Type them into questions box!

“Why am I muted?”
Don’t worry. Everyone is muted except the presenter and host.
Thank you and enjoy the show.
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ACS Efforts and Resources on COVID-19

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www.acs.org/covid-19
ACS Career Navigator: Your Home for Career Services

Whether you are just starting your journey, transitioning jobs, or looking to brush up or learn new skills, the ACS Career Navigator has the resources to point you in the right direction.

We have a collection of career resources to support you during this global pandemic:

- Professional Education
- Virtual Career Consultants
- ACS Leadership Development System
- Career Navigator LIVE!
- ChemIDP
- College to Career
- ACS Webinars
- Virtual Classrooms

Visit [www.ACS.org/COVID19-Network](https://www.acs.org/COVID19-Network) to learn more!

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Enhancing Online Laboratory Experiences

Insights from Organic, Inorganic, and Physical Chemistry Courses

Co-produced with ACS Education

THIS ACS WEBINAR WILL BEGIN SHORTLY...
Enhancing Online Laboratory Experiences: Insights from Organic, Inorganic, and Physical Chemistry Courses

Presentation slides are available now! Edited recordings are an exclusive ACS member benefit.

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This ACS Webinar is co-produced with ACS Education.

Audience Survey Question

ANSWER THE QUESTION ON BLUE SCREEN IN ONE MOMENT

What is the highest degree offered at your institution?

- Associate’s degree
- Bachelor’s degree
- Master’s degree
- Doctoral degree
- Not applicable

* If your answer differs greatly from the choices above tell us in the chat!
Disclaimer

The opinions or views expressed in these discussions do not necessarily reflect on the current statements and guidelines of the American Chemical Society, the views or opinions of ACS’s management or its members, or plans for renewed or revised policies. Chemistry departments seeking ACS Approval must continue to follow the ACS Guidelines for Bachelor’s Degree Programs as stipulated by the Committee on Professional Training, including those for laboratory instruction once their campuses resume face-to-face instruction without social distancing.

What You Will Learn

• Various goals and outcomes for online undergraduate laboratory experiences
• Examples of how laboratory goals and outcomes are being fulfilled
• Approaches for planning and assessing online laboratory experiences
What types of undergraduate laboratories do you teach?
(select all that apply)

- Organic chemistry
- Inorganic chemistry
- Physical chemistry
- Other (tell us more in the chat)
- Not applicable

* If your answer differs greatly from the choices above tell us in the chat!
Why did we create VR labs?

Motivated by accessibility concerns

• Pregnant students
• Deployed military
• Visually impaired students

Informed by learning objectives

Pre-Production: Flowcharts
Production: 360 Video Shoot

Post Production: User Interaction Design
Evaluation
CH 222 Virtual Organic Chemistry Lab Pilot, May 2018
Presented results at ELI 2019 and ACS Orlando 2019

<table>
<thead>
<tr>
<th>Measure</th>
<th>Traditional lab mean</th>
<th>VR lab mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term (Lab report)</td>
<td>66.6 ± 17.9</td>
<td>61.4 ± 23.4</td>
</tr>
<tr>
<td>2-week recall (Quiz)</td>
<td>51.2 ± 23.9</td>
<td>54.0 ± 23.6</td>
</tr>
</tbody>
</table>

The two methods are virtually indistinguishable in terms of student outcomes, even though the VR experience might have been more memorable than a face-to-face lab.

Production and Evaluation of a Realistic Immersive Virtual Reality Organic Chemistry Laboratory Experience: Infrared Spectroscopy

Student Testimonials

“I feel that the virtual environment has the functioning abilities to give me the same information a real class would give me. The virtual experience takes out waiting times during experiments as well as makes it very straightforward and to the point. It also explains step by step what to do one on one which is hard to get in a real class.”

“It allowed me a very detailed explanation of why the correct answer was in fact the correct answer unlike a real class environment where you aren’t sure if you are ever doing it correctly.”

“I like that we still went through like a normal lab in a normal setting. I liked the image and explanations associated with the answers and activities.”

“I’ve never had a TA talk to me for such a long time.”
Sharing with others

Lessons from a Rapid Pivot to Teaching Inorganic Lab Fully Online in SQ2020

Kyle Grice
kgrice1@depaul.edu
DePaul University
Twitter: @GriceChemistry

Based on the July 7 SLiThEr
(Supporting Learning with Interactive Teaching: a Hosted Engaging Roundtable)
hosted by IONiC (Interactive Online Network of Inorganic Chemists)
Fully Online SQ2020

- DePaul is on the quarter system and the timing of the shutdown meant spring quarter was fully online

- CHE 321 is a junior/senior-level inorganic chemistry lab. Normally we have 5 multi-week lab experiments

- In SQ2020 I taught it asynchronously, fully online with very little time to prepare.

- I had 21 students, more than I usually have (14-16)

Goals

- Keep the students engaged in the course and keep communication open

- Give the students a “lab experience”

- Keep the lab report writing expectations and help the students
Moving Labs Online

- Took short videos (a few minutes) and pictures
- Posted raw data (masses and volumes) and let the students do the processing
- Spectral data were saved as pdf or excel files (student’s computers may not be able to run software that isn’t Microsoft Office, etc)
- Rubric and info on lab report writing were given out, and there was an assignment on writing early on

Some Lessons From My Experience

- Keep all links and info centralized on a main page for each lab. Link out to submission folders and discussion posts, etc.
- Be clear and redundant with info in your Course Management Site and your email communications, particularly due dates.
- Keep students engaged between big assignments with small, low-stakes assignments: multiple choice quizzes, discussion board posts (require post and response each week, always due on the same day and time each week)
- Be flexible and supportive. For example, allow students to revise lab reports based on feedback.
- Do the big assignments have to be lab reports? What about presentations? Posters?
Thoughts on moving a physical chemistry lab online

Michael Seery
Professor of Chemistry Education & Director of Teaching
Editor in Chief, *Chemistry Education Research and Practice*

michael.seery@ed.ac.uk  @seerymk

Overview of presentation

Considering what we can get from “online labs”

Designing a physical chemistry “lab”

Notes about my context:
- We are still in *planning* mode!
- All my students are Chemistry Majors
What learning can occur in online labs?

**In**

- Awareness of practical approaches and their rationale
- Using chemical knowledge to apply to problem solving
  
  *Experimental design*
  
  *Group work and data compilation*

**Out**

- Practical experience
- Technical competence development

Seery, M. K. (2020). Establishing the Laboratory as the Place to Learn How to Do Chemistry. *Journal of Chemical Education, 97*(6), 1511–1514
**Design** (physical chemistry)

**Phase 1: Preparation**

**Preparation 1**

**Experimental Guidance:** to familiarise students with an experimental approach (for the purpose of its utility)

**Preparation 2**

**Supporting information:** to provide students with meaningful information that they can use in planning their experimental design

Videos for lots of (phys chem) labs at: [youtube.com/mkseery](https://youtube.com/mkseery)


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**Design** (physical chemistry)

**Phase 2: Activity**

**Group Task**

Based on information provided, students need to prepare a procedure to achieve a given task (literature based)

Guided by teaching assistants, students provided with data based on their task

“Explore temperature or pH or solvent dependence”

**Group Report**

Students assigned to larger than usual groups (e.g. ~6) and have to pull together their various data components to produce a combined report to address given task.

Based on principles discussed in:

Available Now! In support of educators keeping their students’ chemistry education moving forward, ACS Publications & the ACS Division of Chemical Education are sharing a collection of free to read articles from the Journal of Chemical Education.

Coming in September 2020!

Available Now! Laboratory teaching continues to evolve and face new challenges in today's world. To help share the broad approaches to laboratory education, the journal has provided a collective resource of articles on laboratory learning and understanding, inquiry methods, student preparedness, assessing the lab, and faculty goals and professional development for laboratory teaching.

https://pubs.acs.org/journal/jceda8

ACS Education Webinar Recordings

The chemistry community has a wide range of resources to assist with teaching remotely in various and changing circumstances which are organized into six categories. Be sure to view this free resource!

http://www.acs.org/content/dam/acsorg/events/popular-chemistry/Slides/2020-06-30-remote-teaching-resources.pdf

www.acs.org/acswebinars
Panel Resources

Visit these websites and read these articles for more information about the courses, approaches, and assessments presented during this ACS Webinar.

Maria Gallardo-Williams, Teaching Professor and Director, Organic Teaching Laboratories, North Carolina State University

- North Carolina State University Virtual Reality Organic Chemistry Labs: go.ncsu.edu/vrlabs-orgchem

Kyle Grice, Associate Professor of Inorganic Chemistry, DePaul University

- Nataro, C; Johnson, A. R. A community springs to action to enable virtual laboratory instruction, Journal of Chemical Education, Article ASAP. DOI: 10.1021/acs.jchemed.0c00526

Michael Seery, Professor of Chemistry Education, University of Edinburgh

- Videos for lots of (phys chem) labs at: youtube.com/mkseery
- Seery, M. K. Establishing the laboratory as the place to learn how to do chemistry. Journal of Chemical Education, 2020, 97(6), 1511−1514. DOI: 10.1021/acs.jchemed.9b00764

http://www.acs.org/content/dam/acsorg/events/popular-chemistry/Slides/2020-07-22-resources.pdf

*These resources are provided for informational use only. Inclusion on this list does not constitute an endorsement by ACS.

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**Individual Development Plans**

**Opioid Crisis**

**Green Cards for Scientific Researchers**

**What You Will Learn**
- Basics of Individual Development Plans and an introduction to ChemIDP.org
- Importance, challenges, and resources to grow in your self-awareness
- Discovering patterns where you succeed and thrive

**What You Will Learn**
- What are the stats, scientific issues, and policy ramifications driving the opioid crisis
- What are the body’s pain pathways and where are the potential clinical targets
- What solutions are medical chemists working on?

**What You Will Learn**
- How to tame the filing of your green card application
- How to maximize your chances of approval in the EB-1 Armenia categories
- Why you should not worry about Trump’s June 2020 order

Co-produced with ACS Division of Medicinal Chemistry

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