Lessons Learned: The impact of Interactivity and the Human Aspect in Instructional Videos

[1]Riley Petillion, [2]W. Stephen McNeil
University of British Columbia, Okanagan
[1]Centre for Teaching and Learning, Educational Consultant;
[2]Department of Chemistry, Associate Professor
riley.petillion@ubc.ca, stephen.mcneil@ubc.ca

1. Introduction

Instructional videos have become an integral component of modern education, particularly in science disciplines such as chemistry where multiple visualizations are essential to deriving understanding. As digital learning tools evolve, the effectiveness of these videos hinges on their ability to engage students and foster deeper understanding. The authors' body of work offers valuable insights into the design and delivery of instructional videos, emphasizing the roles of interactivity and the human element. This knowledge transfer paper synthesizes lessons from our publications to explore how these factors can enhance learning outcomes, both cognitive and affective, beyond our disciplinary contexts.

2. Context

UBC's Okanagan campus has undergone a multi-year restructuring of its first-year general chemistry courses (two semesters, each with two sections of up to 400 students), resulting in changes in learning outcomes, assessment strategies, and learning activities (Petillion & McNeil, 2019). Flipped-classroom modules were added as a major part of this process to allow in-class time for problem-solving and group work (Lundin et al., 2018). Before class, learners are expected to engage with an interactive instructional video (Petillion & McNeil, 2020a). These videos typically feature a course instructor on screen, with cuts to animations, tablet screencast, and physical laboratory experiments. Much time and thought went into their development (Petillion & McNeil, 2025a).

3. Practical Recommendations

1) Incorporate Multiple Representations: Use a learning framework to guide the integration of varying media.

One of the foundational concepts highlighted in our videos is Johnstone's Triangle, which provides a pedagogical framework for instructional design in chemistry education (Johnstone, 1991). The triangle illustrates the interplay between three levels of chemical understanding: macroscopic phenomena, submicroscopic structures, and symbolic representations. In our videos, we integrated animations that transition smoothly between molecular models and real-world phenomena to help students bridge abstract concepts with tangible experiences, along with written notes showing how we symbolize these interactions.

2) Embed Interactive Features: Include quizzes, reflection prompts, or branching scenarios to engage students actively.

In the flipped-classroom videos, we leveraged interactive features to include multiple choice questions, where answers appeared on the screen and the video automatically paused. Students are prompted to click on an answer and are brought to a particular time stamp in the video. They either receive customized constructive feedback outlining their thought process and clarifying information before being allowed another attempt, or the instructor congratulates the correct responses and summarizes the correct thought process. Students also appreciate the ability to pause, rewind, and review content at their own pace, which helped accommodate diverse learning needs (Petillion & McNeil, 2025b).

Our research on student experiences with synchronous online labs reveals the significance of interactivity (Petillion & McNeil, 2021). Comparing prerecorded and livestream formats, we found that students often preferred videos that allowed for real-time interaction. Livestreams enabled students to ask questions and receive immediate feedback, creating a dynamic learning environment. Even in prerecorded formats, the inclusion of interactive elements—such as embedded quizzes, clickable annotations, or prompts for reflection—proved to be beneficial.

Utilizing technologies, such as H5P (a freely available online Javascript framework where you can create interactive HTML5 content), is one of the most powerful tools to increase learner engagement and support cognitive learning outcomes. We have observed learners purposefully clicking wrong answers in the interactive multiple choice prompts to remark common

misconceptions – the instructor offering immediate and custom feedback explaining why incorrect choices are incorrect is in itself a learning resource for students. Learners spend more time engaging with the media, and when comparing instructional videos with and without embedded interactivity, students learning was significantly improved pre- and post-intervention (Petillion & McNeil, 2025b).

Students have also stated that interactive questions also serve as a mental break in the learning process. Questions appear at the end of a topic to assess understanding, and the forced video pause gives learners an opportunity to take a breath before moving on at their own pace (Petillion & McNeil, 2025b).

3) Foster a Human Connection: Maintain an approachable demeanor, use conversational language, and share personal enthusiasm for the subject.

Another critical aspect underscored in several of our works is involving human connection in instructional design. Through surveys and semi-structured interviews, our studies suggest that students respond more positively to instructional videos when instructors maintain a personable and approachable demeanor (Petillion & McNeil, 2025b). Simple practices, such as using conversational language, making eye contact with the camera, and sharing personal anecdotes or enthusiasm for the subject, can create a sense of rapport between the instructor and the learner. Having your face on screen in an instructional video enhances student connection and learning outcomes. It demonstrates to your students that:

a) you personally created the videos specifically for your students because you care, and
b) your physical gestures actually help signify to learners what is most important (where you look, where you point, if you lean back to grab a breath and recap what has been said so far, etc.).

In the virtual laboratory, we also note the importance of instructor presence in synchronous formats. Livestream sessions where the instructor addressed students by name or acknowledged their contributions fostered a sense of community, even in virtual classrooms (Petillion & McNeil, 2021). This sense of belonging was linked to improved motivation and anticipation to attend class.

A review we conducted of student experiences during emergency remote teaching outlined the frustration and stress resulting from the lack of communication from instructors, and the absence of classroom interaction (Petillion & McNeil, 2020b). With the massive influx of instructional video creation, research participants made it clear the impact that adding some human element, be it your face in your videos or more frequent and relational communications, and finding ways to add interactivity in an otherwise bland non-participatory lesson, can have on student learning outcomes.

4. Summary

By emphasizing interactivity and the human aspect, educators can create videos that not only convey information but also inspire curiosity, foster connection, and support meaningful learning experiences. If you are involved in creating instructional videos, our two biggest recommendations are to add interactive questions with immediate feedback, and show your face on the screen! Both of these are minimal time commitments yielding maximum growth on student cognitive and affective learning gains.

5. References

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