Delivering Research Data Management Training to Graduate Students
From Online Instruction to the "Flipped Classroom"

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DIIL data information literacy

Introduction

As part of the Data Information Literacy (DIL) project, funded by a grant from the Institute of Museum and Library Services (IMLS), the University of Minnesota (UMN) Libraries developed an online class to teach data management and curation skills to graduate students in the sciences.

Using data collected from studying a research group in the Civil Engineering Department, the online class was taught two semesters. Learning from this experience, the instructors transformed the class into a hybrid online and "flipped classroom" approach.

✓ Online instruction allows busy grads flexibility in obtaining extracurricular content at the point of need.

✓ The flipped-classroom combines online video lectures with hands-on class activities that uses example data sets and scenarios.

History of the Course

Based on a user-needs assessment[1] and an environmental scan we developed an online course in Data Management offered in the Fall 2012 and Spring 2013.
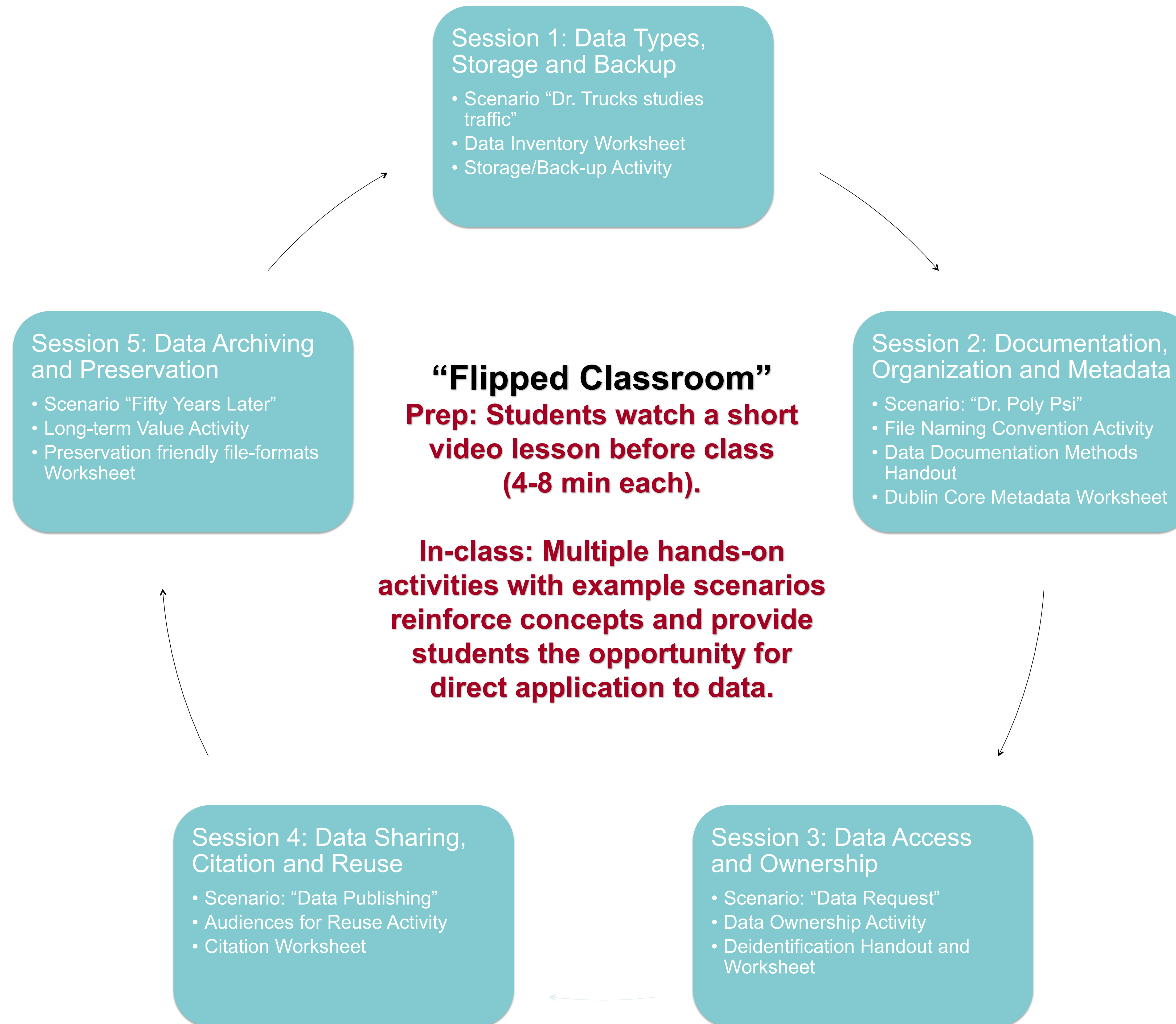
Online Class Enrollment and Completion

	Enrolled	Discipline	Completion Rate
Fall 2012	11	Structural Engineering	45% (5)
Spring 2013	47	14 Sci/Eng Departments	13% (6)
Total	58	STEM Disciplines	19% (11)

Our e-learning approach[2] to teaching was successfully scaled to a variety of disciplines, however many students did not yet have data to apply their skills and students' indicated a preference for in-person pedagogy when offered an optional supplemental workshop to the online course[3].

"I really liked the in-person lecture. Made it easy to set aside one block of time to go through all the information and have staff on-hand to answer questions."
-Spring 2013 online course participant

Outline of the Five Sessions in the Data Management Course

Session 1: Data Types, Storage and Backup
• Scenario "Dr. Trucks studies traffic"
• Data Inventory Worksheet
• Storage/Back-up Activity

Session 5: Data Archiving and Preservation
• Scenario "Fifty Years Later"
• Long-term Value Activity
• Preservation friendly file-formats Worksheet

Session 2: Documentation, Organization and Metadata
• Scenario: "Dr. Poly Psi"
• File Naming Convention Activity
• Data Documentation Methods Handout
• Dublin Core Metadata Worksheet

"Flipped Classroom"
Prep: Students watch a short video lesson before class (4-8 min each).

In-class: Multiple hands-on activities with example scenarios reinforce concepts and provide students the opportunity for direct application to data.

Session 4: Data Sharing, Citation and Reuse
• Scenario: "Data Publishing"
• Audiences for Reuse Activity
• Citation Worksheet

Session 3: Data Access and Ownership
• Scenario: "Data Request"
• Data Ownership Activity
• Deidentification Handout and Worksheet

Retention Rate of the Flipped Classroom Data Management Course

"Flipped Classroom" Workshop Series Class Enrollment and Completion Rates

	Session 1: Types and Back-up		Session 2: Documentation and Metadata		Session 3: Access and Ownership		Session 4: Sharing and Reuse		Session 5: Data Preservation	
	Attended	Retention	Attended	Retention	Attended	Retention	Attended	Retention	Attended	Retention
Fall 2013*	35	100%	29	60%	24	51%	21	46%	21	46%
Winter 2014**	20	100%	16	70%	14	65%	13	60%	13	60%

* The Fall 2013 series was offered in two sections held back-to-back with enrollment capped at 50 students per session. The sessions were offered once a week for a 6-week period in the fall semester.
** The Winter 2014 series was a single session with enrollment capped at 25 students per session. The sessions were held each day over a week during winter break (Jan 2014).

Results

The flipped classroom approach, taught in Fall 2013 and Winter 2014, provided several informal and formal assessment opportunities.

✓ Concept check-ins (with clickers) based on the assigned video lesson.
✓ Direct application to their data
✓ Reflective minute papers

The quantitative component of the minute papers revealed that students (Fall 2013):

100% **Store data on their personal laptop** or external hard drives (41%) rather than protected and backup server locations (26%).

43% **Use a physical notebook** or electronic lab notebook (37%) to document their data.

41% **Use deidentification techniques** on their data.

43% **Reuse data** created by others.

60% **Believe their dissertation data would be useful** to future scholars.

Test it Out!

The course is available online with all of the slides, handouts, and worksheets. In addition, we have created an instructors' version of the course (URL below) that includes the lesson plans and activity tools for anyone interested in adapting the course.

Want more?
http://z.umn.edu/teachdatamgmt

1. Johnston, L. and Jeffryes, J. (2013). "Data Management Skills Needed by Structural Engineering Students" J. Prof. Issues Eng. Educ. Pract., 10.1061/(ASCE)EI.1943-5541.0000154 (Feb. 13, 2013). http://ascelibrary.org/doi/abs/10.1061/%28ASCE%29EI.1943-5541.0000154

2. Jeffryes, J. and Johnston, L. (2013). "An E-Learning Approach to Data Information Literacy Education." Proceedings of the 2013 ASEE Annual Conference (Atlanta). http://www.asee.org/public/conferences/20/papers/6956/view

3. Jeffryes, J. and Johnston, L.. (2013). A Scalable Approach to Data Management Education of Graduate Students. Poster presented at the Data Information Literacy Symposium held Sep 23-24, 2013 in West Lafayette, IN. http://docs.lib.purdue.edu/dilsymposium/2013/posters/5

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