

August 2019

Development and Evaluation of a Hybrid ADI/ SWH Model Pre-Laboratory Curriculum

Tabitha Alitz
University of Northern Iowa

Dawn Del Carlo
University of Northern Iowa

Follow this and additional works at: <https://scholarworks.uni.edu/surp>

 Part of the [Chemistry Commons](#), and the [Higher Education Commons](#)

Let us know how access to this document benefits you

Recommended Citation

Alitz, Tabitha and Del Carlo, Dawn, "Development and Evaluation of a Hybrid ADI/SWH Model Pre-Laboratory Curriculum" (2019). *Summer Undergraduate Research Program (SURP)*. 9.
<https://scholarworks.uni.edu/surp/2019/all/9>

This Open Access Poster Presentation is brought to you for free and open access by the Student Work at UNI ScholarWorks. It has been accepted for inclusion in Summer Undergraduate Research Program (SURP) by an authorized administrator of UNI ScholarWorks. For more information, please contact scholarworks@uni.edu.

Development and Evaluation of a Hybrid ADI/SWH Model

Pre-Laboratory Curriculum

Tabitha Alitz, Dawn Del Carlo

Previous Research at UNI¹

- Students value each part of the pre-lab differently, struggle to connect all of the components, and therefore fail to see the big picture
- Students find the pre-lab moderately helpful in understanding both the concepts and mechanics of the lab, but find it less helpful at the end of the semester compared to beginning
- The cognitive load demands of the SWH pre-lab hinders students' ability to participate in authentic scientific inquiry

Cognitive Load⁶

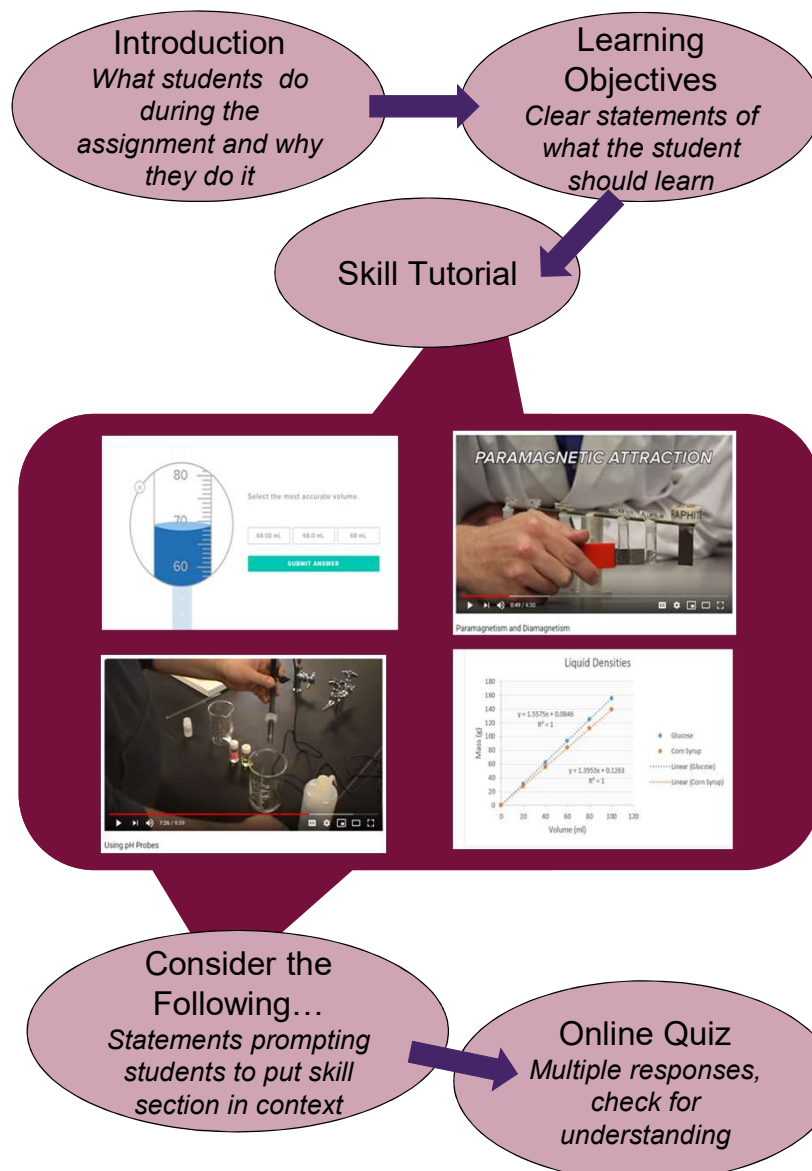
The amount of brain power it takes to process given information

Intrinsic Load	Extrinsic Load	Germane Load
<ul style="list-style-type: none"> •Complexity •Element •Determined by interactivity •Determined by activity and experience 	<ul style="list-style-type: none"> •Unnecessary information or processes •Determined by assignment structure 	<ul style="list-style-type: none"> •Diversity •Varied skill set •Determined by breadth of learning objectives

General Chemistry Lab Models

ADI	Hybrid	SWH
Tools/Skills	Tools/Skills	
Beginning Questions	Beginning Questions	Beginning Questions
Background Info	Background Info	Background Info
Procedure Proposed	Procedure Proposed	Procedure Proposed
		Class Discussion

General Chemistry Skill Assignment



CHEM 1110 Labs	CHEM 1120 Labs
Measurement Videos, Simulation	Concentration and Absorbance Videos, Simulation
Emission Spectra Logger Pro Software	Neutralization Thermochemistry Excel and Logger Pro
Magnetism Video, Simulation	Redox Stoichiometry Videos
Evaporation Video, Logger Pro Software	Reaction Rates Excel and Logger Pro
Calorimetry Questions	Potentiometric Titration Videos

Research Questions

How are the cognitive and affective expectations of students met through the use of the hybrid model compared to a general SWH model in an undergraduate general chemistry course?

In what ways are expectations of students met in the prelab portion of the lab for hybrid and SWH model types?

In a freshman general chemistry class, how does having a mixture of videos, simulations, and interactive feedback questions as prelabs in a hybrid lab compare to SWH prelabs in supporting students in lab?

Methodology (Fall 2019/Spring 2020)

- Interviews
- MLLI⁵

Expected Results

More confidence in lab, better lab technique, better understanding of concepts

Online Interactive Assignments

- Students more confident and prepared^{2,3}
- More focus on concepts, less on technique⁴
- Less technique error²

Assignment Format Goals

- Provide effective scaffolding
- Focus on the skill