

Chapter 19

Designing Virtual Collaborations in Case-Based Science Learning: Using Google Slides, Padlet, and FlipGrid

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ABSTRACT

This chapter focuses on the design components and layout of digitally engaging high school students in high level thinking activities during virtual synchronous science sessions. By integrating digital tools and applying case-based lessons that target “engaging in argument from evidence,” learning experiences that engage all students in an online setting are described. Two virtual experiences from a high school anatomy class related to making a diagnosis and justifying it using evidence are presented in this chapter. In the bell ringer and summative case study diagnosis activities, Zoom breakout room, Google Slides, and Google Docs are used. From a biomedical science course, two other learning experiences are described which utilize career-oriented role play and cases studies to have students collaborate and authentically apply their content knowledge. In the contact tracing and genetic counseling activities, Padlet and FlipGrid are used respectively. The related pedagogical reasoning, successes, and challenges follow the explanations of the four experiences.

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INTRODUCTION

The goal of this chapter is to showcase the importance and affordances of digitally engaging the students in high level thinking activities during virtual science class sessions. The mission is to help teachers redefine what class engagement means and create virtual learning experiences in which students seamlessly interact with content and each other in multimodal forms (using text, audio, video, images). The chapter is meant to guide teachers to question their pedagogical and content goals and re-envision how the students can collaborate to reach the determined goals in a virtual learning environment.

While the strategies and virtual experiences described in the chapter can be adapted to any science classroom, the authors feel highlighting the teaching context is important. Equity in science education is a value that needs to be shown as feasible and practical for teachers to implement, particularly during the pandemic. In this way, the chapter showcases how high school students in this school district are held to high expectations in terms of participation and engagement. In the district, 9.3% of the students identify as white and 100% of the students in the district qualify for free lunches (Niche, n.d.). Educators in other urban settings can be inspired by the virtual learning experiences designed and implemented successfully.

The four virtual learning experiences explained in this chapter are from case study activities of high school Anatomy and Project Lead the Way (PLTW) Biomedical Science classes in an urban Midwestern school district. Teachers have collaborated across the building, district, and with other teachers in the county around the implementation of these case studies which has improved the student engagement and understanding of content greatly. The individuals who experienced these virtual activities are 54 students from 10th through 12th grade, with many of them on the track to finish the state Biomedical Career and Technical Education certification pathway, by graduation. In the Anatomy and Human Body Systems classes, there are 25-28 students, with 79% of the students reporting their race as Black or African American, 6% reporting their race as Hispanic or Latinx, and 18% reporting their race as White and of non-Hispanic heritage. Twenty percent of these students report their gender as male, 79% as female and 1% as non-binary. In the Advanced Biomedical Science class, there are 6 students with 100% of students reporting their race as Black or African American, 83% reporting their gender as female, 16% reporting their gender as male. The case study activities explained in this chapter have been done in person and virtually with students over the last two school years (2019-2021).

During the synchronous virtual sessions of these two high school classes, the instructor Walsh-Rock is the only class member with the camera on. The students do not turn their cameras on in the virtual class. Student participation is not measured by their camera being on or off, rather by responding to questions and activities in the chat box, on Google Tools (Slides or Docs), or within a Padlet or FlipGrid. The digital tools encourage participation rather than limit the students.

The use of online tools as collaborative resources in the classroom requires specific instruction to students on how to communicate and participate in these platforms. Many schools use a learning management system (LMS) such as Schoology, Canvas, Infinite Campus, or Google Classroom to communicate assignments, calendars and grades to students; leveraging these platforms as libraries for resource specific instructions can be a huge asset in the virtual classroom. In Walsh-Rock's class they created original content videos for several instructional tools to help teach students how to use these platforms in class. These resources were housed in a "How-To/General Resources" section of the LMS and referred to frequently throughout the semester. Additionally, when a new technological skill was introduced, students were provided a time for safe practice similar to the way an academic skill would

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