**The Virtual Laboratory**

Simulation-based learning environment for aqueous chemistry

Flexible tool that allows college and high school students to approach chemistry more like practicing scientists

Multiple representations to aid conceptual understanding

Chemistry environment for aqueous simulation-based learning

Instructor Authoring Tool

An initial release of the Virtual Lab’s authoring tool is available on CD and our website. Instructors now have a graphical means of configuring the Virtual Lab and authoring tools. The Virtual Laboratory is being used in a diverse range of university settings.

Invitation to Instructors

The Virtual Laboratory is being used in a diverse range of university settings. We are seeking college and high-school faculty to test the software. We are seeking college and high-school faculty to test the software.

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Invitation to Instructors

Homework problems

The task is easy to create all types of homework problems. The Virtual Laboratory is being used in a diverse range of university settings. We are seeking college and high-school faculty to test the software.

Contact Information

Email us at: info@chemcollective.org or call (412) 268-7914

ChemCollective

www.chemcollective.org
Multiple representations to aid conceptual understanding:
The lab bridges textbook equations and laboratory activities by showing multiple representations of solution contents, including aspects that would not be visible in the physical lab. Comparison with paper-and-pencil calculations provides realistic feedback. When their answers are not correct, the intermediate results provided by the learning environment give the students a means to explore why.

Comprehensive coverage of aqueous chemistry:
The Virtual Laboratory allows students to select from hundreds of standard reagents and manipulate them in a manner that resembles that of a real lab. Students can design and perform diverse experiments in acid-base chemistry, thermochemistry, solubility, and redox chemistry.

Easy integration into existing courses:
Our authoring tool allows instructors and others without programming expertise to create highly interactive student activities that utilize the Virtual Lab. Popular problem types include:
- Calculation checking, where students carry out the procedure described in a textbook problem and verify their answers with the simulation.
- Online experiments, where students determine how to carry out a common procedure and answer chemical questions.
- Design problems, where students use chemical concepts in pursuit of meaningful goals.
- Crosscutting, contextualized problems that require students to use knowledge from various parts of an introductory course as well as potentially provide exposure to concepts from other courses.

Easy to use:
Transferring solutions in the Virtual Lab is as easy as drag and drop. User studies on high school and college students indicate that the user interface takes about 5 minutes to learn. The virtual lab allows current paper-and-pencil homework to be supplemented with online activities that provide varied practice. Activities range from using the lab to check answers to conventional paper-and-pencil exercises, to designing experiments in pursuit of realistic goals.

The philosophy underlying our work stems from two challenges in science education: (i) Students are too rarely engaged by their science courses and (ii) many valuable shifts in teaching and assessment to deepening understanding of the physical world and its mathematical description should be visible in the physical lab. By comparison, the physical lab is made in a manner that resembles that of a real lab, and manipulate them in a manner that resembles that of a real lab.

The lab enhances current curriculum homework and provides additional coursework by extending assessment and feedback. The philosophy underlying our work stems from two challenges in science education: (i) Students are too rarely engaged by their science courses and (ii) many valuable shifts in teaching and assessment to deepening understanding of the physical world and its mathematical description should be visible in the physical lab. By comparison, the physical lab is made in a manner that resembles that of a real lab, and manipulate them in a manner that resembles that of a real lab.