

NOSB PAST PARTICIPANT LONGITUDINAL STUDY UPDATE REPORT FOR APRIL THROUGH NOVEMBER 2007

JANUARY 10, 2008

This report provides an update for the longitudinal study, which tracks former NOSB participant students, as of fall 2007. The report examines the registration database just prior to the start of the fall 2007 semester and also includes new feedback from email surveys of the students as well as the ongoing online survey. This report also includes anecdotal comments of the students to support the data and if desired, for further use by the NOSB for web and marketing purposes.

In addition this report focuses on the role of mentoring by key individuals who were instrumental for college and career choices of these NOSB students and summarizes students' responses that represent mentoring emphases. The data for this report were gathered from three main sources:

- I) The registration database (as of August 17, 2007),
- II) An email survey of students (September-November 2007), and
- III) The online survey (new data since earlier report, as of October 5, 2007).

I. REGISTRATION DATA

As of August 17, 2007, there were 329 past participants in the registration database, an additional 20 since the last report. Of the 20 additional students who registered for the study in June, July, or August of 2007, 13 of these students provided information about their current universities, and 10 students provided information regarding current college majors. All of these college majors were in science or engineering fields including: marine biology, ecology, marine science, engineering, neuroscience, pharmacy, environmental science, mathematics and biology, geology, and mechanical engineering. The colleges or universities entered into the database by these students included:

- University of California at San Diego
- MIT
- Boston University
- University of Wisconsin-Milwaukee
- University of Pittsburgh
- University of Colorado
- California Institute of Technology
- Stony Brook
- Virginia Tech
- Eckerd College
- Butler University
- University of Miami
- University of Michigan

These new students participated in the NOSB at a variety of regional competitions. These bowls included: the Hurricane Bowl, the Blue Lobster Bowl, the Blue Crab Bowl, the Otter Bowl, the Bay Scallop Bowl, the Surf Bowl, the Spoonbill Bowl, and the Manatee Bowl.

II. EMAIL SURVEY ON MENTORSHIP AND COLLEGE MAJORS AND COURSES

Background: The NOSB Past Participants who initially registered for the study in 2006 were surveyed electronically via email in February 2007 to ascertain enrollment in post-secondary education activities related to STEM careers to include college coursework, internships or cooperative education programs (co-ops), or graduate school. A complete description of the results of that initial survey is included in a previous report to CORE.

Fall 2007 Email Survey Methodology: To follow on from this February survey, an email survey was sent to all students in the database in September 2007. Based on findings from the first year of the current longitudinal study (2006-2010) of NOSB Past Participants, these students were queried specifically with respect to specific mentorship relationships and experiences they had had related to both the NOSB, high school to college transition, and career selection or identification. The questions these students were asked to answer were:

- Please describe any career or college-related mentoring which you have received (who, what experiences and/or information was provided, the duration of this relationship, the context of this relationship).
- How important was this mentoring to your selection of your college, your career-path, and/or college courses taken or planned?
- What is your current/planned or completed major in college---and has this changed from your plans at the completion of high school? If these changed, what caused this change?
- What is your current college status-Freshman, Sophomore, Junior, Senior, Graduate, Post-Graduate?

Additionally, students were asked to update information from the prior series of questions they were asked in spring 2006 regarding declared major and STEM related courses they had completed to date.

Fall 2007 Email Survey Findings: A total of 22 past participants in the program responded to initial requests in September 2007 to complete the questionnaire. It was believed that current software limitations for screening out listserv emails and “digital spam” may have inadvertently caused the email communications to study participants to receive limited circulation, so individual emails were re-sent to all students in October and November 2007.

A total of 37 students ultimately responded, providing additional data via email response for this update report, including 6 additional students who had completed the online survey used in year 1 of this longitudinal study. There is a 28% (n=10 students) overlap

between the students participating in the email college information survey in spring 2007 and fall 2007. Comparison of these 10 students who reported major information in two consecutive college academic years indicates that none of them have changed majors—all being science majors. This observation supports a discussion in the year 1 longitudinal study report that these students seem to have a greater sense of their career path, notwithstanding the limited career information/counseling they reported. The group for which we now have two consecutive years of data has not changed from science majors. These students should be considered candidates for individualized follow-up as case studies in the next activity cycle of this research project.

Findings Related to Mentoring: Some students reported key teachers in high school, including several students who reported relationships with NOSB Coaches, that helped them make college and career decisions. Select quotes from students related to these relationships include:

- *In High School, my NOSB coach encouraged me to apply for a lot of scholarships and to go after my dream. She helped me a lot and wrote many recommendations. We still email each other sporadically and I see her every year when she visits for the NOSB.*
- *My swim coach in high school and throughout my childhood years was a huge mentor to me and helped me gain a lot of confidence and encouraged me to join NOSB and to apply for colleges and universities I wasn't really interested in. I still keep in touch with him and he's been like a second dad since I was 8 years old.*
- *My AP chemistry professor in High school also mentored me for college, writing recommendations and helping with reading applications and encouraging all the students to work hard and be diligent.*
- *Ocean Bowl was my mentor to get me into the field of geophysics.*

Unfortunately, many more students reported that they had had a poor experience with mentorship at the high school level, being left to make critical decisions about college and careers substantially on their own. Select quotations related to this perspective included:

- *I received none. I made my college and career plan with no help or consultation with anyone.*
- *I have not received any mentoring per se but I just recently finished an internship at Moody Gardens in Galveston, TX. The internship lasted 8 weeks with a total of 160+ hours. Throughout the summer duties included, food preparation, observations, feeding, cleaning, water chemistries, etc. The internship gave me a great deal of insight into a career in animal husbandry.*
- *The only mentoring I received was really from my high school guidance counselor who discussed with me briefly my college options. Other than that, I have not really had a significant relationship with anyone discussing my career-path.*
- *I have had some general advice in high school, but not really enough college mentoring to mention it specifically.*

The past participants comments with respect to the items was generally negative with respect to the type, duration, and consequence of mentoring toward careers, colleges, and majors at the secondary level, with a further decline at the college level once students enrolled in post-secondary education. This response does not coincide with the results from the extended survey of study participants in year one of the longitudinal study where a large proportion of these past participants indicated that they had maintained communications with their former NOSB coaches. Consequently, it appears that the relationships between coaches and students may be far more academically oriented to NOSB question content, and to overall coursework issues in school, than to the advisement needs of these students for college and career decision formation.

Past participants were able to identify key individuals at the post-secondary level who were providing them important and timely information with respect to college and career path decision-making. These individuals were not necessarily college faculty, though some faculty members were listed. The broader listing of college mentors included friends, upper division students or graduate assistants, and a variety of student advisement personnel at the college or university level. One individual described how a laboratory manager at the undergraduate level provided significant career information. It was clear that the consensus for mentoring relationships was that these were informal at best and not a systematic function of either secondary or post-secondary institutions where these past participants were engaged in study. Further, the mentorships seemed to impact students beyond just the career or course selection functions—as would be expected from the literature reviewed to contextualize this study. In this vein, respondents noted that mentors provided encouragement, socialization into higher education or career experiences, encouraged creative thinking about academic life, and provided a sounding board for decision-making—while the respondents preferred in many cases to make critical decisions themselves.

Findings Related to College Major: Respondents were asked specifically to describe majors in college and whether these had changed substantially since high school. Of the 34 respondents providing information to this item (the items were voluntary and some respondents did not fully complete the questionnaire), only 4 indicated a major change since high school (12% changed majors). The remaining 88% of respondents had remained in the same major they perceived or desired at the high school level (again, none of the 10 students who responded in both spring and fall had changed majors). This high level of stability in selection of college major at the high school level runs counter to higher education data that report undergraduates changing majors as many as 5 times during the first two years of post-secondary education, and, as noted in the extended year one study report, suggests a high degree of certainty among these students. Students were asked to further report additional sections of STEM related coursework that they had completed since the last survey. Of interest since the last survey, an increasing number of students are reporting minors in foreign languages (German and Chinese) based on advisement and on a perception that increasingly, employment in the global economy and in science will require second language proficiency.

Findings related to Current Courses: The courses listed in responses to the curriculum item included 119 sections of science courses (to include engineering and technology) and 106 sections of mathematics. It is noted, as with the prior study, that courses e.g. *Physics with Calculus* are counted as science and not mathematics. Of the 119 sections of science, 82 appear to be primarily Biological science, 28 sections are primarily Chemistry, and 9 sections are Physical Science, Engineering, or Earth Science. Additionally, 31 sections of these science courses—representing 22 students total—were Marine, Coastal, or Oceanographic courses.

III. ONLINE SURVEY

Online Survey Methodology: The online survey, begun in year one of the effort and sent to students following collection of their registration demographic information, was completed this fall by 6 additional students. The lower participation number was most likely a result of survey fatigue—but also a result of a smaller number of additional new study participants recruited in year 2 of the longitudinal effort.

Online Survey Findings: The six individuals completing the survey for this fall report were from Texas, Michigan, North Carolina, New Jersey, and New York—a distribution which continues to diversify the total survey pool. Four of these students only competed one year in NOSB, and one each as two year and three year participants. One of these individuals participated in the NOSB Ocean Scholars Undergraduate Scholarship program—raising to 6 the total number of these individuals participating in the tracking study. Four of these new students are male (two females) and one of the students is Hispanic and one Native American. Neither of these minority students were participants in one of the NOSB Diversity Initiatives.

One of the new students reports he/she has already completed a BS degree from the University of North Carolina at Wilmington, in Marine Biology. This student is employed as a Laboratory Research Technician on a fisheries science project. Five of the students reported current college affiliations, which include:

- Harvard University
- Stony Brook University
- Texas Tech
- UNC—Chapel Hill
- University of Southern California

It was interesting to note that three of these universities are regional bowl sites. Students who participated in the bowls at these universities became aware of the campus location, activities, and programs offered.

The college students were asked to provide their current college majors. The five reporting students delineated these majors as:

- Anthropology
- Chemical and Physical Biology
- Environmental Science

- Marine Science (2 Students).

A series of Likert-scale response items and open-ended response items were provided on the survey instrument. Three items provided interesting, highly similar responses from the six students. All (100%) of the respondents Strongly Agreed or Agreed that NOSB encouraged an overall interest in the oceans. 67% of respondents Strongly Agreed that ocean or science-related hobbies influenced their selection of a career or college major—with an equal number of students Strongly Agreeing or Agreeing that NOSB participation encouraged them to develop hobbies relating to the ocean. These results are quite similar to the earlier survey's responses to these same items.

Benefits to students are highlighted by the following comments:

- On volunteering for the NOSB: *“I love NOSB and want to give back to such a great cause.”*
- On the value of the program: *“I really loved the opportunity to learn about oceanography—something I previously knew nothing about and wouldn't know much about without NOSB.”*
- On college and career influence: *“My teachers and classes, which encouraged an interest in science.”*

IV. CONSIDERATIONS FOR THE FUTURE AND NEXT STEPS

After careful consideration, it has been decided that the study has reached a point in which the focus should not be on a more comprehensive and longer online survey and more targeted to results of the email updates from students on a semester basis—as well as on the development of formal case studies of individual students. Beginning in January and February 2008, contacts with study participants will be on an individualized basis using telephone and email contacts as opposed to group/listserv emailing.

These decisions were predicated on observations that overall response to the email survey was weaker during this fall 2007 implementation (37 respondents as opposed to the 60 respondents in the spring semester). It is perceived that the decline in the email survey participation is more profound than originally anticipated, and that the spring semester immediately following the winter break when students may be less likely to be engaged in outdoor activities, may be a more ideal time to initiate data collection.

It is also perceived that it may be increasingly necessary to engage in more individualized, case study types of data collection such as planned in year three of the study, than the initial high-response online survey approaches. This decline in effectiveness of surveys over time is not desirable, but is anticipated, and underscores the necessity of continual recruitment from each graduating class of seniors into the follow-up study.

In addition to the case studies and follow-up email survey planned for spring 2008, a coaches' survey (revised from the 2003 survey) will be developed and disseminated to gain coaches' perspectives on the competition and its impact on students and themselves.

V. CONCLUSION

Although the increase in the data from the earlier 2007 report is modest, it supports the previous findings and shows consistency within the core of respondents regarding the NOSB and its impact on their college and career choices and interest in ocean sciences.

As noted previously, alternative methods (such as individual or small group email surveys) for contacting study participants will be initiated for the January/February 2008 collection period to enhance participation of new study recruits for this year. Nevertheless, the patterns of responses continue to reflect the importance of the extra-curricular impact of the NOSB program to engage students holistically with an interest in ocean sciences.