

Diagnosing Gaps in Student Experimental Abilities in Biology

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Goals: To investigate the difficulties students may face with knowledge about biology experiment design.

Methods: This research uses a mixed methods approach to characterize the nature and source of each difficulty revealed by three published assessments.

Expected Outcomes: We have characterized a list of the experimental design difficulties that are frequent among undergraduate students in California, Indiana, and South Africa. We have narrowed down the difficulties to five consensus areas and find that most are related to problems with understanding a list of 'investigation concepts' related to biological experiments. In addition, findings also show that drawings can inform us about flaws in students' experimental thinking. Finally, I validate strength of each assessment in revealing student difficulties with experimental abilities.

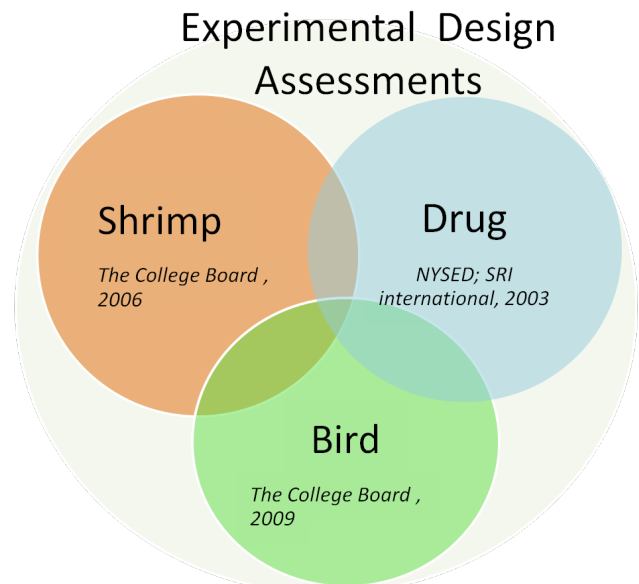
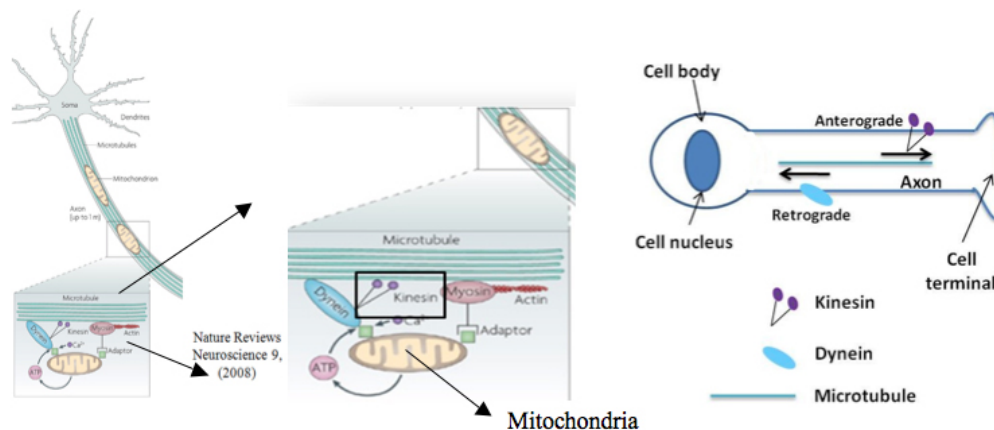


Figure 1: Previously published assessments for experimental abilities

As an original contribution, I use current cellular and neurobiology research as a context to design and validate a reliable probe, the 'Neuron' question, to show how students think about experimental research.



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Key Reference: Schönborn, K., & Anderson, T. (2009). A model of factors determining students' ability to interpret external representations in biochemistry. *International Journal of Science Education*, 31, 193-232.