Standards Alignment

TOPS Biology labs are designed for students to learn that “scientific progress is made by asking meaningful questions and conducting careful investigation” as specified by the California State Science Standards. The TOPS experiments are designed to integrate into a teacher’s current curriculum, and employ a biochemical focus to enhance and bridge the biology and chemistry curricula. The experiments utilize modern technology including computer driven instruments of the type used in local industrial laboratories as well as commercially available data analysis software.

Fish Protein Electrophoresis:
Standards 1h, 4a*, 4e*, 5a*

Investigation and Experimentation Standards: 1 a*, b*, c, d, e, j, l


Assessment of TOPS Biology Labs for 2011-2012

Direct assessment using release questions drawn largely from the California Standards Test (CST Biology 2005 & 2009) shows the following effect on student conceptual understanding of topics associated with the hands-on activity:

Topic: Fish Protein/Electrophoresis
Number of participating students: 930
Change in score: 6.5% increase (post-pre).
Analysis of variance shows this change shows this change is highly statistically significant ($F (1,652) = 18.8, p = 0.000, \eta^2 = 0.028)$