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**Chemistry and Biochemistry**

# **Implementation of video procedures in Biochemistry Lab**

## **The Challenge**

In the past, when students arrived to biochemistry lab, they were generally unprepared. This manifested itself in various ways, such as frantically reading the procedures during class time, not being able to visualize how to carry out the technique, and constantly asking “what do I do next?” The first attempts to tackle this problem included directed pre-lab questions and demonstrations. Although the directed pre-lab questions helped in making them read the procedures prior to class, the lab facilities, size of the class, and the real-time quickness of the procedures made the demonstrations ineffective.

## **The Approach**

Intuitively, the root of the problem seemed to be that students were reliant on written procedures that lacked a visual component. Therefore, video procedures were created and implemented for each directed experiment.

The video procedures were created for each technique that the students were to perform. The videos were filmed with 1080p resolution (when possible) and shot simultaneously with two vantage points, hands on and top-down (see Figure 1). A HD camera and a HD webcam were used to film the procedures. Screenshots or screen recordings of computer programs were also incorporated into the videos. After editing the videos, a voiceover was added to convey important information such as quantities, concentrations, time, etc. The videos were then uploaded to YouTube. On average, the length of each video was ~ 10 min.

To implement the use of the videos in class, all written procedures were removed from the lab manual and students were required to write their own procedures using the video lab procedures as a guide. The procedures were signed off by the TA at the beginning of class. In the event that a student was to arrive to lab without the procedures (which hasn't happened...yet), they would have been turned away from the class.

## How it Went

Overall, the implementation of video procedures in Biochemistry Lab seemed to have gone well. The most obvious outcome from utilizing this teaching tool was that students came to lab prepared; knowing what they were going to be doing for the day since they had seen the videos and written the procedures for themselves. From an instructor's vantage, the videos made the labs easier to teach since all students had a quasi-personal demonstration of the techniques and they no longer asked, "what do I do next?" Instead, they used their phones to watch the video again.

Student perceptions of the video procedures were favorable.

Although the response rate of a DU Qualtrics survey was too

low to gain any statistically relevant information, all respondents mentioned that the videos were helpful for the lab. In addition, the respondents said that the videos increased their confidence that they could successfully carry out the experiments. Respondents also recommended that video procedures be implemented in other chemistry labs (eg. organic and general chemistry). Anecdotally, students mentioned in class that they liked the idea of being able to rewind and view the procedure again and again.

So far, it could be argued that the videos have limited success at this point. To fully gauge whether or not that lab procedure videos are an effective teaching tool for biochemistry lab will require a larger test population and higher survey response rates.



**Figure 1.** A screenshot of a video procedure depicting the top-down vantage point and the hands-on vantage point (inset).

## Advice for Others

It should be noted that the lab procedure videos are far from perfect. Below are some suggestions that could increase the quality of the video:

- Have someone with a radio voice (can speak clearly and enunciate) do the voice over
- Edit YouTube's closed captioning!
- Make sure the webcam's autofocus is turned off or desensitized
- Lighting is key – find a place where you can use filtered light

Below are useful items that you should consider before making the videos:

- Prepare all intermediate steps before hand to speed up filming
- Shoot all scenes at one film location prior to moving to the next location
- Get help!
- iMovie is super easy to use – don't be intimidated!



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