

OPINION

Student Assisted Course Design

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Designing a new course is an important but time-consuming task for instructors. Traditionally, the instructor researches and develops the course, launches it as a pilot class, and receives student feedback upon completion of the course. Here I suggest student participation in the initial design and development of a new course. I initiated a course design class with a few motivated, upper division students to plan an advanced neuroscience course. The students assisted me in the new course preparation and offered valuable organizational and intellectual input prior

to launching the new course. The students benefited by receiving a deeper study of the course topics, developing critical analysis skills, learning about course design, and by viewing the course from the instructor's perspective. Thus, I propose that including students in the design of new courses can assist instructors in course development and can provide a unique, in depth learning experience for students.

Key words: course design; course preparation.

One of the challenges instructors face is the development of new courses. Many factors must be considered in the design of a course. These include the breadth and depth of course content, student learning outcomes, course materials (e.g., textbook), course logistics and format, and assessment of student learning/performance. For some courses, the content is defined by accreditation standards, content expectations in the field, or university or departmental requirements. However, in other circumstances, such as the development of advanced courses, the instructor is typically allowed much more freedom. This freedom allows the instructor to tailor a course to their own interests and pedagogy. However, with this freedom comes the requirement for the instructor to determine all aspects of a course.

Classically, these considerations are determined by the instructor prior to course launch and interaction with students. An instructor does research related to the proposed course and then develops a course they think is appropriate. Then, they teach the course, sometimes as a pilot course, at which point they receive feedback from students, assessments, and their own observations. This feedback can be used to improve a course for the next iteration.

As we strive to be learner-centered (Weimer, 2002), I offer an alternative approach, which is to include students in the course design process. Although others have had students develop some aspects of their own course (Hess, 2008; Weimer, 2002), I implemented a "design course" and worked with students to develop a new advanced neuroscience course. With two advanced students, we designed Neuroscience and Disease (BIOL 539) at Winthrop University that was implemented the following semester. The students assisted in the evaluation of course content, the selection of resources, and development of the course format. This proved to be a great benefit to me in the course preparation. These students also benefited from delving deeper into the intellectual content as they critically evaluated course

materials and design. Furthermore, they learned about course design and implementation from the instructor's perspective, and I received student feedback early on in the process of designing a new course.

Implementation

I utilized a flexible special topics course (BIOL 540, 3 credits), which allowed students to earn course credit for their effort. I recruited two accomplished senior biology majors for the new course design class because I knew they would understand the expectations of the proposed Neuroscience and Disease class. I suggest working with 2-3 advanced and motivated students who are very interested in the topic. I recommend upper division students because not only do they have a more advanced understanding of biological principles, they also better understand the rigor of courses at the institution. In addition, the students need to be mature learners who are internally motivated and self-directed in their learning, which are the advanced stages of learning according to Grow (1991).

Students can be involved in all aspects of developing a course. I started by preparing some topics for inclusion in BIOL 539, and my students helped me determine which would be of greatest interest to their peers. They also suggested additional topics that they thought would be useful, such as certain aspects of sensory perception. I solicited input from the students on class resources, including textbooks, online material, and journal articles. My students looked at two standard textbooks (Purves et al., 2012; Kandel et al., 2013) and an online textbook (Byrne and Dafny, 1997) and gave their opinions of which they found most helpful and readable. (They recommended the online textbook.) One can also assign a few specific readings in a text for the students to evaluate, and they can provide detailed feedback to help determine which particular sections to assign. In addition, my students discovered online resources and gave me feedback on what they found interesting and helpful.

I received extensive student feedback on journal articles for my new course. Students searched for relevant articles for the topics we were covering in the new course, but I also did extensive literature searches. We then met and discussed why we chose certain articles. We discussed how to find significant articles in the field, such as by looking in higher impact journals and at citations in review articles and textbooks. We then discussed article suitability based on readability at the student level, appropriateness for the topic, as well as connection with other course resources. I usually selected many more articles than they did, and often my articles were better suited, but that provided an excellent learning opportunity for the students. As the course progressed, they improved at finding useful articles, some of which we selected for the new course.

A major aspect of my design course was the reading and discussion of appropriate journal articles. I often assigned the students more articles than we would use in the new course. I led discussion on these articles, focusing on analyzing the Results. Through discussion, I observed how the students processed and understood the data from the articles. They gave me their opinions on the articles, and we discussed which articles would be appropriate. This student feedback on the journal articles was invaluable for me to decide which ones would be useful as resources for the new course.

The design course allows students to contribute input into class format and logistics. An instructor can pilot certain teaching methods, techniques, or exercises they are considering, receiving both directed feedback from the students and observational or assessment data on their learning. I led specific discussions and observed their response to my questions and received their feedback on how the discussion proceeded. I also gave my students potential assignments to complete; they provided feedback on these and I assessed their performance. For example, they completed one of the papers we proposed for the new course, and I could see that this assignment worked, but I also realized where I needed to modify the instructions. The students in my course design class were thoughtful about extrapolating what would work with their classmates.

If there is a laboratory component to the course (which was not my case), students can help research potential lab exercises and pilot them. This gives the instructor feedback on the clarity of the lab instructions and the timing of the exercise. It also helps determine if learning goals are met and can illuminate possible pitfalls, such as where additional instruction might be necessary or where student mastery, techniques, or accuracy could be an issue.

Overall, the students in my course design class provided a great deal of feedback and insight for my new course. They did not hesitate to give their opinions. I found them more willing to give feedback and ask questions than students in larger discussion classes. They took their design role very seriously, wanting to be responsible to design an effective course. In addition to obtaining an early perspective about what aspects might be confusing or difficult, the students offered solid

suggestions for covering course material. For instance, the students suggested that I require students in the future class to give short presentations of the techniques that would be covered in the readings. Thus, I found that with a couple of good, motivated students, I obtained excellent insights from the student perspective.

Logistics of a Course Design Model

I set up my course design class as a regular class meeting at a set time and place for consistency and to keep the work a priority. The meeting times were used for discussion and feedback on materials as well as piloting class discussions. In the beginning, I explained my ideas for the course and topics and received feedback on these aspects. Discussions regarding articles from our literature searches and why we chose them occupied about 20% of our class meetings. About 70% of our meetings were spent on pilot discussions of the journal articles themselves. The final ~10% of our class meetings were devoted to discussions about supplementary textbooks and other resources, logistics of the new class, and potential assignments and grading schemes for the future course. For this special topics course, I graded the students primarily on participation (80%) on a scale of 1-5, with good contributions and insights a 5. In addition, there was a paper on one of the covered topics for another 20% of the grade.

A colleague used a similar principle to develop a stem cell biology course. In his design course, he initially asked his students to gather syllabi of similar courses at other institutions for comparison and then they discussed them. Furthermore, he focused primarily on his students doing extensive literature searches for recent papers in the field, with the criteria that they be high impact and appropriate for upper-level undergraduates, and then discussing how useful the papers would be to his new course.

Benefits for Students

Working with students to design a course has a number of important benefits for the students. These students are exposed to a greater depth and breadth of potential course material that they read and evaluate (some of which is not in the final course). One of my students responded, "The learning environment allowed for a much more in depth interaction, and thus providing more insight into the field." Furthermore, evaluating the various aspects of the new course develops the students' critical thinking skills and helps them grow as self-directed learners (Grow, 1991). This experience asks students to assess the materials as well as themselves, an important aspect of learning (National Research Council, 2000), and to engage in an interactive collaborative discourse, another aspect of scientific learning (Osborne, 2010). In the design course, they learned more advanced aspects of a literature search and how to find important journal articles.

In addition, the students gain the instructor's perspective on a course. My students were surprised how much went into the development of a new course and how the academic workload stretched faculty time. One student commented, "The amount of research science I learned by

digging through all the literature in order to help a professor decide which articles a class will read and discuss was the best experience of my college career. I learned how much work a professor has to put into an hour class and how much prep time is required per actual class hour." The students also learned how to develop courses, a skill not formally taught in most institutions (outside of teacher training). This included planning the topics and assignments, and also understanding the pedagogical concepts in teaching and learning. The students appreciated that their earlier courses were foundational for evaluating the new course content. Finally, the students found it exciting to be involved in designing a new course. As one student said, "the opportunity to create a course for future students is one of the greatest opportunities an undergrad could experience."

Benefits for Faculty

Instructors, of course, will see many advantages to designing a course this way. First, there is sharing the workload with students, especially for finding and evaluating resources. This is a great help with the limited time faculty, especially junior faculty, have for course development. It allows broader review of relevant and cutting edge resources to use in the new course. Importantly, instructors receive significant feedback from students at the early stage of designing a course when it will be easier to make improvements. After student feedback in my course design class, I changed some of the topics and added student presentations of techniques in the field. I also was able to narrow down the readings that worked best with the students. I was much better prepared to teach the new course because of the course design class.

One unexpected benefit was that having students involved in the course design facilitated promotion of the new course. These students were very excited and positive about the new course, and felt ownership as it was "their" course to a great extent, similar to inquiry courses (Justice et al., 2007). They promoted the new course with other students and shared their enthusiasm for it. One student stated, "The course also excited me which in turn led to me discussing the actual upcoming course with other students. This, I feel, led to more students signing up for and taking the actual course." The students conveyed to their peers what the new course would be like. They also collaborated with an art student to produce a flyer for the new course that they posted around the biology building. I communicated the course focus and objectives to biology student advisors, but other than that, my course design students were my primary marketing tool outside of the course catalog entry. The new course filled to capacity (15 students). When the students in the Neuroscience and Disease were surveyed, 9 of 11 responders felt strongly positive to knowing that Winthrop students were involved in its design (Table 1).

In conclusion, involving students in course design has many advantages for the instructor in providing student feedback at an early stage. For students, this provides an excellent opportunity for deeper learning and critical

analysis as well as giving them an instructor's perspective. Overall, having students involved in course design can strengthen our course offerings and pedagogy as well as build stronger students in our discipline.

Survey prompt: Although BIOL 539 is a new course, I did a pilot version as a BIOL 540 with 2 students. These students provided significant input into the design and structure of the current BIOL 539 course. How do you feel about knowing that Winthrop students were involved in designing this course?

Strongly positive. That is why I took it.	1 (9%)
Strongly positive, but not why I took it.	8 (73%)
Positive.	1 (9%)
It does not make a difference to me.	1 (9%)
Negative.	0
Strongly negative.	0

Table 1. Response of students from the new BIOL 539 Neuroscience and Disease course to the fact that their peers assisted in the course design.

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