CASE STUDY: Implementation of Interdisciplinary Learning at The Ohio State University
Case Study Prepared For PKAL-Keck Facilitating Interdisciplinary Learning Project
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Institutional Setting
- Large, Public, Land Grant Institution, 56,867 students on Columbus Campus
- 2,930 Regular Tenure Track Faculty, ~ 12,000 courses (undergraduate, graduate, professional)

Mobilization for Curricular Change
- Proposed interdisciplinary approach for National Science Foundation Grant
- Developed new Integrated Science Course for OSTEP Summer Bridge Program
- Campus Conversations regarding Institutional Changes
- Shared Vision

The Ohio State University (OSU) Facilitating Interdisciplinary Learning team focused its efforts on a residential, six-week bridge program for incoming freshmen transitioning into college life as science, technology, engineering, and mathematics (STEM) majors. This program is a component of the NSF sponsored Ohio’s Science and Engineering Talent Expansion Project (OSTEP), in which the primary goal is to increase the number of STEM graduates. Programs that improve STEM education, student retention, and graduation are particularly important at this time at OSU because the institution is undergoing a transformation from the quarter system to semesters. This transition gives us an opportunity to review our current practices, achievement data, and feedback as part of redesigning programs and courses to better serve students. The OSTEP program and the institutional changes provide an environment supporting the development of a shared vision.

Interdisciplinary Community
- Reflective: Diverse Instructional team Ongoing Discussions
- Innovative: Existing Literature and Team Wisdom

The IDL aspects of the OSTEP program began to emerge when we recruited a group of faculty to plan the OSTEP bridge program. The group, which included engineers, chemists, physicists, mathematicians, and biologists, discussed and established the learning outcomes of the program. A smaller group designed Interdisciplinary Science, a course that is part of the program. Through our discussions, we considered research regarding student learning and student-centered pedagogies as well as the faculty members’ rich experiences in their own classrooms. These discussions led to a more focused vision and a toolkit of techniques to support student learning.

Implementation
- Used Backward Design to Develop Integrated Science course.
- Found immersion in IDL is Essential for Faculty and Students to Adopt New Strategies (“Deep Dive”)
- Maximized Institutional Resources and Institutional Partnerships
- Held Regular Team Discussions of Student Activities and Instructional Decisions

Following hours of these discussions and consultation with experts at other institutions, we developed the primary IDL course, Integrated Science. The course goals are to engage students in STEM by (1) facilitating their investigation of authentic questions involving concepts from chemistry, physics, engineering, biology, and mathematics; and (2) exposing students to the rigors of undergraduate STEM courses while they learn fundamental chemistry concepts. In this course, students spend time investigating how to interweave STEM concepts to answer questions regarding dragonfly flight and habitat. In addition to the dragonfly projects, students learn concepts related to substances, pH, and...
metathesis reactions and students completed complementary labs to prepare them for experiences in a
large introductory chemistry course. The bridge curriculum also includes courses in math,
communications, and engineering. Students learn physics applications in math, learn technical
communications, and use visualization tools in engineering to model the dragonfly wings collected in
Integrated Science. Student skill assessments took place across the courses independent of content.

These initial discussions were not enough for effective implementation of the IDL course. We found that
it was important for the faculty, who were accustomed to traditional techniques, to experience teaching
an interdisciplinary course to motivate them to learn more about IDL techniques. The additional
motivation primed the instructors to be receptive to new techniques that were introduced both on
campus and in professional development opportunities off campus. Our team learned that it is
important to be submersed in an authentic IDL classroom to adopt those methods.

**Institutionalization**

- Enabling Structures: Institutional Financial Support
- Enabling Structures: Diffuse IDL Practices by Involving More People

We were lucky to have institutional support from the Office of Academic Affairs to help us seek out
advice off-campus and to assemble an excellent instructional team. The use of an IDL approach in the
OSTEP program is important for the expansion of undergraduate STEM education reform, which is
valued by our institution. We find that our continued recruitment of other instructors to participate with
the OSTEP instructional team is a fruitful way to diffuse IDL teaching methods within OSU. As part of the
team, the instructors have the opportunity to learn IDL practices and discuss IDL with others.

**Major Program Challenges and Opportunities**

- Challenge - Faculty and student Interpretation of Goals
- Challenge - Student Missing the Point
- Challenge - Difficulty in Planning
- Opportunity – Learning Flexibility
- Opportunity – Improving Clarity to all Stakeholders

We have faced challenges as we tried to balance the program goals: (a) the instructional team
interpreted the goals differently; (b) students have not valued the importance of interdisciplinary
studies; (c) many students have not made the connections between the traditional chemistry lessons
and the IDL activities; and (d) the student-centered nature of the course requires flexibility making it
difficult to develop day-by-day plans for the course. We are working to clarify the instructional goals to
help the instructional team stay focused and to help the students value the tasks that support IDL. We
have been encouraged by the fact that others at OSU are interested in what we are learning about IDL
during our summer bridge courses. It is clear that there is much work still to be done and we look
forward to continuing to grow through our IDL endeavors.i

**Discussion Questions**

(1) What was surprising to you in this case study?
(2) What would be the challenges you would face implementing interdisciplinary learning if this was
    your institution?
(3) What do you want to do next to implement interdisciplinary learning at your institution?

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