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

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# Development and Evaluation of a Hybrid ADI/SWH Model

## Pre-Laboratory Curriculum

Tabitha Alitz, Dawn Del Carlo

### Previous Research at UNI<sup>1</sup>

- 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 Load<sup>6</sup>

The amount of brain power it takes to process given information

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

### 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

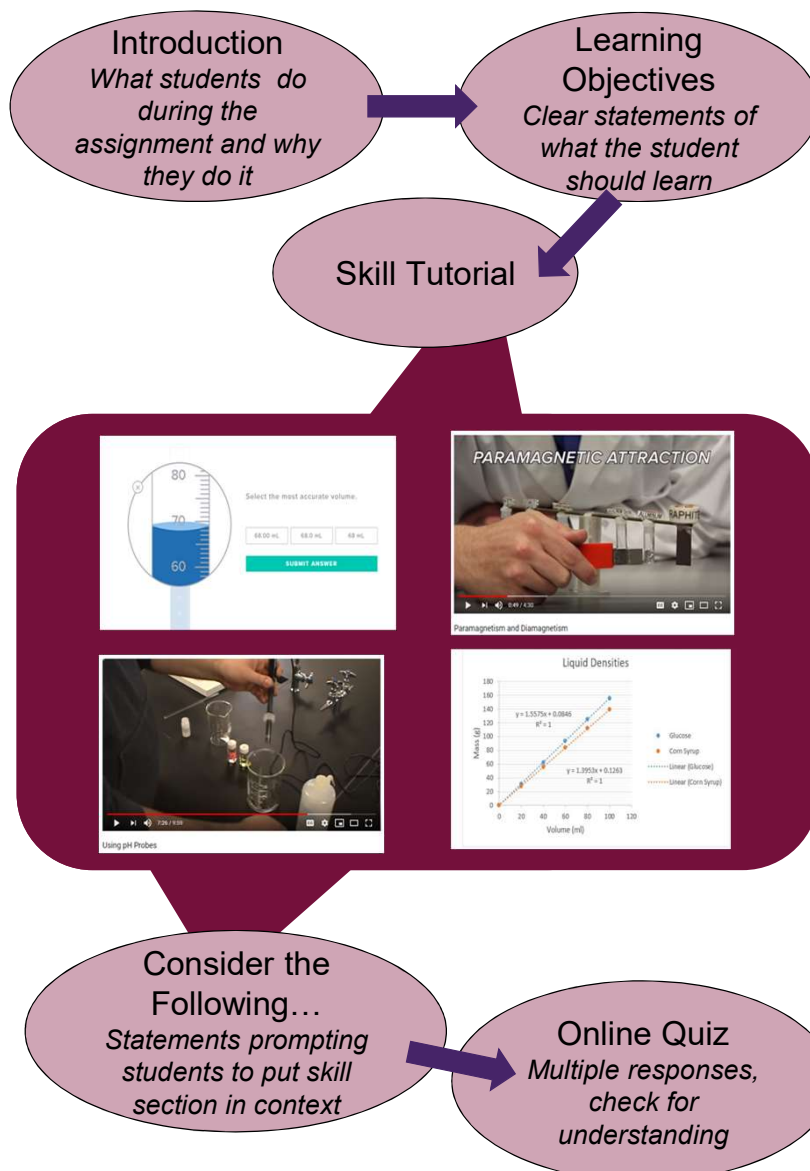
### Online Interactive Assignments

- Students more confident and prepared<sup>2,3</sup>
- More focus on concepts, less on technique<sup>4</sup>
- Less technique error<sup>2</sup>

### Assignment Format Goals

- Provide effective scaffolding
- Focus on the skill

### 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
- MLLI<sup>5</sup>

### Expected Results

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