

Spring 2011 Program Assessment Report

Department of Biology

San Francisco State University

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in collaboration with fellow Biology Faculty
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I. Introduction

In 2006-2007, the SFSU Biology Department convened a new Undergraduate and Curricular Affairs Committee (see 2005-2006 report). Over the past four years, this committee has regularly engaged the biology faculty in revisiting our current degree programs and their supporting curriculum with the aspiration to revise both programs and curriculum to better serve the increasingly large number of biology majors. As discussions of program and curricular revisions are active and on going, assessment activities have been designed to support these discussions and to establish sustainable mechanisms of assessment data collection from over 1600 undergraduate biology majors.

Three overarching goals have guided recent assessment activities: 1) assessment activities should engage more than a few faculty members, 2) a sustainable plan for assessment data collection should be established, and 3) assessment activities should serve faculty decision-making in the department. These overarching goals has been primarily addressed through the iterative development, improvement, and implementation of the Graduating Biology Major Exit Survey. In addition, the results from this assessment has been shared with faculty and other stakeholders through the Biology Department Newsletter, small and large faculty meetings, and responses to individual queries about survey results.

Below we give a brief overview of the development and current form of the Graduating Biology Major Exit Survey, a summary of the mechanisms for its implementation over the last four years, sample findings from these assessment data collections, and future directions for program assessment.

II. Development of Graduating Biology Major Exit Survey

The development of the Graduating Biology Major Exit Survey began in 2006. During that year, the Assessment Sub-Committee worked to establish a sustainable mechanism by which the department could collect a variety of assessment data on a yearly basis. Two formats were piloted to collect data from graduating biology majors: 1) an in-person “Feedback to the Faculty Session” for as many students as would attend, and 2) an on-line Graduating Biology Majors Survey. Because of the low turnout for the in-person sessions and the resources required to process assessment collected on paper, we moved quickly towards the development of an on-line survey. The time point of collecting evidence from graduating biology majors was selected as a starting point, with the goal of eventually collecting data on the same questions at multiple time points during an individual student’s academic career at SFSU.

Over the last four years, the on-line Graduating Biology Major Exit Survey has developed from a 33-item survey in Fall 2007 to a 45-question survey in Spring 2011. The questions that have been added have almost uniformly come from Biology faculty members interested in gaining insights about our students' learning and experiences. The full, current version of the Graduating Biology Major Exit Survey can be seen in Appendix 1 of this report. The 45 items that comprise the survey address different aspects of students' experiences as an undergraduate, as well as probe the state of their conceptual knowledge in biology. Table 1 summarizes the sections of the survey, the nature of the items, and the number of items associated with each section.

Overarching Reason Probed	Specific Nature of Assessment Questions	Nature of Probe	# items
<i>Value of Specific Biology Learning Experiences</i>	Most Valuable Learning Experiences	Open-ended	3
	Least Valuable Learning Experiences	Open-ended	3
	Most Valuable Courses	Open-ended	2
	Least Valuable Courses	Open-ended	2
<i>Value of Biology Education Generally</i>	Attitudes Towards SFSU Biology Education	Likert Scale	8
<i>Biology Conceptual Understanding</i>	Variety of multiple choice questions aligned with overall biology learning goals, coupled with comment boxes for brief explanations	Open- and Closed-ended	9
<i>Future Career Plans</i>	Current Career Goals	Closed-ended	2
<i>Description of Graduating Student Population</i>	Demographic Information and SFSU Academic History Information	Closed-ended	9
<i>Development of SFSU Biology Alumni Database</i>	Contact Information (kept confidential and deleted from data shared with stakeholders)	Closed-ended	5

III. Implementation of Graduating Biology Major Exit Survey

For the last four years, the on-line Graduating Biology Major Exit Survey has been implemented for all undergraduate biology majors during the Fall, Spring, and Summer terms using the on-line survey system, *SurveyMonkey*. Completion of the survey has been made a requirement for obtaining departmental approval of students' graduation applications. This strategy appears to be a highly effective mechanism of collecting assessment data with high participation rates. In addition, the on-line nature of the Graduating Biology Major Exit Survey has proven feasible in conducting program assessment with over 1600 majors. This approach to program assessment implementation has proven cost-effective at \$200 per year, and all data that has been collected has been electronically archived for easy access. In addition, the *SurveyMonkey* assessment approach has built in analysis of closed-ended items, which has proved essential in the absence of dedicated resources to support program assessment. Finally, this approach flexible enough to accommodate simple addition of items requested by a variety of

stakeholders and faculty. We anticipate continuing to use this mechanism indefinitely, though we would of course aspire to have multiple sources of program assessment information.

Data from the Graduating Biology Major Exit Survey has been collected over the last 11 terms over the last 4 calendar years, yielding data from 1022 graduating SFSU biology majors.

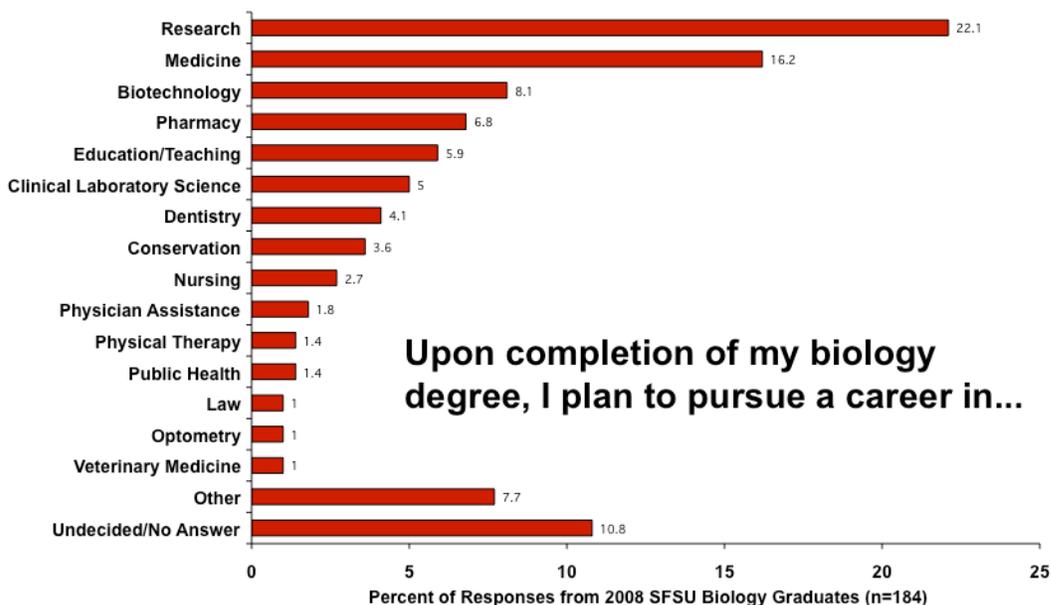
Calendar Year	Term/Semester	Number of Students Completing Exit Survey
2007	Fall	79
2008	Spring	188
2008	Summer	23
2008	Fall	72
2009	Spring	159
2009	Summer	18
2009	Fall	61
2010	Spring	186
2010	Summer	9
2010	Fall	78
2011	Spring	149
<i>Over 3+ calendar years</i>	<i>Over 11 academic terms</i>	<i>Total of 1022 students</i>

IV. Sample Results from Graduating Biology Major Exit Survey

Results from the Graduating Biology Major Exit Survey have been requested, examined, and used by individual biology faculty and staff for a variety of purposes. Below we highlight four areas of investigation and sample findings that have emerged.

A. Investigating the Career Aspirations of Graduating SFSU Biology Majors

An on-going question in the department is the nature of the career aspirations of the over 1600 students majoring in biology. Initially, an open-ended question on the Spring 2007 survey probed students' career aspirations. This question was analyzed and the most prevalent responses were used to construct two closed-ended

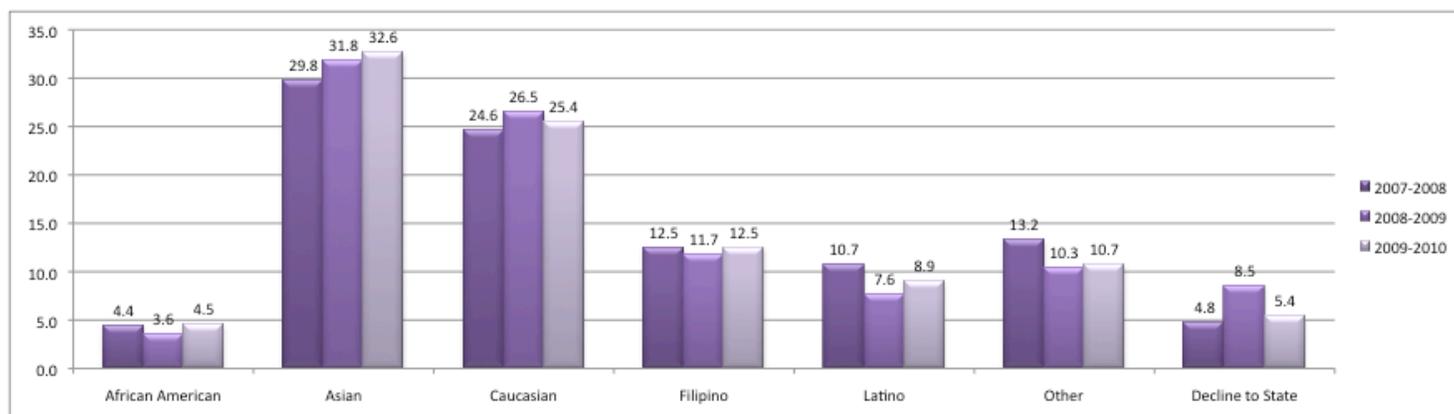


question on the survey, so as to minimize time required in analysis. These questions probed all the careers students were considering, as well as the one best career choice for them at the time of the survey. Below, data is shown for all the careers students were considering in Spring 2008. The results of this investigation were surprising in the number of students interested in research as a career. In tracking these results over time, the three top career aspirations expressed by students in either form of the question are: medicine, research, and biotechnology. Teaching as a career aspiration was surprisingly low, and this information was shared with our colleagues at the SFSU Center for Science and Math Education.

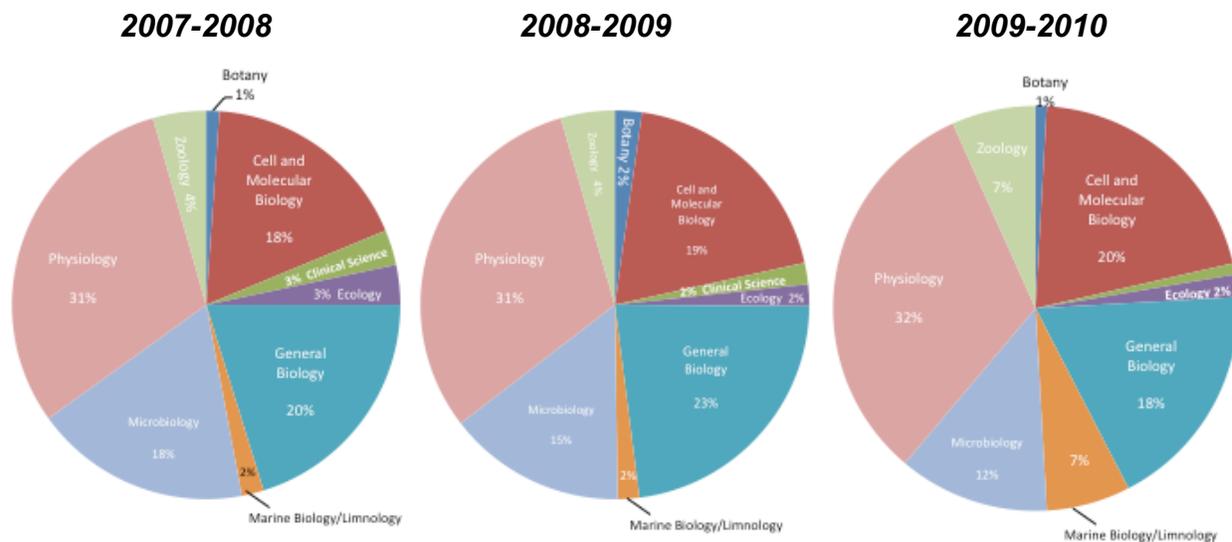
B. Tracking the Ethnicity, Majors Concentration, and Attitudes of Graduating SFSU Biology Majors Over Time

The establishment of a survey that can be given regularly each term gives the department the opportunity to track a variety of characteristics of our student population over time. We have just begun to engage student research assistants in the analysis of these types of data. Below are samples of comparisons over time of the demographic characteristics of biology majors, the concentrations that they are choosing, and their responses concerning their attitudes about their undergraduate biology education generally. The limiting factor in using program assessment analyses in informing departmental work has been the lack of resources to integrate and synthesize data over terms and academic years.

Self-Identified Ethnicity of Graduating Biology Majors Over Three Years (2007-2010)



Major Concentrations of Graduating Biology Majors Over Three Years (2007-2010)



Attitudes of Graduating Biology Majors Towards Their Biology Education Over Three Springs (2008-2011)

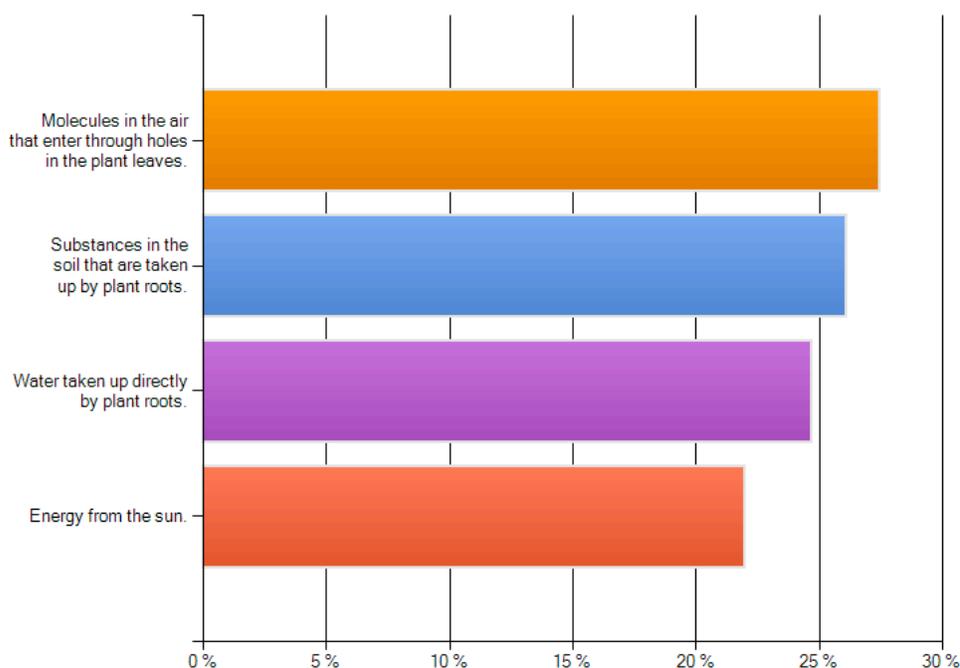
Percent of Graduating Biology Majors that Agree or Somewhat Agree...	Spring 2008	Spring 2009	Spring 2010	Spring 2011
I am more enthusiastic about biology now than when I started my biology major at SFSU.	73.7	79.7	80.6	85.5
My undergraduate biology education at SFSU has prepared me well for my future career plans.	77.1	69.7	69.9	77.7
I felt supported and encouraged during my experiences as an SFSU Biology major.	62.3	60.5	61.3	61.8
I would recommend the SFSU undergraduate biology program to potential students.	70.3	67.8	64.8	67.1

C. Using Conceptual Assessments in Biology to Inform Instruction

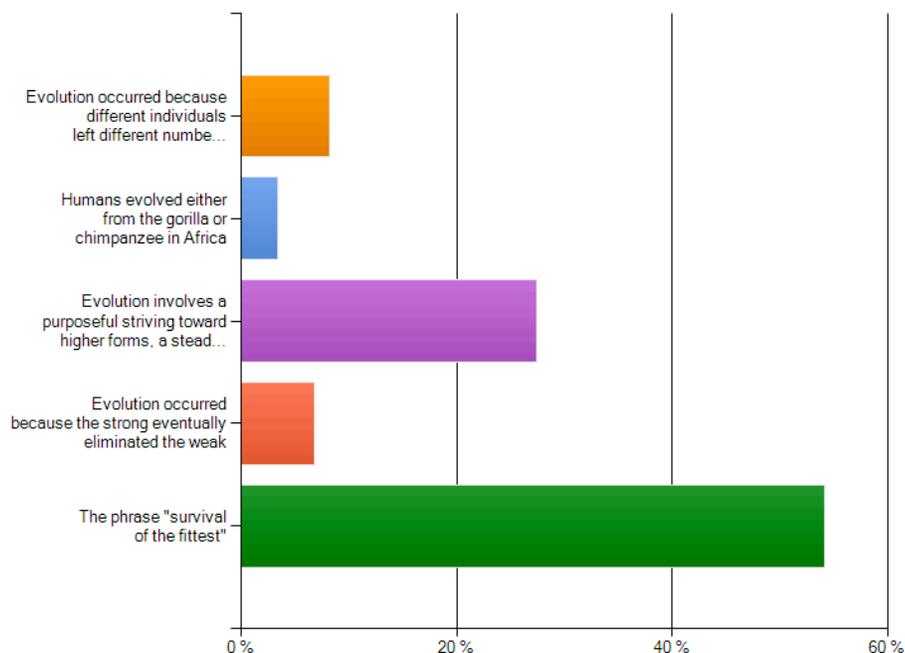
Since its inception the Graduating Biology Major Exit Survey has included biology conceptual questions that probe core biology concepts that thread throughout majors courses and the various biology major concentrations. Some of these conceptual assessments are taken from validated tools in the biology education research literature, while others are questions posed by individual faculty. These results have been shared with key faculty teaching in the introductory courses, and several of the questions are now being used to guide instruction. In the future, we aspire to ask these questions of entering biology majors, as well as of students in the middle of their studies to be able to track how students are responding to these questions as they progress through their undergraduate biology education. Below are two conceptual assessments from Spring 2011

(n=149) that can inform biology instructors who teach at all levels of the curriculum. Each of these questions probes biology concepts that are known to be very challenging for students to learn. In both cases, the answer that would be considered most scientifically accurate is listed first.

The majority of actual weight (dry biomass) gained by plants as they progress from seed to adult plant comes from which one of the following?

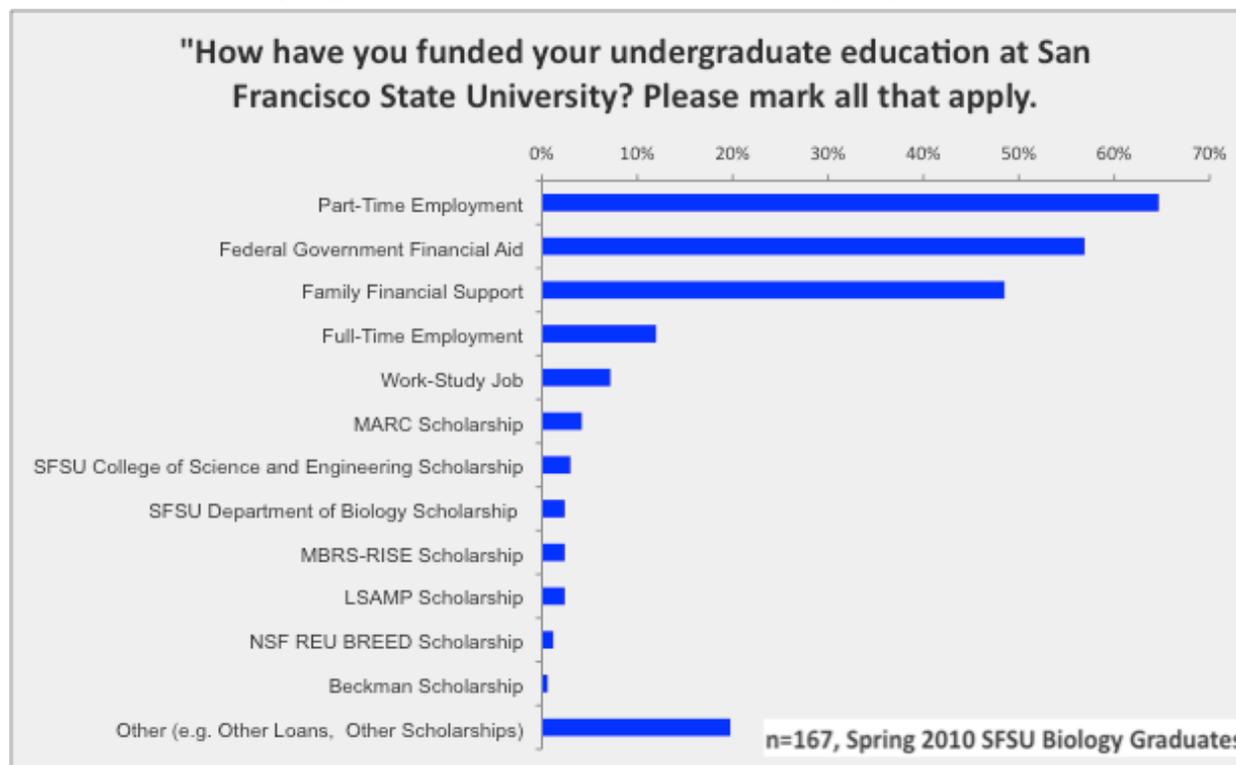


Which of the following is closest to your impression of the modern theory of evolution?



D. Gaining Insight into How Students Fund their Undergraduate Education

Finally, one of many survey questions and analyses that have arisen from faculty and staff queries concerns how our SFSU biology students fund their undergraduate education. Data shown is from the Spring 2010 cohort, which shows that the majority of our students are



employed part-time to support their education and over half receive government financial aid. Like many other survey questions that have been developed, this question was originally asked as an open-ended question and analyzed by hand, which is very time consuming. Now that the likely categories of responses are known from this open-ended version of the item, the question is being adapted to be a closed-ended item, such as to decrease time required for analysis.

V. Future Directions

The establishment of an annual Graduating Biology Major Exit Survey within the SFSU Department of Biology is a significant achievement. This assessment tool has proven efficient, cost-effective, and flexible enough to collect data from over 1600 graduating undergraduate biology students over the last four years. In addition, the tool has proven to be engaging for faculty, staff, and other stakeholders, generating requests for data and analyses, generation of new questions, and use of some conceptual questions within individual courses. In looking towards the future, there are three areas in which we will focus our limited resources and efforts: 1) development of strategy to collect systematic assessments from Entering Biology Majors, 2) development of Graduation Survey for Biology Master's Students, and 3) continued discussion with the biology faculty about results from the assessment mechanisms to promote reflection and iterative change.

Progress has already been made towards collecting similar assessment evidence from Entering Biology Majors with the first pilot data collection occurring in Spring 2010 with those students who were first time freshman in Fall 2009. The current exit survey was used as a template and modified to create an entrance survey for biology majors that could eventually allow comparison of data from individual students as they enter and exit the undergraduate biology program. A key challenge in collecting data from Entering Biology Majors is the current lack of a mechanism parallel to the graduation application, which can be used to compel completion of the Entering Biology Major Survey by a high percentage of students. While the students who took the pilot entrance survey were targeted by the University, we need to develop other mechanisms to get new students into the system, in particular the more than 60% of biology majors who are transfer students. Second, we aspire to develop a Graduation Survey for Biology Master's Students. A tentative outline for such a survey has been generated through conversations with the Biology Graduate Affairs Committee. We are currently constructing the survey, as well as strategizing about the time point at which to require student participation. Lastly, assessment is influential when analyzed and interpreted by faculty, staff, and stakeholders. Efforts will continue to engage an ever broader group of faculty in reflecting on the annual assessment findings and their implications for program improvement.