Using IMPULSE undergraduate neuroscience education: from experiment to publishing in the classroom

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Introduction

The online neuroscience journal for undergraduates, IMPULSE, was created in 2003 (see, Nov. Abs. 29:153) to fulfill a need for training in scientific publishing and peer review. It now has seven archived issues (2004, see, Nov. Abs. 30:26.4; 2005, see, Nov. Abs. 31:20.19; 2006, see, Nov. Abs. 32:26.17; 2007, see, Nov. Abs. 33:22.4; 2009, see, Nov. Abs. 33:23.9). While primary research expectations of undergraduate education programs have increased, work completed by undergraduates is still usually not published or is compiled into a study submitted by the mentor. Furthermore, undergraduate students may not be exposed to the peer review process, an important process in scientific publishing. The current report highlights the use of the journal for enhancing the teaching and learning experience in an undergraduate neuroscience class.

IMPULSE has been offering students the opportunity to publish their research and/or serve as peer reviewers, allowing for a more complete research experience. In one instance, undergraduate students in a neurobiology course at Ursinus College were required to work in teams to prepare a manuscript for submission to IMPULSE. The students carried out original research on drug effects on the D. magnus nervous system, connecting background research to that done in the classroom. Upon submission, each manuscript was sent to an international review team of students from over 15 universities.

Experimental Details

Week 1: The first week the laboratory section of the course met, students worked in groups of four and discussed which chemicals to test. They designed their experiments and started working with D. magnus, collecting culturing data and monitoring heart rate in water. There was a class discussion about the format of IMPULSE articles and the process of online submission. Students also began searching for scientific literature on PubMed.

Week 2: Students began collecting data measuring the effect of stimulants and depreesters on the heart rate of D. magnus. The class reviewed the format of introductions to laboratory projects and the Methods sections in scientific papers.

Week 3: Students continued collecting data and discussed the format of Abstracts, Results, and Discussion sections.

Week 4: Each student group submitted a complete version of a paper that they worked on together, which included their most current data. There was a peer review workshop where students read and commented on each other’s papers; students continued collecting data.

Week 5: Groups presented revised papers and collected additional data.

Week 6: Papers were returned with comments and final data collection was completed.

Week 7: Each student group submitted their revised paper to the journal, IMPULSE.

After several weeks, all of the student groups received IMPULSE reviewers’ comments. For the purpose of the course, the students were given one week for revisions so that papers could be resubmitted before the end of the semester. Ordinarily, a single paper resubmitted with all reviewer comments addressed would have been posted shortly thereafter. However, receiving five resubmissions at the end of the IMPULSE reviewers’ own semesters threatened to overwhelm the review process, and the first article was not posted until August; the journal has modified its review process as a result of this happy problem, and encourages other neuroscience faculty to consider incorporating manuscript submission to IMPULSE as part of their course.

Student and Mentor Advantages

Once students understood that publication of their research was an option, they spent more time and effort researching, writing, and revising the paper, thus stimulating a more in-depth writing experience and a deeper understanding of the research background. Students were able to delve deeper into the functioning of neuronal pathways involved in response to stimulants and depressants than students would have experienced otherwise.

If publication is an option, students tend to take more ownership of their research because, if published, their name will be printed on the paper. Therefore, the research is often more meticulous and thorough than it would be for any other lab course. Students working as peer reviewers have also indicated that a practical understanding of the scientific writing and publishing process helps with lab course writing and will be valuable in their future careers.

The professor (K.R.) found that she made more comprehensive critiques of the papers, grading each paper on the standard of quality seen in most scientific journals. She recognized that possible publication helped motivate students working in the lab. The benefits of undergraduate research can be fully realized by professors with the aid of IMPULSE. The use of IMPULSE is encouraged at other institutions to cultivate professional development in pre-professional neuroscience programs. Students wishing to submit or become reviewers and faculty wishing to set up a training site are asked to contact Impulse. To receive more information about IMPULSE, please write to us at the e-mail address.

History of IMPULSE


2004 First issue posted online. IMPULSE presented at SEN (Nov. Abs. 30:26.4).


2006 Redesign of IMPULSE for rolling publication: IMPULSE presented at 2nd SYNAPSE meeting. Publicity Editors created; ISSN 4 request completed. 2006 issue presented at SEN (Nov. Abs. 32:26.13).


2009 Website moved to www.impulse.aphstate.edu. IMPULSE presented at 5th SYNAPSE meeting and SEN (Nov. Abs. 35:23.9). Dr. S. Switzer (U. South Carolina) steps in as 3rd FA. Dr. S. Symington joins as 4th FA (Salve Regina). Fifth class of graduate students; new reviewers and editors step in.

2010 Sixth annual issue archived. IMPULSE presented at 6th SYNAPSE meeting sponsored by the Helzter Honors College at Appalachian State University. The Department of Psychology at Middlebury College, the South Carolina Honors College at the University of South Carolina, and the Department of Biology at Salve Regina University.

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