Advancing Professional Development Strategies for Undergraduates in Chemistry and Biochemistry

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Abstract

In the Department of Chemistry and Biochemistry at the University of South Carolina (the Department), most curriculum-driven professional development is reserved for third- and fourth-year students. Academic instruction occurs at all levels, but the context comes late. Early exposure to career options and hands-on training is imperative for undergraduates to obtain maximum experiential learning. The purpose of this project is to advance the current professional development strategies of the Department, specifically targeting second- and third-year students. The study surveyed students’ current involvement in professional development activities. The data on extracurricular experience and post-graduation interest was used to design a workshop series to reach students with practical tools for success, such as networking skills and synthesizing intra- and extracurricular experiences. The impact of each workshop was assessed with post-session surveys providing participants about the value and applicability of information shared. The most beneficial topics were incorporated into curriculum development of the Department’s one-credit hour undergraduate seminar course. The course was converted from a series of faculty research presentations into a more complete, in-house professional development course. By integrating more advanced professional development into the curriculum, chemistry and biochemistry undergraduates will be encouraged to pursue experiential learning in their second and third years.

Background

The science education literature includes models for faculty professional development (PD) in order to improve student learning outcomes. The literature is silent, however, on the topic of science undergraduate PD. In order to produce self-directed learners, PD must be provided directly to students. Not only would this practice improve classroom learning (CL) outcomes, but also undergraduate PD would encourage participation in experiential learning (EL). EL engages students in several high-impact educational practices, such as internships, service learning, and global learning, in addition to undergraduate research (Kuh, 2013).

Concept Interaction and Legend: Integrative learning (IL) reflects upon the interaction between classroom (CL) and experiential learning (EL). Professional development (PD) trains students to successfully pursue EL.

Methods and Results

Professional Development Planning (PDP) Form
- Survey delivered digitally to undergraduates in chemistry and biochemistry to gauge career interests and PD involvement
- Conclusion: Sophomore and Junior PD/EL involvement matches overall student involvement, so more IL needed to help students make connections between EL and CL.

Workshop Series
- 5-session series conducted to offer formal PD training to undergraduates in chemistry and biochemistry
- Participants (n=10) agreed that the workshops “met” expectations and delivered “mostly relevant” to “very relevant” presentations and activities.
- Participants felt “more” to “a lot more” prepared to pursue experiential learning opportunities.
- Suggested improvements: better communicate available opportunities and provide more opportunities relevant to majors

CHEM 360: Undergraduate Seminar
- Redesign to construct formal, general PD course to introduce students to available resources and equip students to pursue EL

PD/EL involvement was measured by the PDP form in order to determine students’ baseline PD/EL activity for current and past experiences as well as students’ future PD/EL plans prior to study interventions. PD/EL involvement for sophomores and juniors was similar to involvement of the whole (data not shown).

Workshop Topics

1) Importance of PD
- Presenter: USC Connect
- Activity: Making connections between within- and beyond-the-classroom
- Pedagogy: PowerPoint lecture and hands-on activity

2) Resume and CV Writing
- Presenter: Career Center
- Activities: Quantifying and targeting your resume
- Pedagogy: Interactive discussion

3) Networking Skills
- Presenter: Dr. Amber Fallucca, PhD
- Activity: Writing an elevator pitch
- Pedagogy: Virtual PowerPoint lecture and interactive activity

4) Writing Personal Statements
- Presenter: Office of Fellowship and Scholar Programs and Office of Pre-Professional Advising
- Pedagogy: Pecha Kucha pre-recorded video and interactive discussion

5) Resource Fair
- Table Hosts: Office of Pre-Professional Advising
- Mechanism: Students visit tables of interest drop-in style

Producing Professional Scientists Significance

The Department’s Industrial Advisory Board (IAB) charged the Department in 2002 with producing scientists ready for the workplace. The IAB insisted that the companies could teach students the science necessary for their jobs; the challenge was to graduate students who could communicate well and be a productive member of the workforce.

Conclusion

More formal professional development is needed to equip students to pursue available EL opportunities. More integrative learning (IL) is needed to facilitate students making connections between EL and classroom learning (CL).

Recommendations
- Host career conversations within academic advising
- Require experiential learning
- Encourage professional development courses
- Reintroduce senior exit interviews
- Emphasize integrative learning
- Coordinate professional development workshop series for graduate students

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Selected References

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