CASPiE Module Development: From the Cradle to the Lab

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CASPiE Modules

- 6-8 week continuous research projects
- Curriculum developed by scientific researchers and CASPiE team members
- Students explore questions and collect data that will be used to further the research of the scientist

What Makes a Module

- Authored by a research scientist
- 2-4 weeks of skill-building activities
- Students develop their own research questions within the bounds of the module and ask previously unanswered questions
- 2-4 weeks of open-ended research
- Student data collected and used by research scientist in conjunction with their work

The First Meeting

- PI / Co-PI meets with module author to examine module goals
- CASPiE goals and criteria are outlined
- A rough outline for the module may be developed
- Community college faculty partner for module author is chosen

Writing

- Most of the writing is done independently by the author, or the author and her or his graduate students or staff
- The author is supplied with previously developed modules for reference and structural consistency

Writing (Cont.)

- The CASPiE staff and community college faculty partner meet with the author regularly to discuss progress
- Suggestions for accessibility, content, and writing style are made
- If necessary, the direction of the module can be adapted to better fit with the goals of the CASPiE program

In-Lab Testing

- During or after the writing and editing stages
- Undergraduate research students follow the written procedures and develop hypotheses as students in lab courses would
- Students provide feedback on accessibility and construction of procedures and materials to the author

Revisitation

- After the undergraduate research students test the module, the author receives their feedback and modifies the module using their findings
- Often, further testing is necessary to evaluate the modified materials

Implementation

- The module is often implemented small-scale (small number of lab sections) for the first run
- Information from the first implementation is used to modify the module for larger-scale implementations

CASE 1: Phytochemical Antioxidants with Potential Health Benefits in Foods

- Developed in the first semester of the CASPiE program
- Testing occurred concurrently with writing and editing
- During next semester, revisions were in-depth to integrate student feedback

CASE 1: Phytochemical Antioxidants with Potential Health Benefits in Foods

- Module was overhauled after its first implementation
- Further revisions completed by CASPiE staff
- Module finalized after three semesters of testing and revisions

CASE 2: Medicinal Chemistry: Small Molecule Anti-Viral Drug Development

- Module author had specific experimental needs from the outset
- Undergraduate research students started in the lab immediately exploring directions for the module without written materials
- The module author was deeply entrenched in this process, attending the beginning of each laboratory session to evaluate progress and guide the students

CASE 2: Medicinal Chemistry: Small Molecule Anti-Viral Drug Development

- The undergraduate research students have discovered new procedures during the testing phases that will be used in the module and possibly published
- The module itself is still in the early to middle stage of writing and editing

What We've Learned

- We have become more adept at making equipment and procedures accessible for the undergraduate lab
- Students need to see the big picture of the module very early on to become engaged
- Students are better prepared for the lab period when they are given explicit pre-lab and post-lab instructions (i.e. calculations in this section, make a reagents list)

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