Does Echo360-ALP analytics predict the relationship between student behaviours and learning?

Colin Montpetit, Sonya Sabourin
Does Echo360-ALP analytics predict the relationship between student behaviours and learning?

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Modules (self-paced)
- Targeted readings
- Interactive act./Videos
- Reflective act.
- Module quiz

Online
BlackBoard LMS
Initial exposure

Summative
- Two-Stage Collaborative Exams (2 midterms + 1 final)

Assessments 65%

F2F-class
Echo360-ALP

15%

Class
- Clicker case studies
- Peer-Instruction
- Just-in-Time Teaching

Engage, Explore, Evaluate

Labs
- Experiments
- Worksheets, reports
- Quizzes

Engage, Explore, Extend, Evaluation

Defined Learning Outcomes, 5E Learning Cycle

F2F-Labs 20%
Echo360- Active Learning Platform

3. Engage!

- Take Notes
- Pose/Review Questions
- Bookmark Slides
- Note Confusion

Active Learning Platform Primer: Training for Conference Engagement
Donna Jones, Ed.D. - Sr. Pedagogical Solutions Engineer

May 14 - Active Learning Platform Primer: Training for Conference Engagement
What is the class usage profile?
Engagement data provides insight via dashboards

Learning Analytics Database
Attendance, Participation, Activity Score

**Attendance**
- mean (0.828)
- median (0.890)
- N = 597

**Activity Participation %**
- mean (0.855)
- median (0.887)
- N = 597

**Activity Score %**
- mean (0.501)
- median (0.517)
- N = 597
Note Taking

65% took notes / LEC
91% of Ss took notes
~200 words/Ss/LEC
Class: 1,7 million words typed

mean (2,245)
median (1,349)
N = 597
Presentation Views

# of views
mean (125)  
median (114)  
N = 597

100% viewed 1  
90% Ss/LEC  
8 views/Ss/LEC  
Class: 64,000 total views

% length viewed
mean (0.603)  
median (0.616)  
N = 597
Video Views

# of views
mean (4.01)
median (3)
N = 597

78% viewed 1
4 views/Ss/LEC
Class: 15232 total clicks

% length viewed
mean (0.341)
median (0.3)
N = 597
Questions to the professor
BIO1140 – Introduction to Cell Biology

447 different students asked at least 1 question

Number of questions asked per lecture
Number of students asking questions

Caroline Petit-Turcotte  Winter 2015
SOS call out! (flagging slides)

BIO1140 – Introduction to Cell Biology

153 different students flagged a slide

Flags per lecture (sections combined)

Students flagging per lecture (sections combined)
Item Analysis – Difficulty Index
Item Analysis – Discrimination Index
Distribution of Learning Gains

Proportion of Class (%)

2011: 30%
2014/16: 60%

Normalized LG = Post – Pre / 100 - pre
What Are Two-Stage Exam?

Stage 1: Individual
- MCQs, T/F, Match
- Short Answer
- Average: 65%

Stage 2: Groups
- MCQs, T/F, Match
- Short Answer
- Average: 88%

Stage 1
- ⅔ Total Time
- 85% Of Exam Grade

Stage 2
- ⅓ Total Time
- 15% Of Exam Grade
Learning Gains in Groups? 2016

<Gain> : Pretest (Individual) vs Post-test (Individual)
Avg: 50%
Learning Gains in Groups? 2016

<Gain> : Post-test (Individual) vs Post-test (Individual)
Avg: 66%
Learning Gains in Groups? 2016

$\langle \text{Gain} \rangle$ : Pretest (Individual) vs Post-test (Group)

Avg: 80%
Final Exam Scores

Class Proportion (%)

Final Grade

2016
2015
2014
2013
2012
2011

A+  A  A-  B+  B  C+  C  D+  D  E  F

Final Grade

## Summary - Learning Outcomes

(2011 versus 2012-2015)

<table>
<thead>
<tr>
<th>Category</th>
<th>Change</th>
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<tbody>
<tr>
<td>Student performance on exams</td>
<td>7-10%</td>
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<tr>
<td>Final grades</td>
<td>~10%</td>
</tr>
<tr>
<td>Learning gains</td>
<td>50-90%</td>
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<tr>
<td>pre/post assessments</td>
<td></td>
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<td>(Smith et al., 2008)</td>
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2012-2015 – eInstruction, LectureTools and Echo360 Lecture Captures enabled classrooms
Research Questions

1) Does the use of an Echo360-ALP feature influence the use of another?

2) Is there a relationship between each individual metric and exam outcomes?

3) Are there interactions between the metrics that lead to differences in student performance and learning?

4) Is there a relationship between user profiles and exam outcomes?
Does the use of an Echo360-ALP feature influence the use of another?

### Correlation between each metric and outcome

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<th>Gains</th>
<th>Comp. Score</th>
<th>0.22</th>
<th>0.11</th>
<th>0.15</th>
<th>0.08</th>
<th>0.04</th>
<th>0.08</th>
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<td>0.75</td>
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<td>0.67</td>
<td>0.62</td>
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<td>0.58</td>
<td>0.07</td>
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<td>0.24</td>
<td>0.75</td>
<td>0.62</td>
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<td>0.38</td>
<td>0.51</td>
<td>0.04</td>
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<tr>
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<td>Note Taking</td>
<td>0.04</td>
<td>0.25</td>
<td>0.18</td>
<td>0.18</td>
<td>0.41</td>
<td>0.40</td>
<td>0.22</td>
<td>0.15</td>
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**Complete set of data (n=597)**
- $R^2 > 0.7$ (p<0.05)
- $0.7 > R^2 > 0.3$ (p<0.05)
- $0.3 > R^2 > 0$ (p<0.05)
- (p>0.05)

**Gains Subset (n=434)**
- $R^2 > 0.7$ (p<0.05)
- $0.7 > R^2 > 0.3$ (p<0.05)
- $0.3 > R^2 > 0$ (p<0.05)
- (p>0.05)

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<th></th>
<th>Pres. Views</th>
<th>0.17</th>
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<th>0.82</th>
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<td>Video Views</td>
<td>0.02</td>
<td>0.07</td>
<td>-0.07</td>
<td>0.01</td>
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<td>0.21</td>
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<td>0.26</td>
<td>0.09</td>
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<td>0.15</td>
<td>0.44</td>
<td>0.32</td>
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Are there interactions between the metrics that lead to differences in exam outcomes?

Model generated by “stepwise backward linear regression”.

- 6 of 256 interactions were eliminated from the model.
- Interactions between the metrics are many and complex.
What are the effects of the metrics on the learning gains?

Linear regression model was used to evaluate the effect size of each metric on learning gains.

Effect size of each metric calculated by setting all metrics at their median values except the one under study.
Using the Linear Regression Model to Evaluate the Effect Size of Each Metric on Exam Outcomes

Effect size of each metric calculated by setting all metrics at their median values except the one under study.
Is there a relationship between user profiles and exam outcomes?

Example

- Attendance: 10.71%
- Video Views: 14.29%
- Presentation Views: 25%
- Q&A: 7.14%
- Notes: 7.14%
- Activities: 35.71%

Engagement score =
Weighting schemes which give the smallest interquartile range of engagement scores within each grade level

F
APP ATT NOT PVE VVE
0 1 0 0 0 0

D
APP ATT NOT PVE VVE
10 3 0 2 4

C
APP ATT NOT PVE VVE
8 0 0 0 1

B
APP ATT NOT PVE VVE
9 2 1 0 1

A
APP ATT NOT PVE VVE
9 2 0 2 0
What does it all mean to teaching and learning?
Acknowledgements

Teaching and Learning Support Services

Funding sources:
TLSS Pedagogical Grants
Vice-Rector Academics – Initiative Grants
Echo360 grant
uOttawa Blended Initiative

Ontario Consortium of Undergraduate Biology Educators