12-2005

Requiring Undergraduate Research for a BS Degree in Biology: Does It Do Any Good?

Heather G. Kuruvilla
Cedarville University, heatherkuruvilla@cedarville.edu

Alicia E. Schaffner
schaffna@cedarville.edu

B. E. Phipps

Follow this and additional works at: http://digitalcommons.cedarville.edu/science_and_mathematics_presentations

Part of the Biology Commons

Recommended Citation
Requiring Undergraduate Research for a BS Degree in Biology: Does It Do Any Good?  
Heather G. Kuruvilla, Associate Professor of Biology  
Department of Science and Mathematics, Cedarville University, 251 North Main St., Cedarville, OH 45314

Introduction
Cedarville University is a primarily undergraduate institution located in Southwest Ohio. Cedarville has always been committed to excellence in teaching, and our focus is on mentoring undergraduate students in order to ensure their future success. However, we realize that the research experience is a critical part of “learning science”.

Several years ago, the biology faculty at Cedarville University decided to make a one-semester course in undergraduate research a mandatory component of the BS degree in biology. Research remains a popular elective choice for the BA degree in biology, as well as the biology education degree.

Our aim in requiring research was twofold:
1. To help students learn the scientific method by putting it into practice while solving an original research problem.
2. To help students gain necessary marketable skills which would facilitate entry into either graduate/professional school or the industry position of their choice.

Additional goals we had in mind included the following:
• Inquiry-based learning
• Learning new techniques
• Learning the value of perseverance in research
• Falsifying hypotheses
• Working as a member of a team

Survey form
Survey for Research Alumni
1. I was/will be an author on a publication as a result of research done at Cedarville University.
   • Agree
   • Disagree

2. Having previous research experience and/or being an author on a publication helped me to gain admission into my current place of education/employment.
   • Agree
   • Disagree

3. In addition to the research I did at CU, I did research through a Summer Undergraduate Research Program (SURP) at another institution.
   • Agree
   • Disagree

4. My destination after graduation from CU was (please specify).
   • Agree
   • Disagree

5. Being involved in research helped me better understand the scientific method.
   • Agree
   • Disagree

6. How I do this research was important to me.
   • Agree
   • Disagree

7. The mandatory research requirement should remain as part of Cedarville University’s BS BIO program.
   • Agree
   • Disagree

8. What was the most important thing about our research program?
   • Agree
   • Disagree

9. What would you be most likely to change?
   • Agree
   • Disagree

10. What would you be most likely to change?
    • Agree
    • Disagree

Results
The survey was emailed to 22 alumni who had worked with me in the CU research program. The alumni were chosen based on valid email addresses that I was able to obtain, either through the alumni office, or through my personal communication with the students themselves. 21 of 22 students responded to my email, giving me personal updates on their progress as well as completing the survey. This was a 95.4% participation rate. The unusually high participation rate can be explained by the fact that I have worked with all of these students and invested personally in their lives. Although the sample is not random, the data obtained from this survey still be useful in helping us to assess and better our research program.

Survey design and participants

My research/publishing experience helped me obtain my current position.

One of the stated goals of our program is to help students gain admission to the graduate program or industry of their choice. The majority of respondents did, indeed, find the research experience helpful in this regard.

In addition to my research at Cedarville University, I pursued additional undergraduate research opportunities.

The majority of alumni surveyed either pursued Ph.D. programs in the biological sciences or careers in the medical field. However, many career choices were represented. I was/will be an author on a publication as a result of my research at Cedarville University

My research at CU helped me better understand the scientific method.

Surprisingly, few respondents had pursued undergraduate research opportunities outside CU. This is a trend that is beginning to change, as many students seek to broaden their research horizons by working at a large university or research center over the summer.

My research at CU helped me better understand the scientific method.

The majority of respondents expected to be authors on publications as a result of their research experience. While this has been true of my students, it is not representative of our research program as a whole.

Selected Open-ended Responses
What was your favorite thing about our research program?
• Freedom to do experiments we wanted with the uncertainty of Ph.D. Education
• Independence, working on your own experiment
• Working as a member of a team
• Learning to figure things out on my own
• First hand experience with research
• Learning how data were collected
• Solving the mysteries of the unknown
• Freedom to work on things without being graded on results
• (You Dr. K)
• Brainstorming and coming up with own ideas.
• Being able to speak more knowledgeably with members of the biology community
• Independence, working on your own experiment

What would you be most likely to change?
• More research required, either more times per week, or longer time period (e.g. a year instead of a semester) (14.3%)
• More research topics to choose from (19.0%)
• Mandatory data presentation at end of research (14.3%)
• Start research earlier in students’ career
• Allow government funding or extramural funding for research (9.5%)
• More background knowledge prior to beginning the project (14.3%)
• More experience/education in scientific writing
• More research laboratory facilities

Summary
• The goals of our research program are currently being met; however, the program could be further improved.
• We can better serve our students by increasing their accountability in terms of presentations and written reports of their data.
• We should continue to encourage students to pursue opportunities outside of CU in order to broaden the diversity of research offerings.
• We should encourage students to continue their projects for a year, rather than a semester.
• We should invest more time in teaching “background” concepts at the beginning of the semester.

Contact information
Heather G. Kuruvilla, Ph.D.
Associate Professor of Biology
Cedarville University
Department of Science and Mathematics
251 North Main Street
Cedarville, OH 45314
Email: heatherkuruvilla@cedarville.edu
Office Phone: (937) 766-7806
Fax: (937) 766-7631
http://people.cedarville.edu/Employee/heatherkuruvilla/