenges:

1. Time to prepare, class time
2. Money, funding , infrastructures (3)
3. Discrepancy between abilities in instructors and learners
4. Struggling to make labs inquiry based labs (11)
5. Student frustration with open ended questions
6. Student interest in the world. Biology and other species

Recommendation:

1. Teaching sabbaticals (5)
2. Small- medium equipment grants $10K - $50K (2)
3. Small –medium grants to incorporate evidence based practices (not invent new ones) (5)
4. Student co-author labs
5. Explicit expectations of students and faculty

Resources—URLs –models, best practices

- Avida-ED evo.labs www.avida-ed.msu.edu
- HHMI Bio-interactive

- Evolution in action: graphing and statistics
- LTERs (several) developing field based exercises and K-12 friendly data sets to work with in-class using real data.

G) Incorporating sustainability and social science

1. Training - encourage or enable students to learn to lead or participate in interdisciplinary terms(1)
2. Create new "comfort zones" for education at all levels to engage with interdisciplinary (3)
3. Professional progression - public mechanisms to enable positive professional environment for interdisciplinarity (8)

Resources—URLs models, best practices

- Encourage student leadership e.g. promote ESA's SEEDS program
- Inter-professional solutions course
    - Pre professional, pre-nursing, pre-engineering (8)
    - Solve community health challenge
    - JMU Bio/IPE 490

H) Enhancing Quantitative Skills in Biology

1. Data illiteracy (lack of ability to acquire, explore, use , manipulate, interpret data) (11)
2. Lack of integration of math, computer science, and biology (communication, jargon, ways of thinking) (12)
3. Quantitative anxiety (8)

Resources—URLs models, best practices

- QUBESHub (www.qubeshub.org) (3)
- MathBench (www.mathbend.umd.edu)
- Charlene D'Avanzo: TIEE resource on how to read figures
- Paul Strode and Ann Brokaw: Using Biointeractive Resources to Teach Mathematics and Statistics in Biology

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