Delivering Research Data Management Training to Graduate Students
From Online Instruction to the “Flipped Classroom”
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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 grad flexibility in obtaining extracurricular content at the point of need.

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

History of the Course
Based on a user-needs assessment1 and an environmental scan we developed an online course in Data Management offered in the Fall 2012 and Spring 2013.

Our e-learning approach2 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 course3.

“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/Backup Activity

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

Session 3: Access and Ownership
- Scenario: “Data Request”
- Data Ownership Activity
- Deidentification Handout and Worksheet

Session 4: Sharing and Reuse
- Scenario: “Dr. Poly Psi”
- Data Reuse Activity
- Citation Worksheet

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

“Flipped Classroom”
Prep: Students watch a short video lesson before class (4-9 min each).

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

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% Believe their dissertation data would be useful to future scholars.
60% Want more?

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://lz.umn.edu/teachdatamgmt

Online Class Enrollment and Completion

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Enrolled</th>
<th>Completion Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2012</td>
<td>11</td>
<td>45% (5)</td>
</tr>
<tr>
<td>Spring 2013</td>
<td>47</td>
<td>13% (6)</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>19% (11)</td>
</tr>
</tbody>
</table>

Retention Rate of the Flipped Classroom Data Management Course

<table>
<thead>
<tr>
<th>Session 1: Types and Back-up</th>
<th>Session 2: Documentation and Metadata</th>
<th>Session 3: Access and Ownership</th>
<th>Session 4: Sharing and Reuse</th>
<th>Session 5: Data Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attended</td>
<td>Retention</td>
<td>Attended</td>
<td>Retention</td>
<td>Attended</td>
</tr>
<tr>
<td>35</td>
<td>100%</td>
<td>29</td>
<td>60%</td>
<td>24</td>
</tr>
</tbody>
</table>

Fall 2013

| Winter 2014** | 20 | 100% | 16 | 70% | 14 | 65% | 13 | 60% |

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