Novice and Expert Explanations of Molecular and Cellular Mechanisms: Exploring 'Illusions' of a Microscopic World

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Goals: How do expert biologists and novices differ in how they explain cellular and molecular mechanism? The purpose of this project is to understand this unique skill of the life sciences and propose ways to help students learn these mechanisms. The goals of the mechanism project are to:

1. Capture the components of mechanistic explanations from life scientists;
2. Develop a model that can guide students to create explanations;
3. Bring research to the classroom;
4. Evaluate the explanations of students

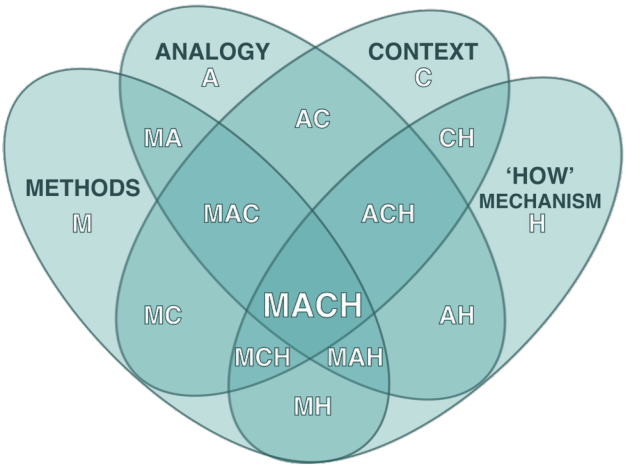

Figure 1: The MACH model from Trujillo *et al. (In review,* IJSE)

Methods: I use mixed-methods approaches to capture explanations (See Schönborn and Anderson, 2009). Interviews were collected from biologists who resolve molecular mechanisms, as well as from undergraduate students. I use thematic analysis, content analysis, and statistical analysis.

Expected outcomes: My research has produced a model of explanations of scientists of cellular and molecular mechanisms – the MACH model (See figure). Currently, I am translating my research into practice using a modified model of explanation for teaching.

Key References:

Schönborn, K., & Anderson, T. (2009). *Science Education, 31*, 193-232.

van Mil, M. H., Boerwinkel, D. J., & Waarlo, A. J. (2013). *Science & Education, 22*(1) 93-118.

Trujillo, C., Anderson, T. R., & Pelaez, N. (*In review*). A model of how different biology experts explain molecular and cellular mechanisms. *International Journal of Science Education.*