Previous Research at UNI

- 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

The amount of brain power it takes to process given information

<table>
<thead>
<tr>
<th>Intrinsic Load</th>
<th>Extrinsic Load</th>
<th>Germane Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity</td>
<td>Unnecessary information or processes</td>
<td>Diversity</td>
</tr>
<tr>
<td>Element</td>
<td>Varied skill set</td>
<td>Determined by breadth of learning objectives</td>
</tr>
<tr>
<td>Interactivity</td>
<td>Determined by activity and experience</td>
<td></td>
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</tbody>
</table>

General Chemistry Lab Models

<table>
<thead>
<tr>
<th>ADI Tools/Skills</th>
<th>Hybrid Tools/Skills</th>
<th>SWH Tools/Skills</th>
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<tr>
<td>Beginning Questions</td>
<td>Beginning Questions</td>
<td>Beginning Questions</td>
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<tr>
<td>Background Info</td>
<td>Procedure Proposed</td>
<td>Procedure Proposed</td>
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</table>

Online Interactive Assignments

- Students more confident and prepared.
- More focus on concepts, less on technique.
- Less technique error.

Assignment Format Goals

- Provide effective scaffolding.
- Focus on the skill.

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

Expected Results

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