



Chem101



# Strategies for Chemistry Instructors in Fall 2021

How COVID Has Changed The Way We Teach (and Learn)  
Chemistry



# Introduction

As we approach the new school year, it is important for us to look at the lessons learned from the abrupt switch to remote learning last year and consider how we can put them to good use for the Fall 2021 school term.

Like many other STEM subject educators, college-level chemistry instructors face unique challenges such as loss of lab time, increased knowledge gaps and learning loss, and changes in student attention and engagement. Instructors must also be more prepared for institutions to leverage hybrid teaching models or suddenly return to remote-only teaching.

This ebook serves to help identify the many opportunities borne out of these challenges - taking what we learned during a period of sudden and intense change - and leverage them to increase student engagement and lower barriers to learning.

# A challenging landscape ahead

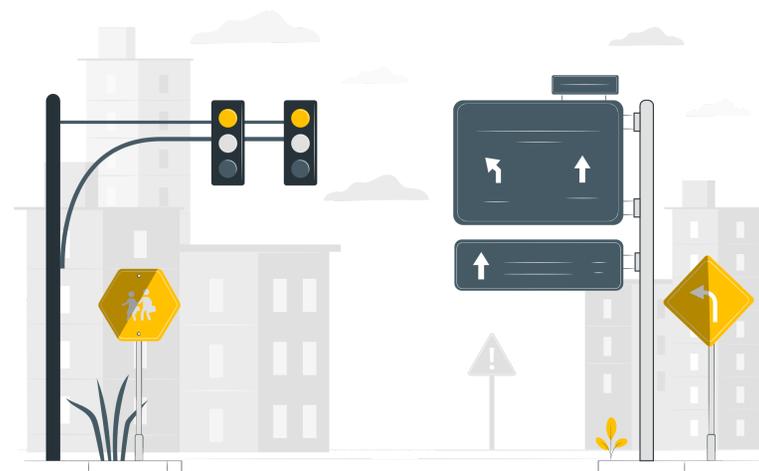
Let's take a closer look at some of the specific challenges that we must prepare to address as we resume instruction over the Fall 2021 semester.

## Decisions are short notice and uncertainty abounds

With so much uncertainty around vaccinations, the rise of new variants, and the overall safety of returning to the classroom, instructors need to be ready for anything. They may face abrupt changes that require their in-person curriculum plans adjust to hybrid or online models. It appears that the only thing certain for Fall 2021 is uncertainty.

Instructors are nervous about returning to the classroom. Many instructors are wary of returning to the classroom for fear that the risk to their, and their students', health and

safety is still too high. In fact, one in four instructors surveyed indicated they were considering leaving the field by the end of the 2020-2021 school year. This trend could be especially problematic for advanced college courses like chemistry that require specialized knowledge from teachers.





## Student knowledge gaps and learning loss may be at all time highs

The abrupt shift to online learning left many students and instructors struggling to adapt. When entirely remote, students were unable to gain the valuable practical experience that lab time presented, as well as opportunities to work collaboratively in peer-to-peer groups. What remains unclear as we approach Fall 2021, is the level of mastery students attained in their courses during the pandemic, and how much retention they'll demonstrate as we return to the classroom. Instructors must prepare for knowledge gaps to be wider than before, and for students to be at widely varying levels of preparedness for the new term.

# A look at how teaching (and learning) chemistry has changed

Here is a look at the many ways that teaching and learning chemistry have changed over the course of the pandemic.

## A plethora of remote access tools

There are more options than ever for remote teaching including common tools like Zoom or Microsoft Teams, as well as more specialized offerings like Google Classroom. In many cases, instructors are using more than one remote tool concurrently, and managing more remote tech than ever before. And while these tools are well suited for remote meetings, they can lack the type of functionality that aids in teaching highly conceptual (and technical) subjects like chemistry.

The change here isn't just the work required to set up these tools for each individual course, but the added technical support students need in getting them familiar with navigating and engaging with each platform on their

devices. This all costs time and effort and can create gaps between students, depending on the quality of their internet connection and devices. Put simply, instructors now find themselves in a dual role of teacher and tech support.

## Student focus and engagement has changed

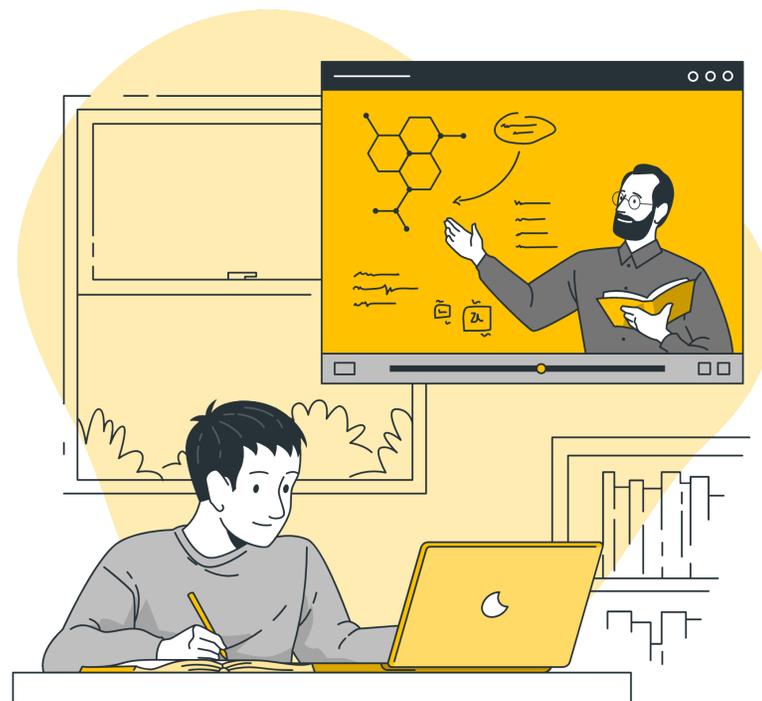
Learning remotely has changed how students engage with their courses and, in many cases, student focus has been impacted. At home distractions are plentiful and maintaining student focus is more challenging than it ever was in the classroom. Complex chemistry concepts can be challenging to present via remote instruction, and it can be harder for instructors to identify when students aren't following. Instructors have had to get creative about how they present material and encourage participation with a fully remote student body - from new lecturing styles, breakout discussions and activities, to revamped homework assignments.

What's now clear is that some students struggled with remote learning and may return to the classroom further behind as a result, while other students have thrived in the new model and may be less excited to return to a standard classroom format. Understanding that students' needs will be different in Fall 2021 is key, with an intense focus on active learning and increased student engagement.

## The rise of new educational technologies

One of the most beneficial changes to present itself is the rise of new educational technologies. Beyond the basic remote access tools, new technologies that focus specifically on active learning and skill-building have been rapidly developing and will only improve going forward. This presents a whole new set of opportunities to help close learning gaps and engage students in more effective ways.

For chemistry, new tools that focus on creating engaging and informative lab simulations, complex concept illustration, and molecular drawing have provided students with visual and practical aids to support their learning.



# Strategies for chemistry course instructors

How can chemistry instructors best prepare for the upcoming Fall 2021 term and beyond?



## Diagnose and address gaps

First and foremost, chemistry instructors need to be prepared to identify the learning gaps that developed during time away from the classroom. Knowing what the gaps are is only the first step, as they then need to be addressed through implementation of the right tools, homework, and practice exercises to keep students engaged and rebuild their skills.



## Student engagement is key

After a year of predominantly self-directed learning in environments filled with distractions, college students have shorter attention spans than ever. A return to the classroom is going to require engaging students in new and more effective ways.

Active learning strategies can keep student attention and allow them to maintain the sense of being student-led and self-directed. Presenting concepts in relatable ways and utilizing educational technology tools that draw students in and allow them to visualize and practice chemistry concepts will improve student engagement dramatically.



## Build in flexibility and adaptability

It can't be stated enough that the only thing certain about the road ahead is uncertainty. While everyone is anxious for a return to "normal" we must be prepared for the possibility of new outbreaks and the return to hybrid or fully remote instruction at any time. The best strategy to prepare your chemistry course for fall is to build in flexibility using educational technology that integrates effectively with your LMS and remote learning tools. Older interactive technology like clickers, which rose to popularity in the 1990s and were heralded at the time as the key to in-class engagement, fail at being adaptable to a hybrid or remote model. Similarly, reliance on paper/pencil formats for homework and exams will leave you scrambling to adapt.

Instructors who build out their courses with a student response system that can work both in-person and online will be ahead of the curve and ready for any possibility. Instructors who have previously avoided such systems due to question formats being limited to multiple choice and/or short answer should take advantage of educational technology tools that have evolved to support critical skill-building in the areas of molecular drawing and dimensional analysis and beyond. Using technology does not have to mean losing access to the depth of conceptual understanding you wish to evaluate in your students.



## Final thoughts on your Fall 2021 strategy

Setting an effective chemistry teaching and learning strategy for fall means understanding not only the new challenges we face but also how college education has changed in the face of the pandemic and a year of remote learning.

Being prepared to diagnose and overcome student knowledge and learning gaps while baking in flexibility and adaptability are key elements to this effective strategy. Using chemistry-focused educational technology tools, like Chem101, to provide students with actively engaging content, concept visualization, and practice will help keep students engaged whether in the classroom or at home, all while maintaining the integrity of your course.

**Ready to Build a Better Chemistry Course?**

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