PULSE
Promoting Vision and Change through Departmental Transformation
The NW PULSE Community of Practice

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THE AAAS 2011 Report “Vision and Change” Recommends a Focus on Core Concepts and Competencies, Not Details And Information, in Undergraduate Life Sciences Education
Many Efforts are Underway to Respond to the Challenge, including PULSE: the Partnership of Undergraduate Life Sciences Education
PULSE: Our Focus Is on Department-Level Change
PULSE is a Nationwide Project With Many Activities to Assist Departments to Align with Vision and Change

- Certification Program and Self-Assessment Rubrics
- Ambassadors Program
- Catalyst Program
- Online Resources
- Regional Networks, one in the Pacific Northwest
The Current PULSE Community

1731 Members as of November 1, 2015

140 Community Colleges  
216 LA Colleges  
189 RC Universities  
182 R1 Universities

www.pulsecommunity.org
Participants in Pacific Northwest PULSE Conferences-October 2013-15

Blue = PULSE Leaders
Yellow = Cohort 1, 2013
Red = Cohort 2, 2014
Green = Cohort 3, 2015

Grant: 1345033
Institutions and Individuals that Participated in Previous PULSE Workshops
Structure of Annual NW PULSE Workshops for Departmental Teams
What is your discipline?

A. Biology/Life Sciences
B. Chemistry
C. Earth Sciences/Geology
D. Physics
E. Engineering

If your discipline is not listed here, please enter it with your name, institution name and clicker number on the sign in sheet going around the room. Thanks!
What is your institution type?

A. Community college or other 2 year school
B. Four year liberal arts
C. Four year masters’ granting/regional comprehensive
D. R1 Research intensive university
A. Integration of core concepts into curriculum

Core concepts are:
• Evolution;
• Structure/function;
• Information flow/exchange/storage;
• Pathways and transformations of energy and matter;
• Systems

If your discipline is not life sciences, do not answer the first question!!
A1. Students are exposed to the core concepts multiple times as they complete their degree

A. None of the core concepts are covered multiple times in the curriculum
B. One or two of the core concepts are covered multiple times in the curriculum
C. Three of the five core concepts are covered multiple times in the curriculum
D. Four of the five concepts are covered multiple times in the curriculum
E. All five core concepts are covered multiple times in the curriculum

Core concepts are: Evolution; Structure/function; Information flow/exchange/storage; Pathways and transformations of energy and matter; Systems

If your discipline is not life sciences, do not answer this question!!
B. Integration of core competencies into curriculum

Core competencies are:
• Process of science;
• Quantitative reasoning;
• Modeling and simulation;
• Communication and collaboration;
• Interdisciplinary nature of science;
• Understanding of the relationship between science and society
B2. Students are exposed to the core competencies in significant detail in at least one required course

A. Students are not exposed to any of the core competencies in significant detail
B. Students are exposed to one or two of the core competencies in significant detail
C. Students are exposed to three of the six core competencies in significant detail
D. Students are exposed to four or five of the six core competencies in significant detail
E. Students are exposed to all six of the core competencies in significant detail

Core competencies are: Process of science; Quantitative reasoning; Modeling and simulation; Communication and collaboration; Interdisciplinary nature of science; Understanding of the relationship between science and society
B3. Students are exposed to the core competencies multiple times in order to complete their degree

A. None of the core competencies are covered multiple times in the curriculum
B. One or two of the core competencies are covered multiple times in the curriculum
C. Three of the six core competencies are covered multiple times in the curriculum
D. Four or five of the six core competencies are covered multiple times in the curriculum
E. All six of the core competencies are covered multiple times in the curriculum

Core competencies are: Process of science; Quantitative reasoning; Modeling and simulation; Communication and collaboration; Interdisciplinary nature of science; Understanding of the relationship between science and society
D. Program level assessment
D6. Assessment of six V&C competencies at the program level

A. Competencies not assessed at the program level
B. Development of at least one of the competencies assessed
C. Development of 2-3 competencies assessed
D. Development of 4-5 competencies assessed
E. Development of all 6 V&C competencies assessed

Core competencies are: Process of science; Quantitative reasoning; Modeling and simulation; Communication and collaboration; Interdisciplinary nature of science; Understanding of the relationship between science and society
D7. Use of data on program effectiveness, direct and/or indirect, to strengthen the program

A. Program is not revised in response to data on program effectiveness

B. Program revision occurs in response to indirect data on program effectiveness only

C. Program revision occurs in response to indirect data and one source of direct data on program effectiveness

D. Program revision occurs in response to indirect data and 2-3 sources of direct data on program effectiveness

E. Program revision occurs in response to indirect data and 4 or more sources of direct data on program effectiveness
E. Pedagogy & student higher level learning
E8. Inquiry, ambiguity, analysis, and interpretation in all courses, lab and/or non-lab

A. Most courses do not provide opportunities for inquiry, ambiguity, analysis, and interpretation; students have little exposure

B. 25% or less of courses have opportunities for inquiry, ambiguity, analysis, and interpretation; a subset of students are exposed

C. Class sessions/assignments in ~25-50% of courses have opportunities for inquiry, ambiguity, analysis, and interpretation; many students are exposed

D. Greater than 50% of courses have opportunities for inquiry, ambiguity, analysis, and interpretation; most students are exposed

E. Opportunities for inquiry, ambiguity, analysis, and interpretation are the norm in all courses; nearly all students are exposed; many get multiple exposures
E9. Students’ metacognitive development

A. Faculty do not guide students to reflect on and understand how to use learning strategies that are supported by cognitive research
B. Less than 25% of faculty guide students to reflect on and understand how to use learning strategies that are supported by cognitive research
C. 26-50% of faculty guide students to reflect on and understand how to use learning strategies that are supported by cognitive research
D. 51% - 75% of faculty guide students to reflect on and understand how to use learning strategies that are supported by cognitive research
E. Greater than 75% of faculty routinely and intentionally guide students to reflect on and understand how to use learning strategies that are supported by cognitive research
E10. Students’ higher-order cognitive processes

A. Exams and assignments are focused on lowest-level cognitive processes (memorization/recall) across the curriculum.

B. Exams and assignments are typically at lower cognitive levels, but may include understanding and application in addition to recall across the curriculum.

C. Less than 25% of courses routinely challenge students to use higher-order cognitive processes (e.g., synthesize, evaluate, create) on exams and assignments.

D. 25-50% of courses routinely require students to use higher-order cognitive processes, but such practice is not yet ubiquitous across all courses.

E. Work at higher cognitive levels is the norm in most courses, and instructors are adept at developing assignments and exams for practice at each level.
E11. Pedagogical approaches reflect evidence-based practices

A. Lecturing without student engagement is dominant practice in all life science courses
B. Evidence-based pedagogies used by one or few instructors
C. A core group of faculty is shifting department's attitudes and practices toward more widespread use of evidence-based pedagogies, although courses in which students experience uninterrupted lecture are common
D. Nearly all faculty are learning about and attempting to adopt evidence-based pedagogical practices, although courses in which students experience uninterrupted lecture are a standard part of the curriculum
E. Majority of faculty routinely use evidence-based practices, so that students rarely sit passively listening to lectures for an entire class session
E12. Awareness of national efforts in undergraduate STEM education reform

A. Faculty isolated from the national dialogue
B. Pockets of awareness of need for reform and national efforts exist
C. Greater than 25% of the faculty aware of reform and national efforts
D. Greater than 50% of the faculty aware of reform and national efforts
E. Greater than 75% of faculty are aware of the need for reform and national efforts in undergraduate STEM
Survey: How useful do you think that this tool will be in your department/institution?

A. Extremely useful
B. Somewhat useful
C. Moderately useful
D. Limited usefulness
E. Not applicable/not useful
The full Snapshot Rubric (seven sections) is available at:
http://new.az1.qualtrics.com/SE/?SID=SV_1HafPxKwxU1Jmp7

Full versions of all rubrics can be accessed from the PULSE website:
pulsecommunity.org
What Do We Mean by *Systems Thinking*?

"Where are leverage points?"

"What's the mental model?"

"Structure drives behavior!"
System Approach to Understanding Faculty Members’ Teaching-Related Decisions
Habits of a Systems Thinker

- Seeks to understand the big picture
- Observes how elements within systems change over time, generating patterns and trends
- Recognizes that a system's structure generates its behavior
- Identifies the circular nature of complex cause and effect relationships
- Makes meaningful connections within and between systems
- Changes perspective to increase understanding
- Surfaces and tests assumptions
- Habits of a Systems Thinker
- Considers how mental models affect current reality and the future
- Uses understanding of system structure to identify possible leverage actions
- Considers short-term, long-term and unintended consequences of actions
- Pays attention to accumulations and their rates of change
- Recognizes the impact of time delays when exploring cause and effect relationships
- Checks results and changes actions if needed: “successive approximation”
Thank you for your attention.

Questions?

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