

Evolution across the biology curriculum at UWL: Departmental initiation and implementation process

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Vision & Change Goals

- Integrate Core Concepts and Competencies Throughout the Curriculum
 - Core Concept #1: Evolution
- Focus on student-centered Learning

The setting

- University of Wisconsin La Crosse
- 10,227 students; 1,100 biology majors
- Departmental content assessment takes place in the Biology capstone class.
- The Biology core curriculum is required of all biology majors and consists of: General Biology, Plant, Animal, or Organismal Biology, Genetics, Ecology, Cell Biology, and Capstone. Human Anatomy & Physiology I & II are also taken by almost all biology majors and were also included.

Our approach

- We tried to include all members of the biology department at every step of the process.
- We asked for their current teaching practice and to recommend to us what concepts would fit most logically in their classes.
- At each stage, EvoC members met with their core constituency and the committee reported our progress to the department.

Results

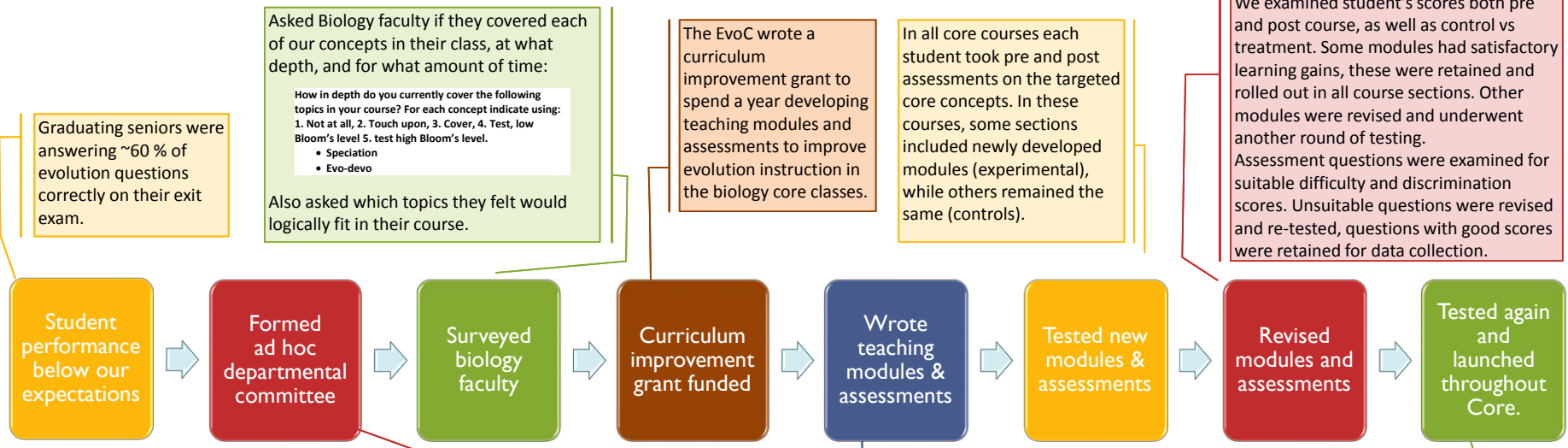
Figure 1. Curriculum map with results of survey of UWL Bio faculty, coverage of Evolution concepts in core courses. Numbers are average values across different instructors, representing different sections of the course. 1. Not at all, 2. Touch upon, 3. Cover, 4. Test, low Bloom's level, 5. test high Bloom's level.

Darker colors indicate areas of greater concern, little to no coverage of important concepts

Curriculum (average)	3.2	3.1	2.7	2.5	3.2	2.7	2.5	2.1	3.2	2.4	2.1	2.9	1.8	1.7	2.6
General Bio (majors)	4.0	3.8	3.6	2.4	4.2	4.2	3.4	3.4	3.4	4.0	2.8	2.8	1.4	2.0	2.6
Organismal Bio	5.0	5.0	4.0	2.0	5.0	2.0	3.0	2.0	5.0	3.0	4.0	5.0	1.0	2.0	5.0
Plant Bio	1.0	5.0	2.0	1.0	4.0	1.0	1.0	1.0	4.0	1.0	1.0	3.0	1.0	1.0	4.0
Animal Bio	4.0	5.0	4.5	2.0	3.5	2.0	1.5	1.0	2.0	1.0	1.0	1.5	2.0	1.5	3.5
Genetics	2.3	1.3	1.0	3.3	2.3	4.3	5.0	3.3	1.3	2.3	2.3	1.7	3.3	1.7	1.3
Ecology	3.0	1.3	1.7	2.0	3.7	1.7	3.0	1.3	4.3	4.7	3.3	4.3	1.3	1.0	1.3
Human A&P	2.0	1.0	2.0	2.0	1.0	3.0	1.0	3.0	4.0	1.0	1.0	2.0	1.0	3.0	1.0
Cell Bio	4.5	2.5	2.5	5.0	1.5	3.0	1.0	1.5	1.5	2.0	1.0	2.5	3.5	1.5	2.0

Figure 2. Average improvement in percent correct on post assessments for each concept comparing Control to Treatment sections. The number of questions on a concept varied from 1-9. *Indicates classes that only had Treatment sections. In this case percent improvement from pre-post assessment is given. Effect sizes should be larger in these cases (in gray). Data is for Spring 13 except Animal/Plant which only gathered data in Fall 12.

General Bio (majors)	25.00														13.19	17.36	
Plant Bio	-7.50															13.89	15.00
Organismal Bio*	17.05															2.42	1.21
Animal Bio	3.07								4.97							7.00	
Genetics												19.72					
Ecology																	
Human A&P*																	31.90
Cell Bio	0.00															6.00	4.22



The evolution across the curriculum committee (EvoC), totaling 8 members, was made up of one representative from each core class. This person acted as a liaison between their core constituency (the other faculty that typically teach that core course) and the committee. We met bimonthly for two semesters. Our first task was to determine what were the evolutionary concepts we wanted our students to know and to find out when and at what depth those concepts were being taught.

Sample concepts:

- Molecular Patterns of Evolution
- Speciation
- Evo-devo

We began with a 2 day workshop with the primary goal of producing student-centered teaching modules and assessments for 3 concepts for General Biology.

Workshop topics:

1. Intro. to student-centered learning.
2. Student conceptual difficulties with Evolution.
3. Guidelines for assessment development.

Student Centered Learning Module Format

1. Engagement question
2. Student exploration about concept
3. Instructor explanation
4. Extension question or activity
5. Assessment via clicker question

For the rest of the summer we met every 2 weeks to present the modules we had developed and revise with EvoC member's feedback.

This Fall, the new evolution teaching modules will be taught in all core courses, except Ecology, where the modules are not performing satisfactorily. We will continue to track any change in evolution content knowledge over the curriculum for the next 4 years.

Acknowledgements

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- UWL students!