Thoughts on a Flipped Classroom

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Preparing Future Faculty Workshop

My Teaching Background

- 2003 - PhD, Computer Science, UNC
  - summer of 2000 - Intro to Computer Science (Java)

- 2004 - Visiting Assistant Professor at UNC
  - Intro to Computer Science (Java) - 100+ students, single section

- 2005-2006 – Assistant Professor at Clemson University
  - undergraduate Intro to Networking
  - graduate Computer Networks

- 2006–now – Assistant/Associate Professor at ODU
  - undergraduate networking, web programming
  - graduate information visualization, vehicular networks, research seminars
  - undergrad/grad online cybersecurity

What's a Flipped Classroom?
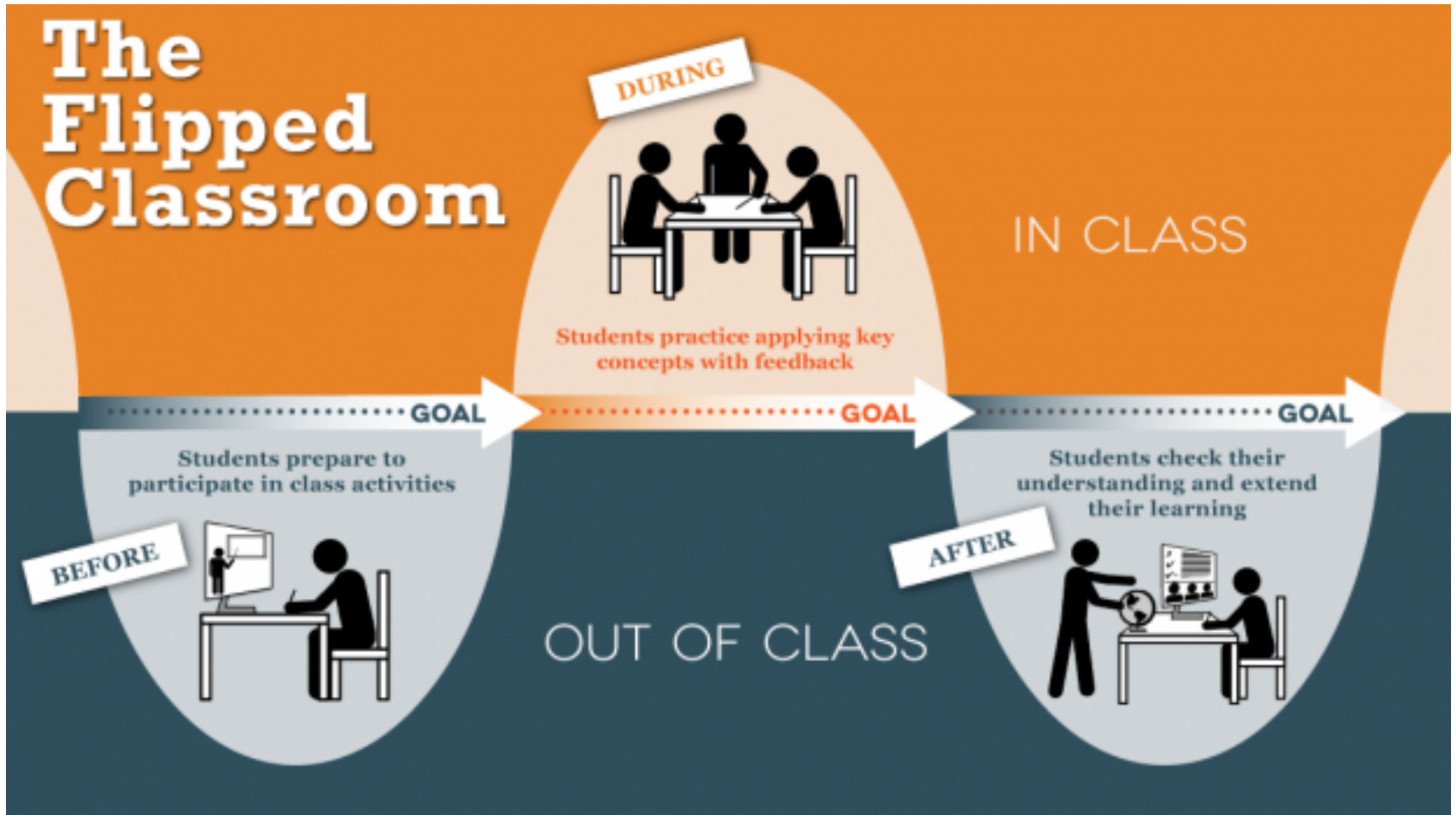
CS 725/825 – Information Visualization

- Description
  - Theory and application of information visualization.
  - Research on graph design, visual perception, cognition, and interaction
  - Research and practical techniques for the display of graphs, networks, hierarchies, text, and complex multivariate data
  - Course projects will require the development of interactive web-based visualizations.

- Taught 3 times, traditionally (2011-2013)

- Taught 2 times, flipped
  - Spring 2015 - all on-campus
  - Spring 2016 - hybrid on-campus and online

CS 725/825 - Spring 2016
Information Visualization

Wednesdays   9:30am-12:15pm   E&CS 2120

"Flipped" classroom model
- reading and homework due *before* class
- in-class discussion
- in-class exercises

Course project
Student presentations of academic papers

Map Average Speed (cm/s)

Prereqs: comfortable learning new programming languages/tools/APIs, familiarity with Unix, familiarity with web programming (HTML, CSS, JavaScript, jQuery) will be helpful
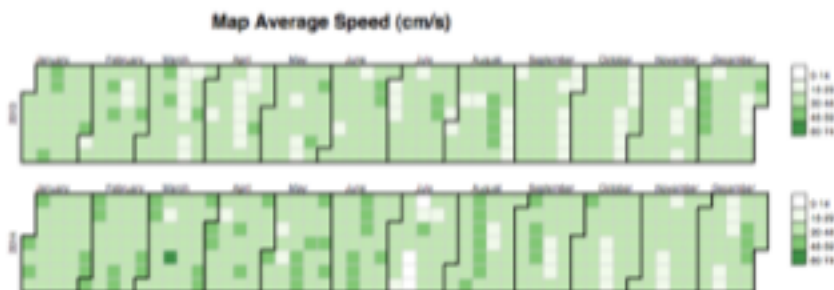
More Info: http://www.cs.odu.edu/~mweigle/CS725-S15 or email mweigle@cs.odu.edu
(last year's website)

Why Move to Flipped?

- Moved to a new (excellent) textbook
  - When creating slides, found myself just copying from the book
  - If students actually read the book, I wouldn't need to transcribe it and read it to them in class.
  - Plus, I'd have time to provide additional materials and insight

- Knew I'd be developing an online version.
  - From experience creating an online class, responsibility of reading materials is all on the student.
  - Putting all materials on Blackboard - assignments, discussion boards
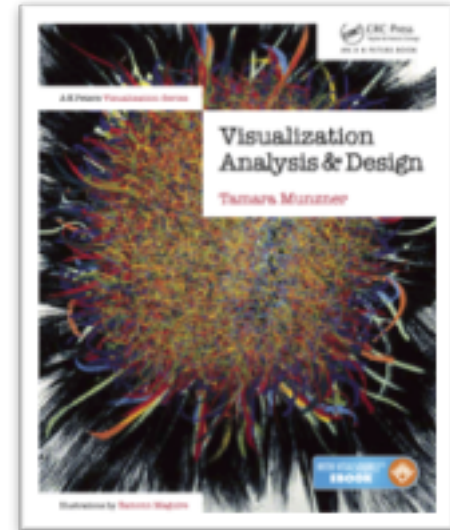
Benefits / Changes

- Moves class time from content delivery to active learning

- Dissemination of knowledge is no longer instructor's main role

- Instructor becomes facilitator

- Students are responsible for content acquisition

CS 725/825 Weekly Agenda

- Before class
  - Textbook reading
  - Learning checks – based on reading, not graded, but required to submitted *before* class

- During class
  - Discussion of learning checks – each question led by a different student
  - Discussion of confusing points
  - Student presentation of academic paper
  - In-class work – small group assignments, planning for course project

- After class
  - Visualization implementation – traditional homework programming assignment, application of class discussion

Students Actually Read the Book!

- *"The textbook was excellent. Reading before class and answering the topic questions each week really prepared me for the class."*

- ***This is major!***
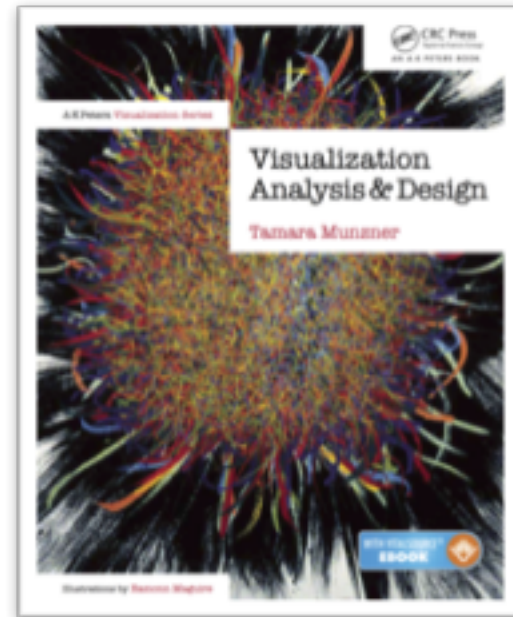
Flipped + Hybrid

- Spring 2016
  - 20 on-campus students
  - 10 online students (asynchronous)

- Benefits
  - on-campus students aren't forced to take an online class
  - online students don't have to wait until it's offered online only.
  - allowed some on-campus students to take the course even after the physical classroom filled up

Implementation

- Recorded computer screen (images from book, few slides) and audio using WebEx

- Recorded audio (including student comments) using Jabra USB microphone/speaker
  - put in center of classroom

- WebEx session posted online, so even on-campus students could review

Handling Major Assignments

- Presentation of an academic paper
    - online students recorded their presentations and we watched the presentations in-class

- Project
    - group implementation of a visualization, in-class presentation, demo video, and paper
    - mixed online and on-campus groups

- Exams
    - no exams given – upper level graduate course

Hybrid Group Work is Tricky

- Group coordination among online and on-campus students could be difficult.

- Collaborative aspect of in-class work was hard to replicate for online students.

- Courses with a large project may be more difficult for online students (other responsibilities)
  - may not anticipate the extra time required to complete the project and coordinate with group members

Bottom Line: Flipped + Hybrid

- Provides flexible course offering

- Class preparation time spent in developing in-class activities, *not* in making lecture slides

- Students are responsible for basic content acquisition

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