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P289: Using flipped learning to engage students without sacrificing content
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To see the full student data and analysis for my flipped project, please see the following.

- Trogden, Bridget G. "The view from a flipped class: improved student success and subject mastery in organic chemistry." *Implementation and Critical Assessment of the Flipped Classroom Experience.* IGI Global. expected publication date of 2014.
- Trogden, Bridget G. "Reclaiming face time: how an organic chemistry flipped classroom provided access to increased guided engagement." ConfChem. May/June 2014. http://confchem.ccce.divched.org/2014SpringConfChemP3 (ConfChem is an online conference. The paper and discussion board are archived at the site above.)

A FLIPPING HOW-TO GUIDE

Whereas increased in-the-classroom student engagement is a well-documented mechanism for student knowledge retention and skill acquisition, classroom time is valuable. For those who teach very content-heavy courses, flipping the classroom can be a way to balance content delivery with student engagement.

In my organic chemistry classroom, I wanted to spend more in-class time on problem solving, so created video lectures to deliver the content out of class. There is no correct or incorrect way to flip a classroom, so the individual in- and out-of-class needs will vary according to each instructor. I will detail what I used for my project, but the main components needed are: 1.) electronic notes, 2.) audio and/or video-capturing software, and 3.) a website to host the files.

1.) **Electronic notes.** I chose to draw structures in real time as I narrated through the content. I utilized the SMART Notebook software installed on my computer as a drawing interface. (My university's instructional tech support office was able to supply the SMART Notebook software.) I used a Bamboo writing tablet (~$80) in order to draw out structures and notes while in SMART Notebook. Alternatively, those who teach with PowerPoint could just narrate over the slides. I exported my SMART Notebook files as pdfs and uploaded those to the course management system (Blackboard). The students could then print out and annotate directly on the notes while watching the videos, allowing them more time to listen rather than just copy down everything I was writing.

2.) **Screen capture.** I used Camtasia Studio (~$300, educational license) for screen capture and voice narration. Camtasia Studio was an easy to use and professional-quality software product. I could stop at any point, merge video files, do any editing that I needed, and produce videos in a variety of formats (mp4, etc.) for a variety of outputs (YouTube, etc.). I did not go back and edit every single pause or correction, just as I do not rewind myself live in class. Alternatively, the software Jing can do video screen capture and is free. (Currently, Jing users are limited to 5 minutes of video time.) Apple's iMovie and the free PC program Photostory are very powerful and easy to use for combining video, still-frame pictures, and/or audio into a movie. (I have not used it for screen capture.) There are also several iPad apps for screen capture, including ScreenChomp and Doceri.

3.) **Video hosting.** I uploaded each video to the educational hosting site Vimeo. (Youtube is perfectly fine; I just find it a bit too crowded.) I protected each video with a password and posted the video link and password on Blackboard for my students. (Passwords are optional, not required.) Although there were no equity issues with my student population (i.e.: internet and computer access is plentiful at my University), internet hosting of videos allows students to access the content from any computer or smart phone.

It took a few weeks of producing videos to become proficient with the software, after which I could make a 40-minute video in about an hour, including prep, recording, and editing time. Producing a video lecture took on average 20 minutes more per week than prepping for a traditional lecture, but I believe this was a good time investment based upon all qualitative and quantitative data I acquired on the project.

FLIPPING RESOURCES I'VE FOUND HELPFUL

BOOKS

Bergmann, J.; Sams, A. *Flip Your Classroom: Reach Every Student in Every Class Every Day*; International Society for Technology in Education: Washington, DC, 2012. (Note: You can find the authors on Twitter @chemicalsams and @jonbergmann.)

Bowen, Jose Antonio. *Teaching Naked: How Moving Technology Out of Your College Classroom Will Improve Student Learning;* John Wiley & Sons, Inc.: San Francisco, CA, 2012. (Note: "Chapter 5 - Technology for Information Delivery" is absolutely worth the read. It has many tips on finding content on the web for your students rather than having to create it on your own.)

ARTICLES

Carpenter, J. P. & Pease, J. S. (2012). Sharing the learning. *Phi Delta Kappan*, 94(2), 36-41.

Cox, J. R. & Yearwood, D. (2013). In Defense of Teaching. *Teaching Professor*, 27(1), 4-4.

Dahlstrom, E., Walker, J.D., Dziubah, C. *ECAR Study of Undergraduate Students in Information Technology*, 2013. EDUCAUSE Center for Analysis and Research. available from http://www.educause.edu/ecar.

Rais-Rohani, M., & Walters, A. (2014). Preliminary assessment of the emporium model in a redesigned engineering mechanics course. *Advances in Engineering Education*, 4(1), 1-19.

Strayer, J.F. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research*, 15(2), 171-193.

Twigg, C.A. (2003). Improving Learning and Reducing Costs: New Models for Online Learning. *EDUCAUSE Review*, 38(5), 28-38.

Zappe, S., Leicht, R., Messner, J., Litzinger, T., & Lee, H. W. (2009). "Flipping" the Classroom to Explore Active Learning in a Large Undergraduate Course. Paper presented at the American Society for Engineering Education Annual Conference & Exhibition.

ELECTRONIC

Flipped Learning Journal. http://www.flippedlearningjournal.org/

Flipped Learning Network. http://flippedclassroom.org/
(A group at FLN has compiled a nice flipped document with a full bibliography. It is available under the "Resources"→"Research" link, or at the following URL.
http://flippedlearning.org/cms/lib07/VA01923112/Centricity/Domain/41/LitReview_FlippedLearning.pdf)

Khan, Salman. "Let's use video to reinvent education." TED Talk. March 2011.
http://www.ted.com/talks/salman_khan_let_s_use_video_to_reinvent_education.html

MERLOT (Multimedia Educational Resource for Learning and Online Teaching) www.merlot.org.

Peer Instruction Network. https://www.peerinstruction.net/

Twitter. Hashtag #flipclass. https://twitter.com/

TECHNOLOGY RESOURCES I USED FOR FLIPPING

Camtasia Studio. http://www.techsmith.com/camtasia.html

i>Clicker. http://www.iclicker.com

Jing. http://www.techsmith.com/jing.html

Vimeo. http://vimeo.com/ (Note: This link contains a sample video for which I removed the password so that others can see what my finished videos looked like: http://vimeo.com/trogden/enolates.)

OTHER RESOURCES FOR ENGAGING STUDENTS IN CLASSROOM ACTIVITIES

Bowen, Jose Antonio. (see above)

Bean, John C. *Engaging Ideas: The Professor's Guide to Integrating Writing, Critical Thinking, and Active Learning in the Classroom*, 2nd ed; Jossey-Bass, Inc.: San Francisco, CA, 2011.

Huston, Therese. *Teaching What You Don't Know*; Harvard University Press: Cambridge, MA, 2009

Student Writing Notebook. Hayden-McNeil, 2013. ISBN-13: 9780738064291. (Note: This is a custom book that I worked with Hayden-McNeil to create. It is like a lab notebook, but for writing. It has carbonless notebook pages so that the student and instructor can each have a copy of the student's work, and the back cover contains ideas for informal writing activities. Contact Hayden-McNeil if you would like to see a copy.)

National Center for Case Studies Teaching in Science http://sciencecases.lib.buffalo.edu/cs/. (Includes many disciplines, such as psychology, business, economics, biology, mathematics, teacher education, nursing, etc.)