The first-year chemistry lab course represents fundamental chemistry broadly, thus building consensus amongst representatives from the various chemistry disciplines is key.

1) Lab Committee drafts experiment-specific LGs.
2) Research Team synthesizes drafts and integrates into the RU global framework.
3) Iterative discussion between Research Group and Lab Committee
   \[\Rightarrow\] Improves LGs & builds consensus
4) Development of assessment instruments from LGs (implementation of assessments and validation).
5) Evaluation of results, re-examine LGs, adjust course, re-assess, etc.

**Laboratory Learning Goals (LGs)**

- Basic laboratory skills
- Communication and record keeping
- Maturity and responsibility
- Context
- Integration and application of knowledge

These broad, faculty/college-level learning goals from RU provide a global framework for lab LG development.

**Assessment Instruments**

- **Pre-/In-/Post-Experiment Surveys**
  - Written surveys that target “priority” LGs not already assessed by course deliverables
  - Before students begin preparing for an experiment (Pre-, online)
  - At the beginning of the lab period (In-, paper)
  - After lab report has been completed (Post-, online)

- **Experiment Observations**
  - Researchers observe students completing experiments to assess students’ technical performance/practical skill.

- **Lab Skill Interviews**
  - (not yet completed)
  - Interview students about specific experimental techniques and observe their ability to perform that technique.

- **Beliefs/Attitudes Survey**
  - CLASS-chem (see adjacent poster)

- **Lab Background Survey**
  - Previous laboratory experiences and chemistry courses taken

- **Lab Background Survey**
  - Demographics

**Consensus Building and the Development of Lab LGs**

<table>
<thead>
<tr>
<th>Department:</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Members</td>
</tr>
<tr>
<td>6 Members</td>
</tr>
</tbody>
</table>

**Pre/Post Course Surveys**

- **Lab Skills Survey**
  - Precision and significant figures
  - Labware/Glassware recognition
  - Appropriate use of labware/glassware
  - Procedural questions
  - Reading a buret and graduated cylinder
  - Graphing data
  - Error (identify type/definition)

**Validation**

- Instruments validated through interviews with volunteer students selected to capture the breadth of the population.
- Participation: \(\geq 70\%\) of class participate for minimal incentive (very small bonus).

**Preliminary Results**

- RU framework and consensus building model worked well to develop lab LGs.
- Background survey revealed unexpected demographic details (large ESL fraction)
- Lab skills survey useful but in need of further refinement.
- Clear themes emerge from experiment observations.
- Presently, no consistent relationship between students’ written steps and performance of a technique.