The Flipped Classroom for Library Instruction:
A Student Focused Assessment

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Brigham Young University
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Overview

• History of the flipped classroom teaching model
• Development of a IL flipped classroom at BYU
• Assessment of a flipped classroom study
• Recommendations for future implementation
History of the Flipped Classroom

High School Beginnings
- Chemistry teachers Jonathan Bergmann and Aaron Sams - 2007
  - Pre-recorded lectures for students to view before class
  - Collaborative learning activities during class time (Bergmann & Sams, 2009)

Higher Education Applications
- “Inverted classroom” economics course (Lage et al., 2000)
- Increased interest and research in 2010’s
  - (Davies et al., 2013; Missildine et al., 2013; Tune et al., 2013)
- Flipped classroom = improved learning outcomes (generally)
  - Mixed results for student satisfaction (Missildine et al., 2013)
  - Credit bearing courses
Flipped Classroom - Library Instruction

Library Instruction

◦ Quickly followed academic timeline in 2010’s
◦ Use online library tutorial
◦ Most studies for library instruction are exploratory
  ◦ (Allen, 2014; Arnold-Garza, 2014; Fulkerson, 2014)
◦ Many studies compare tutorial to traditional lecture
  ◦ (Anderson & May, 2010; Beile & Boote, 2005; Germain et al., 2000; Gonzales, 2014; Nichols et al., 2003; Schimming, 2008; Shaffer, 2011; Zhang et al., 2007)
◦ Few studies compare full flipped classroom model to traditional lecture
  ◦ Impact of hands-on, collaborative activities
Advanced Writing Course at BYU

Brief history

- General requirement for all students
  - Predominantly juniors and seniors
- Students sign-up for library workshop
  - Discipline-specific
  - One-shot, 50 minute session
  - Receive attendance points
  - Traditional lecture-based
- Looking for more student engagement

Photo Credit: Mark A. Philbrick/BYU
Life Sciences Library Tutorial History

Collaboration
- Instruction Librarian
- Library iLearning
- Subject Librarian

Move “point and click” instruction online
- Source evaluation
- Search strategy development

http://net.lib.byu.edu/tutorial/lifescience/
Life Sciences Library Tutorial

Multiple software tools
- Articulate Storyline
- Adobe Creative Cloud (Illustrator, After Effects, Premier Pro, SpeedGrade, and Soundbooth)

Students “walk through” developing a search in Web of Science

http://net.lib.byu.edu/tutorial/lifescience/
Flipped Classroom Assessment

Pilot Study- Fall Semester 2014
- 20 student participants
- Modified tutorial and student assignment

Main Study- Winter Semester 2015
- 8 unique advanced writing sessions in the life sciences
- 122 student participants
- Traditional lecture and flipped models
Traditional Lecture Model

In-class session
- Covered same material as online tutorial
- Overview of peer-review process and source evaluation
- Live database search demonstration (*Web of Science*)
- Students complete search assignment and session evaluation

*"Laboratory" by Derek Bruff, CC BY-NC 2.0, https://www.flickr.com/photos/derekbruff/11308678834/*
Flipped Classroom Model

Watched LS tutorial in advance
◦ Sent link and reminders to students

During in-person session:
◦ Brief recap of tutorial
◦ Search activity with partner (student facilitated reference interview)
◦ Librarian/T.A. consultations
◦ Group discussion of research activity
◦ Students complete search assignment and session evaluation
Life Sciences Library Session Assignment

1. Do you give the library permission to use your responses on this worksheet for research purposes?
   - Yes [ ]  No [ ]

2. Did you complete the online Life Sciences Library Tutorial before attending this instruction session?
   - Yes [ ]  No [ ]
   - If yes, when did you complete the tutorial?
     - Today [ ]  1-3 days ago [ ]  4-7 days ago [ ]  More than 7 days ago [ ]

3. Research Topic:
   The impact of soft drink consumption on childhood obesity.
   What distinct concepts would you use to search on this topic? Are there related terms or synonyms? List each distinct concept and any relevant synonyms or related terms in the table below, as needed.

<table>
<thead>
<tr>
<th>Distinct Concepts</th>
<th>Synonym</th>
<th>Synonym</th>
<th>Synonym</th>
<th>Synonym</th>
</tr>
</thead>
</table>

4. Construct an effective search strategy within the Web of Science database (http://wls.lib.hwu.edu/web-science-hs) to find relevant journal articles on this topic. Use the OR, AND, and NOT operators and any necessary limiters (date range, title search, truncation, document type, etc.) to refine your results.

   a. Write your final search statement:

   b. List any limiters used to refine the results:

   c. Total number of articles in final search:

Life Sciences Library Session Worksheet Rubric

<table>
<thead>
<tr>
<th>Worksheet Section</th>
<th>Point Value</th>
<th>Examples</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a. Distinct concepts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. &amp; 2. concepts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. &amp; 4. concepts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. &amp; 6. concepts</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 3b. Synonyms |
| 1. & 2. synonyms |
| 3. & 4. synonyms |
| 5. & 6. synonyms |

| 4a. Final search statement |
| 1. & 2. search terms |
| 3. & 4. search terms |
| 5. & 6. search terms |

| 4b. Limiters/modifiers |
| 1. & 2. limiters |
| 3. & 4. limiters |
| 5. & 6. limiters |

| 4c. Total number of articles in final search |
| 1. & 2. articles |
| 3. & 4. articles |
| 5. & 6. articles |
Study Hypotheses

Three distinct groups of students
- Students in flipped group who watched tutorial (Flipped/Yes)
- Students in flipped group who did not watch tutorial (Flipped/No)
- Students in lecture group (Lecture)

Anticipated results on Final Search Statements
- Flipped/Yes > Lecture > Flipped/No
- Timing of tutorial viewing will impact performance
- Strong student preference for interactivity of flipped session

*Research* by luckey_sun, CC BY-SA 2.0, https://www.flickr.com/photos/75579887@N05/6866478111/
Results - Search Statements

Lecture > Flipped/Yes > Flipped/No

- Lecture, \( n = 57; \ x = 8.78 \)
- Flipped/Yes, \( n = 54; \ x = 7.11 \)
- Flipped/No, \( n = 11; \ x = 4.70 \)

Tukey HSD

<table>
<thead>
<tr>
<th>(I) Grouping</th>
<th>(J) Grouping</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Flipped/Yes</td>
<td>1.67422*</td>
<td>.43990</td>
<td>.001</td>
<td>.6302 - 2.7183</td>
</tr>
<tr>
<td></td>
<td>Flipped/No</td>
<td>4.07616*</td>
<td>.76287</td>
<td>.000</td>
<td>2.2656 - 5.8867</td>
</tr>
<tr>
<td>Flipped/Yes</td>
<td>Lecture</td>
<td>-1.67422*</td>
<td>.43990</td>
<td>.001</td>
<td>-2.7183 - .6302</td>
</tr>
<tr>
<td></td>
<td>Flipped/No</td>
<td>2.40194*</td>
<td>.76629</td>
<td>.006</td>
<td>.5832 - 4.2206</td>
</tr>
<tr>
<td>Flipped/No</td>
<td>Lecture</td>
<td>-4.07616*</td>
<td>.76287</td>
<td>.000</td>
<td>-5.8867 - .2256</td>
</tr>
<tr>
<td></td>
<td>Flipped/Yes</td>
<td>-2.40194*</td>
<td>.76629</td>
<td>.006</td>
<td>-4.2206 - .5832</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the 0.05 level.
Results- Timing of Tutorial Viewing

Timing of tutorial viewing and mean score

- Day of session, $n = 22$; $\bar{x} = 7.16$
- 1 to 3 days prior, $n = 24$; $\bar{x} = 7.53$
- 4 to 7 days prior, $n = 2$; $\bar{x} = 5.75$
- More than 7 days prior, $n = 5$; $\bar{x} = 5.5$

- No significant difference on score and timing of tutorial viewing
## Results - Student Evaluations (Lecture)

### Lecture Top Positive Responses

<table>
<thead>
<tr>
<th>Activity</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning search strategies</td>
<td>34</td>
</tr>
<tr>
<td>Discovering library databases/resources</td>
<td>23</td>
</tr>
<tr>
<td>Demonstrating search process</td>
<td>8</td>
</tr>
<tr>
<td>Practicing searches</td>
<td>4</td>
</tr>
</tbody>
</table>

### Lecture Top Negative Responses

<table>
<thead>
<tr>
<th>Reason</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time consuming/already knew information</td>
<td>12</td>
</tr>
<tr>
<td>More instruction on search strategies/databases</td>
<td>7</td>
</tr>
<tr>
<td>More interaction/one-on-one help/smaller class size</td>
<td>7</td>
</tr>
<tr>
<td>Research own topic</td>
<td>5</td>
</tr>
<tr>
<td>More time for student practice</td>
<td>4</td>
</tr>
</tbody>
</table>
## Results - Student Evaluations (Flipped)

### Flipped Top Positive Responses

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning search strategies</td>
<td>42</td>
</tr>
<tr>
<td>Discovering library databases/resources</td>
<td>16</td>
</tr>
<tr>
<td>Researching own topic</td>
<td>12</td>
</tr>
<tr>
<td>Time for student practice/hands-on learning</td>
<td>12</td>
</tr>
<tr>
<td>One-on-one librarian help</td>
<td>8</td>
</tr>
<tr>
<td>Online tutorial</td>
<td>5</td>
</tr>
</tbody>
</table>

### Flipped Top Negative Responses

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate more search strategies</td>
<td>14</td>
</tr>
<tr>
<td>No research topic/assignment correlated to library session</td>
<td>8</td>
</tr>
<tr>
<td>More one-on-one help/more T.A.s/smaller class size</td>
<td>8</td>
</tr>
<tr>
<td>More time to explore other databases/resources</td>
<td>5</td>
</tr>
<tr>
<td>Time consuming/make entirely online</td>
<td>5</td>
</tr>
</tbody>
</table>
Discussion - Limitations

Limitation

- Narrow research focus - search strategies
- Study participants - juniors and seniors
- No incentive for participants to perform well
- Artificial search assignment
Discussion- Student Performance

Why didn’t student perform better in the flipped session?
- Immediacy of lecture instruction
- Casual completion of tutorial
- Human component to instruction
- Difficult implementation for one-shot
- While performance differed significantly, were these differences important?
  - 8.78 vs. 7.11 vs. 4.70
Discussion- Student Performance

Why didn’t student perform better in the flipped session?
◦ Immediacy of lecture instruction
◦ Casual completion of tutorial
◦ Human component to instruction
◦ Difficult implementation for one-shot
◦ While performance differed significantly, were these differences important?
  ◦ 8.78 vs. 7.11 vs. 4.70

Need to also consider student preference
Discussion- Student Preferences

Learn new search strategies
Discover library resources
View demonstration of search process
Interact with library instructor and one-on-one help
Research own topics
Practice and hands-on application

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https://www.flickr.com/photos/83634107@N07/7658254172/
To Flip, or Not to Flip . . .

What are your specific goals?

Modify how much is flipped
  ◦ Does not have to be “all or nothing”
  ◦ Integrate different learning styles to reach more students

Critical to connect out-of-class material to in-class activity
  ◦ Example from first session
Take Home

- Human component to library instruction
- Casual completion of tutorial
- Flipped works better over multiple sessions
- Must connect out-of-class material to in-class activity
- Utility of blending lecture and flipped instruction
- Student accountability critical in flipped environment
- Student preferences are as important as student performance
References


References (cont.)


