

Assessment of Student Reading and Math Skills Using a National Exam

Jim Farrar and Andrew Lawson

Plant Science Department

Reading and math skills are fundamental to student success in Plant Science. In Spring 2006, the ACT CAAP Reading and Mathematics Tests were administered to 35 Plant Science majors in Economic Entomology (PLTH 103) and Weeds (PLTH 105) courses. In order to encourage students to perform their best, the exams were counted as a component of the final grade in each course. Results of the exams were compared to the national average (supplied by ACT). In addition, reading scores were compared to university-wide scores obtained from a Spring 2005 testing of students in IC courses.

National Comparisons

While the CSUF group tested below the national average on the reading test ($t = -7.074$, $df = 694$, $P = 0.000$), the Department of Plant Science was not different from the national average ($t = 0.317$, $df = 34$, $P = 0.753$). Neither group differed from the national average in the art subscore, however in the social science / science subscore the CSUF group fell below the national average ($t = -7.224$, $df = 694$, $P = 0.000$).

In the math test, Plant Science students did not differ significantly from the national average ($t = -0.964$, $df = 34$, $P = 0.342$). They also did not differ significantly from the national average in either subscore (basic algebra and college level algebra). It should be noted that the mean college level algebra subscore was 45.17 percentile. The small sample size ($n = 34$) contributed to a relatively large standard deviation ($sd = 22.98$) and a larger sample would likely find the plant science students scoring below the national average in college algebra.

CSUF and Plant Science Reading Comparisons.

There was no difference in overall reading score between the CSUF and Plant Science groups, however in the social science/science subscore, Plant Science students scored significantly higher than the CSUF group ($F = 7.757$, $df = 1, 728$, $P = 0.005$). There was no significant difference in the art subscore ($F = 0.836$, $df = 1, 728$, $P = 0.361$).

In comparing population characteristics, the Plant Science group was found to have a higher educational level than the CSUF group (educational level ranked from freshmen to seniors, Mann-Whitney U test, $P = 0.004$). There was no difference in cumulative GPA (Mann-Whitney U test, $P = 0.187$). In order to account for this difference in educational level between the two populations, a second analysis was completed on the social science / science subscore with educational level as a co-variate. The Plant Science students again scored higher than the CSUF group on this subscore ($F = 5.970$, $df = 1, 721$, $P = 0.015$).

Plant Science Reading Test Scores.

Neither gender, ethnicity, English as a first language, educational level or enrollment status significantly affected reading scores. Cumulative GPA did significantly affect

reading scores ($F=15.144$, $df=3, 27$, $P=0.000$) with students holding a GPA of 3.51 or greater and those with 3.01 – 3.50 scoring significantly greater than those with a 2.0- 2.51 and 2.51 – 3.0 GPA (Tukey's HSD, $P\leq 0.05$).

Plant Science Math Test Scores.

Neither gender, ethnicity, English as a first language, educational level or enrollment status significantly affected math scores. Cumulative GPA did significantly affect math scores ($F=3.367$, $df=3, 26$, $P=0.026$) with students holding a GPA of 3.51 or greater scoring significantly greater than those with a 2.0- 2.51 GPA (Tukey's HSD, $P\leq 0.05$).

Discussion and Outcomes

The results of the ACT CAAP Reading and Math test of Plant Science majors provide some data on which to discuss curriculum in Plant Science bachelors program. The results are encouraging for the reading skills of our majors. In anticipation of less favorable scores in the reading test, at least three faculty members in Plant Science increased the amount of required reading in their Fall 2006 courses. The results are less encouraging for the math test. Plant Science majors scored slightly below national average (not statistically significant) for the total math score and for the College Algebra subscore (not statistically significant). Since Plant Science is a science-based curriculum, our students should be scoring significantly above the national average in college algebra.

The Plant Science faculty agreed to the following changes based on the reading and math assessment.

Reading - Faculty will use various techniques (written summaries, pre-lecture quizzes, pop quizzes) to insure that students have completed assigned readings. Faculty will increase the use of scientifically sound but non-technical reading assignments (for example, the journal California Agriculture and publications from the University of California Cooperative Extension) in all classes.

Math - Faculty will include more mathematical analysis in all classes and as components of graded work. Faculty will include more examples of interpreting graphic representations of data (for example, the inverse relationship between fruit number and fruit size in tree fruit production) to illustrate fundamental principles.

The changes are meant to be systemic throughout the whole department and are not applied to one particular class. Nor are we going to create new classes specifically to support reading and math skills.