Summary on Undergraduate Research

One of fourteen public universities in the Pennsylvania State System of Higher Education (PASSHE), Lock Haven University is situated in the heart of central Pennsylvania. With an enrollment of 5000 students, almost 90% of the university’s students come from Pennsylvania. Many LHU students are first-generation college students. Over three-quarters receive degrees in professional fields of study. LHUP offers 49 majors, the most popular include: education, sport, and recreation management, health sciences, criminal justice, business, psychology, social work, communication media, and biology. Master’s Programs are also offered in education, counseling, sports studies, and health sciences (Physicians Assistant). Of degrees awarded in 2011/12 most were bachelor degrees (80% bachelor, 10% associate, and 10% master).

Our principal successes at Lock Haven University (LHU) involve steps taken to institutionalize Undergraduate Research (UGR) including: i) an annual University-wide Celebration of Scholarship event that focuses on UGR, ii) incorporation of UGR into some degree programs (Applied Physics, Psychology), and iii) a revised General Education program that promotes UGR through Critical Thinking and Experiential Learning outcomes. Individual faculty and programs have been successful in obtaining federal and state grants that support student research and have fostered UGR experiences by codifying them in the curriculum. An example is the capstone research project required of students in Computer Science (see box below). Lastly, the faculty union (APSCUF) has pledged funds for a competitive award for students conducting UGR. These efforts have contributed to large numbers of independent studies within the STEM and health related disciplines (Table 1). This is a frequent conversation with our students and faculty, and it becomes easier with time to expand UGR into non-STEM disciplines and assess the impact of UGR on student learning and success.

Major Challenges

The major challenges we face are how to increase the number and depth of UGR experiences when faced with shrinking budgets, limited time for research during the academic year and financial constraints on student research during summer. Additional funds are needed to support student and faculty travel to conferences and to support a full-time grants office. Additionally, we seek to expand UGR into non-STEM disciplines and assess the impact of UGR on student learning and success.

Applied Computer Science Capstone Course

The Applied Computer Science and Information System program instituted a required capstone course in 2012. COMP475, Senior Capstone in Computing is an integrating experience that requires students to apply knowledge and skills gained from previous coursework in both the core and their concentration. They demonstrate analytical problem solving and hone research skills through a senior project based on the student’s program track. Students develop a project proposal containing a research and product component. Examples of senior projects include:

- Developing new algorithms to identify musical data from images of sheet music
- Creating techniques to optimize management of web services
- Analyzing software models as applied to game development
- Simulating network traffic and analyzing load patterns

Total number of students that have participated since the capstone requirement was implemented three years later: 12 students the first year, 21 students the second year, and 29 students the third year.

Analysis of Current Rates of UGR at LHU

Showen are the number of students completing Independent Study (IS) vs. other Experiential Learning (EL) experiences including clinical experiences, field experiences, student teaching, and internships.

While we can be reasonably sure that the IS experiences are research based, we cannot be certain that some of the other EL experiences do not include research experiences. This would result in an underestimation of numbers of students engaged in student research and reflects a flaw in tracking student research.

In conclusion, even in a challenging funding environment, LHUP has increased the number of students involved in UGR. There remain, however, several long-term goals that are yet to be achieved.

Contributor Acknowledgements

We would like to give thanks to other contributors who provided information or feedback on this presentation: Sue Boland (Psychology-CUR Chair), Mark Cloud (Psychology-APSCUF President), Carina Howell (Biological Sciences), Beth McMahon (Health Sciences), Tara Mitchell (Psychology), John Reid (Physics).

FINAL ANALYSIS

Classically defined UGR is systemic in the NBHS Disciplines as Independent Studies, while Internships and other Experiential Learning experiences (student teaching, clinical, field experiences) are more common in LAE and BISHS disciplines. A broader definition of UGR is needed to capture these student experiences (Fig. 2). Furthermore, if the campus community could define or capture student products created during Internships and External Learning experiences, it could better codify and count these experiences as traditional UGR products. Most student complete IS and other EL experiences in their Junior or Senior year. Thus, an additional goal is to assess the level of research experience students get earlier in their academic careers at LHUP.

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