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Laboratory or Service-Learning (S-L)? The Community Experience Is Part of the Answer

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Introduction

Students who major or minor in Biological Sciences at North Carolina State University (<http://www.cals.ncsu.edu/>) are required to complete a one-credit course, *Senior Seminar in Biology*, as juniors or seniors. Referred to as “seniors” in this paper, they learn about seminars as customary professional events in the sciences and become more skilled in speaking, writing, editing, and publication protocols. However, due to high numbers of seniors (>100/semester) and the availability of a single meeting time each week, we have yielded class times to invited speakers who address professional development topics and current topics/issues in the biological sciences and in the state and region. Student responsibilities, beyond attendance supported by a written one-minute summary of the day’s seminar, are completion of a designated community service requirement. Community service may involve instructional activities as teaching a class, tutoring, mentoring, and generally supporting the educational effort. Recently, the service activity has been devoted exclusively to assisting youngsters/youth in educational and after school programs.

The transition to a service-learning format was tested along with several other formats during 2003 and seniors rated it very highly. Furthermore, this type of service project is consistently available and always needed, and N.C. State University promotes community engagement by faculty, students, and staff (<http://www.ncsu.edu/extension/>).

The University’s Biological Sciences Interdepartmental Curriculum prepares graduates who are proficient in communication as well as in the biological sciences. As part of this curriculum’s assessment, we prepared a written survey and administered it during the last class day for spring and fall semesters, 2004. Survey results provide the basis for this paper. All “selected comments” provided herein were chosen by Flynn as part of her doctoral program. Haning led the course.

Procedures

Course Description

The instructor selected the topics and speakers as well as the community sites where seniors could complete their instructional community service. Some seniors also helped coordinate activities. Considerably more sites were available in spring term than in the fall. Seniors were asked to serve for 8–9 hours that they could complete at their choice of sites anytime during the semester. They were encouraged to work in pairs or small groups and to spread their collective efforts throughout the semester in order to be of optimum benefit to the community.

The major service sites were several Boys and Girls Clubs (<http://www.wakebgc.org/>), two John H. Baker, Jr., Charter High Schools (<http://www.jbchigh@bellsouth.net>) (one is a detention center and one is not), and the Governor Morehead School for the Blind (<http://www.governormorehead.net/>). Some of these opportunities were periodic, one-time events, for example:

- assisting with the state level Science Olympiad (<http://www.soinc.org/>) biology events,
- judging science fairs,
- planning a spring science-focused N.C. State workshop called *Expanding Your Horizons* (http://www2.ncsu.edu/ncsu/univ_relations/news_services/press_releases/98_03/66.htm),
- special events at the N.C. Museum of Natural Sciences (<http://www.naturalsciences.org/>), and
- responding to local school teachers' requests for assistance with special science topics.

Since some seniors preferred weekend service opportunities, we established a *Saturday Science Academy* at the Raleigh Boys and Girls' Club, replete with special tee shirts, diplomas and a graduation ceremony. In both semesters, but emphatically in fall, the vast majority of community students were considered as "at-risk", indicated by * where appropriate in this paper. Some service sites required greater preparation and planning by seniors than did others, for example, teaching an actual lesson vs. mentoring in an after school program.

At semesters' end, seniors submitted a 2-page written report summarizing their service work and its significance to them. Satisfactory attendance and written reports guaranteed an A+ grade. Seniors were not obligated to complete the survey (See Appendix) consisting of 14 qualitative and quantitative items. Means were calculated for seniors' numerical responses. Other assessment methods for service-learning courses exist, e.g., Gelman (2000 a, b).

Results

Spring 2004 (S'04)

In S'04, 99 students (90%) completed the survey. According to the results, seniors devoted a mean of 1.7 hours preparing for their projects and 5.92 hours in completing them. They identified 21 community service sites including Museum of Natural Sciences; Science Olympiad (3); Expanding Your Horizons Science Conference (2); Raleigh Boys and Girls Clubs* (49); Zebulon Boys and Girls Club* (5); Wake County Detention Center* (8); Habitat for Humanity (2); Loaves and Fishes After School Program*; Yates Mill Pond Camp; Heritage Park (environmental education) (3); Governor Morehead School for the Blind (5) Fuller Elementary School* (2); Lincoln Heights Elementary School*; Winstead Elementary School*; Reedy Creek Elementary School (2); Farmington Woods Elementary School; Fred Olds Elementary School (5); Washington Elementary School* (7); Adams Elementary School; East Millbrook Middle School, and Southeast Raleigh High School. The number of seniors who selected the different sites is given in parentheses (one student served if there is no number).

Seniors described their service assignments as: helping with:

- homework in science as well as other subjects (42);
- tutoring in science (and other subjects) (29);
- assisting with games and other recreational activities (11);
- answering various questions about science (4);
- reading to/with students (4);
- teaching elementary school students about the importance of science (3);

- teaching kindergarten students about plants (3);
- helping middle school students with science fair projects (2);
- teaching a high school biology class about forensic science (2);
- preparing and delivering a lesson about dolphins to a 3rd grade class;
- helping students prepare for science exams;
- helping motivate students in science;
- assisting in environmental science activities, projects and field trips;
- developing and presenting a science activity at a science conference;
- mentoring young students;
- simplifying science material for young students; and
- formulating and administering a science exam in a high school class.

Many listed more than one service activity. All other questions were evaluated using a 1 – 5 scale with 5 representing the greatest success/benefit. Rating means are provided in Table 1.

Table 1. Means of students' ratings to survey items for S'04 and F'04. Questions 3-8 are based on use of a 1-5 scale, with 5 always being the highest possible rating.

Question:	Spring 2004 (means)	Fall 2004 (means)
2a. Hours of preparation	1.70	2.36
2b. Hours for completion	5.92	6.43
4. Assess – community benefits	3.99	3.84
6. Success – individual projects	4.13	3.94
8. Assess – personal benefits	4.32	4.01
9. Probability – future projects	3.91	3.78
11. Preparation for project	3.54	3.31
13. Assess – lifelong value	3.85	3.62

The mean for seniors' assessment of the community benefit from their individual projects was 3.99 while their assessment of the success of their projects was 4.13. Nearly 100% of seniors responded to this question. Four replied that the inability to continue working with the youngsters prevented their assessing their projects as successful. Select comments were: "I gave kids some science experience they would not otherwise have gotten." "Children enjoy it when someone spends some time with them." "It benefited me as well as them." "I believe that I helped some girls become more interested in science." "We helped the community by helping its youth." "I learned that all students need special attention." "I plan on continuing to serve in this way." Nearly 100% of seniors responded to this question. Four replied that the inability to continue working with the youngsters prevented their assessing their projects as successful.

Seniors rated the benefits that accrued to themselves as 4.32. Four seniors did not respond to this question. Seniors wrote: "I learned that I have to be able to relate my knowledge to anyone." "I enjoyed the brief moments when students appeared interested in science." "I saw the importance of teaching young kids." "It made me appreciate my education." "An appreciation of service encourages one to do more." "Knowing that I've helped children even in a small way is rewarding." "I developed a concern for science education." "No matter how much work it took, it felt good in the end."

Seniors indicated, with a mean rating of 3.91, that they were likely to seek other education-focused service projects in the future. They rated their overall undergraduate preparation for their service projects as 3.54 and wrote: “You must know biology to teach biology.” “My coursework made helping children with science easier.” The biological sciences department needs to provide a leadership preparation course.” “My public speaking course helped me.” “My biological sciences coursework helped but you can’t be too detailed with 5 year olds.” And “The biological sciences department needs to provide more external opportunities for service.”

Their suggestions for enhancing seniors’ preparation for this project were “more community service requirements”, “a science pedagogy class”, “personally, more experience with children”, “more preparation time”, “knowing about the audience’s prior knowledge”, “observing a teacher in an individual settings”, “more undergraduate outreach programs”, “more advanced information about what I would be tutoring” and “do not think any experience would have enhanced preparation”.

They also wrote: “I enjoyed it and may do it again.” “Continue the service requirement.” “It was rewarding.” “It would have been better if we could have picked our own organization/type of work.” “It was fun.” “unique part of my degree – glad I had the opportunity”, “great experience”, “needs to be more organized”, “better times – conflicting schedules”, “helps one understand the power of knowledge”. They rated the overall, life-long value of their community service as 3.85.

Fall 2004 (F’04)

In F’04, 90 biology seniors (75%) completed the survey, identifying 10 instructional community sites where they served. (The number of seniors who selected the different sites is given in parentheses; one student served if there is no number.) Sites included: Raleigh Boys and Girls Club* (74); Saturday Science Academy* (6); Washington Elementary School* (6); Dubois Center* (5); John H. Baker, Jr., Charter High School (non-detention)* (5); John H. Baker, Jr., Charter High School (detention)* (5); Governor Morehead School for the Blind (2); Zebulon Boys and Girls Club* (2). Forty-five seniors worked independently and 35 worked with one or more peers. They summarized their projects as follows: helping with homework in science and other subjects (33); tutoring in science and other subjects (28); assisting with games and other recreational activities (14); teaching elementary school students about the importance of science (12); mentoring (4); teaching a science lesson (2); aiding teachers (2), and conducting small experiments for children (2).

Mean ratings of their responses to the survey items are provided in Table 1. Means for hours of preparation and hours for completion were higher than in spring semester but means for all other questions were lower than in the spring.

Their assessment of community benefit from their individual projects provided a mean of 3.84, and the personal benefits that accrued to them as 4.01. Regarding the latter, they wrote: “I learned how to better bridge the gap and relate with younger children.” “I felt that I made these kids happy. We had a lot of fun.” “I wanted them to be interested and when they were, I felt so good about what I was doing.” “It made me feel good; I benefited by helping young children and I could tell that I made a difference.” “I learned aspects of life that I had not been exposed to, such as poverty.” “It made me feel good to give back to the community and help out with subjects that I know well.” They assessed the community benefit from their individual projects as 3.84, and they wrote the following comments: “I felt like I could connect with the students and that their life was impacted by my sharing my experiences.” “Not only did I help others that needed attention, but I gained from the experience as well.” “The kids had a lot of fun and so did I. We played and they all wanted to know when I would come back.” “I helped children with their homework and along the way I made a few friends.” “It really helped those children and the

children are our future.” “I think when you give your time to the community it is a success.” “My ability to work/relate to children is not the best so I learned from them as well as them learning from me.” “I had super fun.” Ten seniors responded that they did not think that their community service was a success, believing that the youngsters were not interested and that teachers were already there to instruct.

Seniors rated the overall, life-long value of this community service requirement as 3.63, and commented: “I think that it was a good idea but difficult to schedule.” “It was a very valuable learning experience.” “It was hard for me to complete. It would be nice to have other options available for those who work, go to school, and have children.” “More service options that relate to different areas other than teaching.” “It was very rewarding.” “I think that this is a good starting point for those who want to get very involved in community projects in the future.”

Seniors rated the likelihood of their seeking other education-focused service projects in the future (mean = 3.78), their overall undergraduate preparation for their individual service projects (mean = 3.31) and provided these comments: “It really did not require any college training. As long as you had the classes in high school you were able to help them understand better.” “I have had to learn how to successfully communicate with others on many levels.” “I didn’t exactly teach much so there was no preparation except to be ready for a lot of kids.” “The structure of learning through my education helped me when explaining information to others.” “I had taken a biology service-learning course (no longer offered). This course helped me to perceive my service in all aspects.” “My previous experience as an undergraduate helped me with time management to find time to complete this project.”

They added these suggestions for improving their preparation: “Knowing exactly what I was going to do.” “Having another person with me.” “Educational psychology coursework.” “More interaction with children.” “Experience being the minority (non-American student).” “Knowing the curriculum of elementary and middle school kids today.” And “More communication and teaching skills.”

Community Partners/Service Sites

We did not formally survey the community partners but we were constantly engaged by telephone, email, and in person, and can confidently report that agency leaders were very pleased and gratified with the biology student commitment and want this program to be maintained. The Raleigh Boys and Girls Clubs awarded *Senior Seminar in Biology* the *Volunteer Program of the Year* award for establishment of the *Saturday Science Academy*.

Discussion

We believe that the decision to modify *Senior Seminar in Biology* from a speaking-writing course to a speakers’ bureau and community service course was productive for all participants. The transition was motivated by previous student feedback that requested another format and by the authors’ dedication to community service. Additionally, N.C. State has added engagement to its extension mission (<http://www.ncsu.edu/extension/>), and the Faculty Center for Teaching and Learning (<http://www.ncsu.edu/fctl/Initiatives/>) hosts a Service-Learning faculty group who instruct and assist with service-learning courses. However, there is neither a requirement by the University or the College of Agriculture and Life Sciences, in which the Biological Sciences Interdepartmental is housed, that students perform community service.

Many seniors have volunteer experience while many others are new to the experience and summarize it as highly significant and meaningful to them, and robustly indicated such in their written reports. Furthermore, over the two semesters, they provided a mean rating of 3.85 regarding the

likelihood of performing volunteer work in the future (Sax and Astin, 2000). The majority of senior seminar courses in biology are either research-focused or are combinations of student seminars and invited speakers. N.C. State biology students have a 3-hour requirement for successful completion of a research, teaching or service internship of their choosing.

We observed that, overall, mean student ratings were higher in spring than in fall. This may be partly attributable to Flynn's presence in the spring class where she explained her assessment project and her absence in fall term. It may also be due to the problems of large classes in auditoria where less interested seniors sit in the rear (Greenberg et al, 1996), senior stress and the parochial views of some students who prefer to serve only in areas where they may find eventual employment (Slaboch, 2000; Woodmansee, 1995; Graves, 1994), and the exclusive focus on instructional service. While the survey was not administered in spring '05 when the course was conducted identically as in the fall, Haning believes that the ratings would have been lower, yet. There could have been subtle resentment about the number of service hours required but the recommendation to increase the hours was forcefully made by seniors during the trial year, 2003. The majority of seniors selected the less confining options, the after school programs, rather than more restrictive schedules. Their busy senior schedules seem to have compelled the majority to serve alone rather than to try to coordinate with others.

Large student numbers in the seminar course and limited time and credit prevented the course from being conducted as an authentic service-learning course (<http://www.ncsu.edu/ctl/Initiatives/Service-Learning/>) with structured reflection opportunities. Mabry (1998) found that college service learning is more effective when students complete 15-20 hours, have frequent contact with their beneficiaries, participate in weekly reflections in class as well as in continuous, summative writings, and discuss their service experiences with both instructors and site supervisors. Hardy et al., (2000) investigated student and community satisfaction with programs designed and implemented by students for at-risk pediatric clients in need of assistance. They found high levels of satisfaction by both groups and increased student self-assurance by the end of the program.

We firmly believe that the basic content of this course must be available to students much earlier in their careers, ideally, as sophomores, and that it should be a 3 or 4 credit service-learning course complete with a speaking and writing requirement. We have learned that while students may write papers in their science classes, few instructors provide significant feedback to students with opportunities for improvement and additional assistance. Early instruction in scientific writing and communication should help students universally in their coursework. Such coursework currently is not required. The University recommends writing across curricula, however. Regarding community service, they would learn about community needs while having adequate time to plan and perform it during subsequent semesters, an issue on which numerous seniors commented. Service sites would be tailored to compensate for the younger mentor age, confidence, and skill level but they would incur the benefits of service-learning paradigms.

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Appendix: Survey items, arranged concisely.

Community Service Experience Assessment, Senior Seminar in Biology

Please answer the following questions as thoroughly as possible.

1. Name the community site/s where you performed your service of teaching/tutoring youth in science/biology, and other academic and recreational areas this term.
2. Did your service require specific preparation, e.g., review or lesson plans? Yes No
 - a. If yes, how many total hours did you spend preparing for your service?
 - b. How many total hours did you spend completing the service?
 - c. Did you complete you community service alone (yes) or with (how many) ___ others?
3. Describe the responsibilities involved in the community service project that you selected among the opportunities offered this semester:
4. Using the following scale (5=highest), rate your assessment of the community benefit ensuing from execution of your community service project.
5. Do you think that your community service experience was a “success”? Why/why not?
6. Using the following scale (5=highest), rate your perceived success of your community service project.
7. In what ways did you benefit or not benefit from engaging in this community service project?
8. If your benefit/s were positive, use the following scale (5=highest) to rate the value of your benefit/s regarding your community service project.
9. On the basis of this project, how likely are you to seek other education-focused service projects with youth (5=highest)?
10. Write about your overall undergraduate preparation for the successful completion of this community service project, irrespective your academic major or minor in biological sciences.
11. Using the following scale (5=highest), rate your overall undergraduate preparation for the successful completion of this community service project, irrespective your academic major or minor in BLS.
12. What overall general experiences would have enhanced your preparation?
13. Using the following scale (5=highest), rate the overall, life-long value of this community service requirement in teaching/tutoring in science/biology for seminar students.
14. Other comments about the community service component (only) of Senior Seminar