Estrella Mountain Community College
Scientific Inquiry Assessment
Fall 2011

Prepared by:
Office of Planning and Institutional Effectiveness
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# Scientific Inquiry Assessment, Fall 2011

Background

This assessment was part of a larger effort to assess student performance on the General Education abilities. Specifically, it was designed to assess student proficiency in five areas: Observation / Question, Identifying Hypothesis / Explanation, Planning, Analysis, Conclusion / Solution. Instructors either used their own assessment or a generic instrument, and rated students as Proficient, Approaching Proficient, or Below Proficient in each of the areas (see the Appendix for the rating rubric). Seven instructors rated 226 distinct students. One student participated twice, in two different courses. The instructors taught the following courses:

- ECN211 (Macroeconomic Principles),
- ECN212 (Microeconomic Principles),
- CIS120DF (Computer Graphics: Adobe Photoshop),
- PSY230 (Introduction to Statistics),
- MAT151 (College Algebra/Functions), and
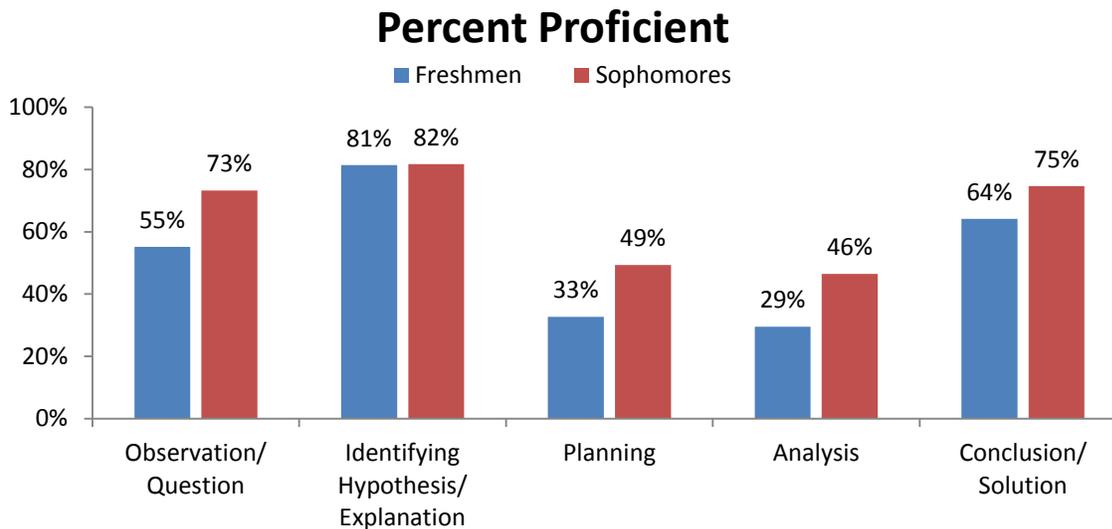- SOC140 (Racial & Ethnic Minorities).

Overall Performance

Across all students and all areas, 56% of the ratings were Proficient, with 29% receiving Approaching Proficient and 14% identified as Below Proficient. The relative breakdown by skill area is shown below. Students' performance was generally lower in the Planning and Analysis skills than the others, and was generally highest in Identifying Hypothesis/Explanation.


All Ratings (n = 227)
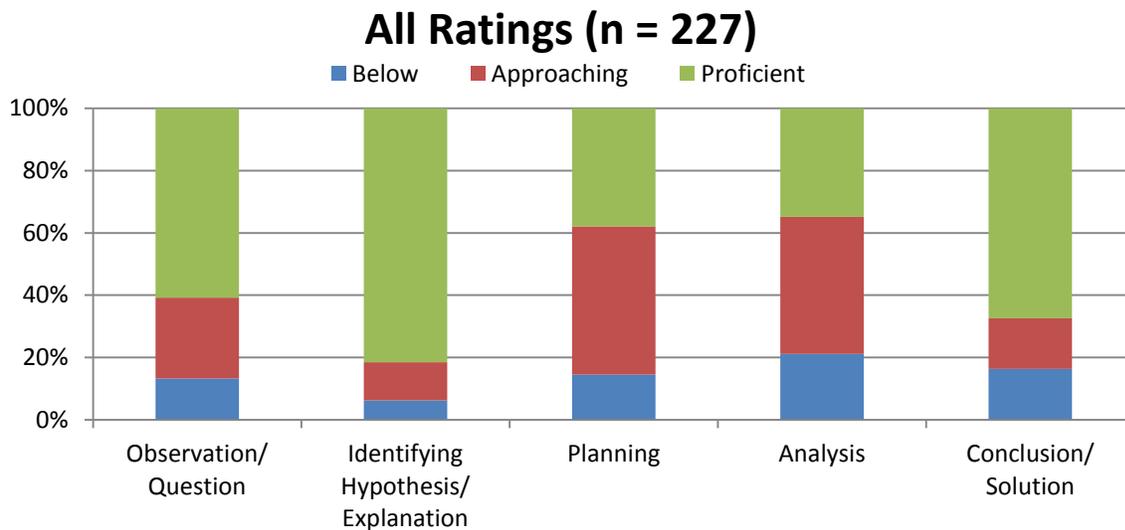
Freshman/Sophomore Comparison

Generally, freshman students (having earned less than 30 credit hours prior to Fall 2011) did not perform as well as sophomore students (30 or more earned credits prior to Fall 2011). The only area in which the proficiency levels were close was Identifying Hypothesis / Explanation, where both groups scored over 80% proficient (see chart below).

Percent Proficient

■ Freshmen   ■ Sophomores

Category	Freshmen	Sophomores
Observation/Question	55%	73%
Identifying Hypothesis/Explanation	81%	82%
Planning	33%	49%
Analysis	29%	46%
Conclusion/Solution	64%	75%

Looking more precisely, a definite trend can be seen in proficiency in Observation/Question, when the students are grouped by effective numbers of semesters (up to 15 hours earned prior to Fall 2011, 16-30 hours, 31-45 hours, and more than 45 hours; the parenthetical numbers in the legend give the number of students in each group). The trend is less apparent in the other areas: Identifying Hypothesis/Explanation is essentially flat and Analysis and Conclusion/Solution both show dips for second semester students.
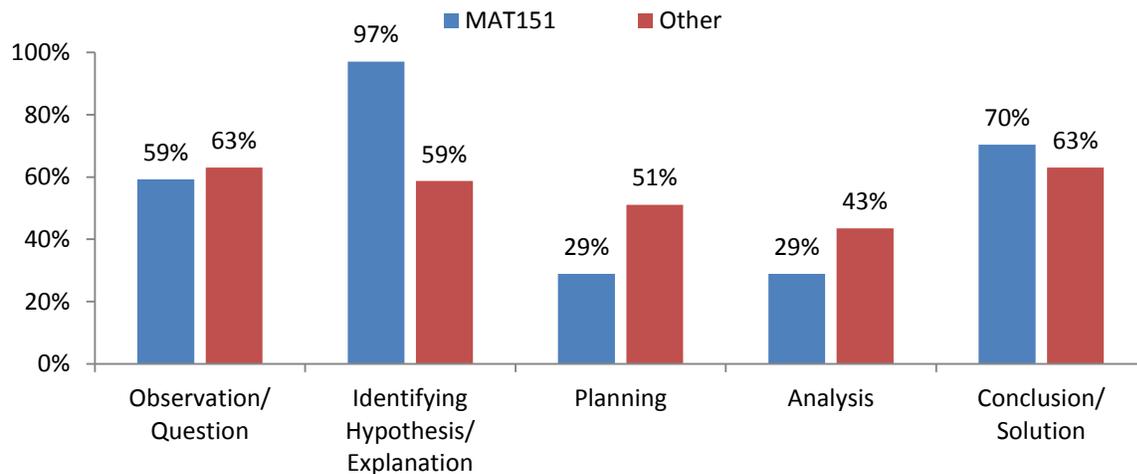
Percent Proficient
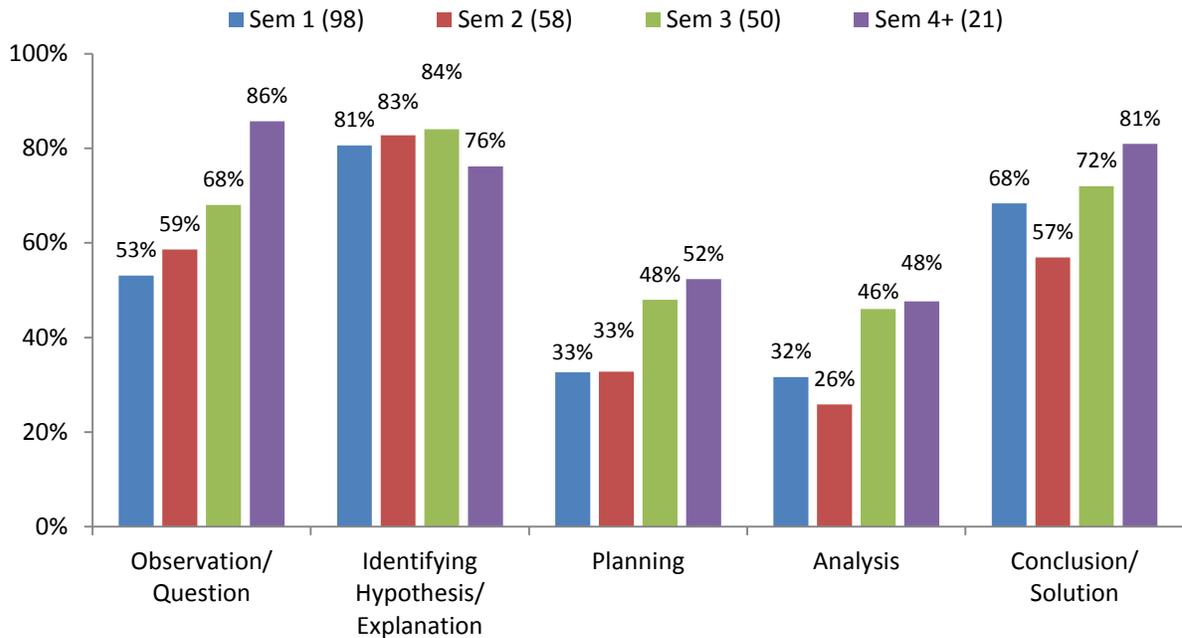
MAT151 compared with other courses

As almost 60% of the ratings came from MAT151, this course's results were compared with the aggregation of the other courses. There was no a priori reason to think that this distinction would be important, however, the ratings revealed a difference in Identifying Hypothesis/Explanation, with 97% of the MAT151 students being scored as proficient (see chart below).

Percent Proficient

Appendix: Scientific Inquiry Rubric

Categories	Proficient	Approaching Proficient	Below Proficient
Observation/Question	Student can identify a relevant, testable question prompted by observation or scenario.	Student poses questions but not specifically targeted to the observation.	Student does not pose a question based on observation or does not understand the concept.
Identifying Hypothesis/ Explanation	Student can generate potential plausible and testable explanations to the question(s) identified.	Student poses an explanation that is not testable, or not related to the question.	No explanation was presented.
Planning	Student identifies appropriate steps needed to collect or find relevant data to address the question or troubleshoot the problem.	Student partially identifies steps needed to collect or find relevant data, or identifies steps towards collecting irrelevant data.	Student was unable to identify relevant steps needed to collect data.
Analysis	Student uses appropriate tools or methods to thoroughly examine the data.	Student uses tools or methods that are partially suited for examining the data, or does not thoroughly examine the data.	Student is largely unaware of the appropriate tools or methodologies required to examine the data.
Conclusion/Solution	Student reaches a reasonable conclusion or solution regarding the hypothesis or explanation, properly aligned with the question and analysis of the data.	Student reaches a conclusion or solution, but there is a problem at some point, such as the analysis does not support the conclusion, or the data was not pertinent to the question.	Student does not reach a conclusion or solution regarding the hypothesis or explanation.