Using Student Performance to Evaluate an Online Tutorial: Is Flipping Really Worth it?

Michael C. Goates  
*Brigham Young University, michael_goates@byu.edu*

Gregory M. Nelson  
*Brigham Young University, greg_nelson@byu.edu*

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Using Student Performance to Evaluate an Online Tutorial: Is Flipping Really Worth it?

Michael C. Goates & Gregory M. Nelson
Brigham Young University
Utah Library Association
May 15, 2015
Overview

- History of the flipped classroom
- Development of a library flipped classroom
- Assessment of a flipped classroom study
- Recommendations for future implementation
The Flipped Classroom

History
- High school chemistry teachers Jonathan Bergmann and Aaron Sams- 2007
- Pre-recorded lectures viewed before class
- In-class collaborative learning activities
- University Applications
  - Multiple studies since 2010
  - Improved learning outcomes (generally)
  - Credit bearing courses
Anderson and May (2010) incorporated a hybrid instruction model using an online tutorial in conjunction with an in-class library instruction session. They found that students performed equally as well at constructing keyword and Boolean searches in face-to-face, online, and hybrid teaching models. However, in this study, the in-class session of the hybrid model was identical to the instruction in the face-to-face model, rather than leveraging the in-class instruction time for hands-on application of concepts learned during the online tutorial. Thus, from this example, combining online tutorials with in-class instruction did not appear to improve student performance. However, it is possible that a hybrid library instruction session that allows students to participate in collaborative, hands-on application exercises will enhance student learning over traditional lecture and online only instruction methods. To date, however, little research in library instruction exists to support or refute that assumption.
Advanced Writing 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
Life Sciences Library Tutorial

Collaboration
- Instruction Librarian
- Library iLearning
- Subject Librarian

Move “point and click” instruction online
- Source evaluation
- Search strategy development
- Web of Science demo

http://net.lib.byu.edu/tutorial/lifescience/
After pilot, made tutorial more directive in Web of Science module. Clarified worksheet.
Traditional Lecture Model

In-class session
- 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
Flipped Classroom Model

Watched 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?

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. Conduct an effective search strategy in the Web of Science database [https://ws.literati.co](https://ws.literati.co) for the relevant journal articles on this topic. Use the OR, AND, and NOT operators and any necessary limits (Field range, title search, translation, document type, etc.) to refine your results.
   a. Write your final search statement:

   b. List any limits used to refine the results:

   c. Total number of articles in final search:

Life Sciences Library Session Worksheet Rubric

<table>
<thead>
<tr>
<th>Rubric section</th>
<th>Specific Criteria</th>
<th>Examples</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Distinct concepts</td>
<td>3 points for each relevant distinct concept up to 3 points total</td>
<td>Soft drinks, Childhood obesity</td>
<td>Concepts do not need to be exact, but should be general and relevant to the topic. Multiple distinct concepts can be assigned points.</td>
</tr>
<tr>
<td>B. Synonyms</td>
<td>3 points for each related or synonym term up to 3 points total</td>
<td>Caffeine, sugar-sweetened beverages, obesity, body mass index (BMI), body fat, percent, weight, obesity prevalence</td>
<td>Synonyms need to be relevant and related to the concept.</td>
</tr>
<tr>
<td>C. Total search statement</td>
<td>3 points for appropriate use of AND, OR, and NOT operators up to 3 points total</td>
<td>“Soft drink” AND childhood obesity OR “sugar-sweetened beverages” OR “obesity”</td>
<td>Search terms should be specific and relevant to the topic.</td>
</tr>
<tr>
<td>D. Limits/submit limits</td>
<td>3 points for appropriate use of limits (Field range, title search, translation, document type, etc.) up to 3 points total</td>
<td>Adult = [20 to 65], “obesity” AND childhood obesity</td>
<td>Limits should be used to refine search results.</td>
</tr>
<tr>
<td>E. Total number of articles on final search</td>
<td>3 points for appropriate use of limits (Field range, title search, translation, document type, etc.) up to 3 points total</td>
<td>20 articles</td>
<td></td>
</tr>
</tbody>
</table>
4. Construct an effective search strategy within the **Web of Science** database 
(http://dbs.lib.byu.edu/web-science-isil) 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 Evaluation

1. Please indicated your year in school.
   - □ Freshman  □ Sophomore
   - □ Junior     □ Senior

2. What is your gender?
   - □ Female
   - □ Male

3. What did you find most helpful about this session?

4. How could this session be improved?
Study Hypotheses

Three distinct groups of students
- Flipped group - watched tutorial (Flipped/Yes)
- Flipped group - did not watch tutorial (Flipped/No)
- Lecture group (Lecture)

Student Performance/Preference
- Flipped/Yes > Lecture > Flipped/No
- Timing of tutorial viewing will impact performance
- Strong student preference for flipped session
Conducted One-way ANOVA with Tukey-Kramer Post-Hoc comparison

Lecture scored significantly higher than flipped/Yes and Flipped/No

Flipped/Yes scored significantly higher than Flipped/No
Results - 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

<table>
<thead>
<tr>
<th>Lecture Top Positive Responses</th>
<th>Lecture Top Negative Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning search strategies</td>
<td>Time consuming/already knew information</td>
</tr>
<tr>
<td>Discovering library databases/resources</td>
<td>12</td>
</tr>
<tr>
<td>Demonstrating search process</td>
<td>More instruction on search strategies/databases</td>
</tr>
<tr>
<td>Practicing searches</td>
<td>More interaction/one-on-one help/smaller class size</td>
</tr>
<tr>
<td></td>
<td>Research own topic</td>
</tr>
<tr>
<td></td>
<td>More time for student practice</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>
# Results - Student Evaluations

<table>
<thead>
<tr>
<th>Flipped Top Positive Responses</th>
<th>Flipped Top Negative Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning search strategies</td>
<td>Demonstrate more search strategies</td>
</tr>
<tr>
<td>42</td>
<td>14</td>
</tr>
<tr>
<td>Discovering library databases/resources</td>
<td>No research topic/assignment correlated to library session</td>
</tr>
<tr>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Researching own topic</td>
<td>More one-on-one help/more T.A.s/ smaller class size</td>
</tr>
<tr>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Time for student practice/hands-on learning</td>
<td>More time to explore other databases/resources</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>One-on-one librarian help</td>
<td>Time consuming/make entirely online</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Online tutorial</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
Study Limitations

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

Why didn’t students 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

This really hurt for me. I like teaching the flipped model and I hoped students would do better.
Student preferences appear to incorporate elements from both traditional lecture and flipped classroom teaching models.
Should we only use a flipped model in credit-bearing, semester-long instruction? My response is NO. Flipping can be an important tool, even in a one-shot.

Own Assessment- Start of small- simple open-ended student evaluations “What was the most helpful about this session? How could this session be improved?” Good idea to try this out any time you implement something new in your instruction. Good to get direct feedback from students. If you have more time and are feeling adventurous, try developing way to gather measures of student performance. Sometimes hard to get end product to evaluate. Collaborate with teaching faculty on graded assignment. Greater student buy-in and interesting to compare grades/results.
Future Directions

Improve tutorial viewing engagement
- Embed questions/polling
- Require login
- Develop tutorial assignment
- Collaborate with teaching faculty
- Limit the number of tutorial modules
- Optimize timing of tutorial viewing

Evaluate searching trends
- Print search history
<table>
<thead>
<tr>
<th>Set</th>
<th>Results</th>
<th>Edit</th>
<th>Combine Sets</th>
</tr>
</thead>
<tbody>
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<td>#3</td>
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<td></td>
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<tr>
<td>#2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>#1</td>
<td>288</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Search History: Web of Science™ Core Collection

- **Set 6**: TITLE: ("soft drink" OR soda OR "carbonated beverage") AND TITLE: (obesity OR obese OR overweight OR BMI) AND TOPIC: (child OR youth OR adolescence OR teen)
  - Refined by: DOCUMENT TYPES: (ARTICLE)

- **Set 5**: TITLE: ("soft drink" OR soda OR "carbonated beverage") AND TITLE: (obesity OR obese OR overweight OR BMI) AND TOPIC: (child OR youth OR adolescence OR teen)

- **Set 4**: TOPIC: ("soft drink" OR soda OR "carbonated beverage") AND TOPIC: (obesity OR obese OR overweight OR BMI) AND TOPIC: (child OR youth OR adolescence OR teen)
  - Indexed: SCI-EXPANDED, SSCI, A&HCI Timespan: All years

- **Set 3**: TOPIC: ("soft drink" OR soda OR "carbonated beverage") AND TOPIC: (obesity OR obese OR overweight OR BMI) AND TOPIC: (child OR youth OR adolescence OR teen)
  - Indexed: SCI-EXPANDED, SSCI, A&HCI Timespan: All years

- **Set 2**: TOPIC: ("soft drink" OR soda OR "carbonated beverage") AND TOPIC: (obesity OR obese OR overweight OR BMI) AND TOPIC: (child OR youth OR adolescence OR teen)
  - Indexed: SCI-EXPANDED, SSCI, A&HCI Timespan: All years

- **Set 1**: TOPIC: (soft drinks) AND TOPIC: (obesity) AND TOPIC: (childhood)
  - Indexed: SCI-EXPANDED, SSCI, A&HCI Timespan: All years
Future Directions- (cont.)

More one-on-one help
- Increase number of T.A.s in each session
- Spend more time with each student/group

Include brief demo in flipped session
- Ask for student volunteer
  - Apply learning from tutorial
  - Use student topic
  - Include group search activity
Take Home

- Human component to library instruction
- Casual completion of tutorial
- Must connect out-of-class material to in-class activity
- Utility of blending lecture and flipped instruction
- Student accountability critical in flipped environment
- Student performance and preferences should both be considered