

PROJECT BACKGROUND

Scaling OER over Math 119 College Algebra

Motivations for adopting and scaling OER

- Decreased student cost of course materials.
- Enriched, student-centered, research-based learning environment.
 - Content contextualized to a specific course and student population.
 - Customized active-learning materials.
 - Sustained undergraduate learning assistants in the classroom by replacing high textbook cost with a low course fee.

IMPACT

272 Students in 12 course sections Fall 2017 – Fall 2018

PROJECT STUDY

Comparison of final course scores and DFW rates Student-perceptions Survey

- Spring 2017 Non-OER vs Spring 2018 OER
- 4 sections per semester, active learning (modified IBL)
- Same instructor, similar meeting times (2 MWF and 2 TR)
- OER would be considered a success if its utilization did not harm the learning environment (no impact on final grades/ DFW rates)

RESOURCES

LMS integrated, editable textbook and online homework manager (OHM)

- Piloted a Lumen Learning technology that integrated an editable digital text and online homework manager into the LMS.
- OHM, derived from MyOpenMath open-source homework manager, includes numerous libraries of OER homework problems created over 12 years.
- Utilized existing CC-licensed videos available on YouTube.
- Utilized various interactive graphs (e.g. Desmos, Geogebra)
- Created original problems, digital interactive graphs, reading notes outlines, and videos.

OBSERVATIONS AND CONCLUSIONS

| Spring 2017 Math 119 College Algebra | Spring 2018 Math 119 College Algebra |
|---|---|
| Non-OER textbook, Non-OER online homework manager | OER textbook, OER online homework manager |
| \$120 per student | \$0 per student |

Both groups were taught by the same instructor using a modified IBL active-learning teaching style, and comprised students enrolled in 2 MWF courses and 2 TR courses with similar meeting times, in the same classroom. Both groups paid a \$40 per student fee to support an in-class undergraduate learning assistant who held office hours outside class-time.

A T-Test for comparison of means was conducted on the final semester averages. A two-tailed test would allow a favorable observation of similarity between the groups. That is, the inability to balance variables in this quasi-experiment precluded the possibility of drawing conclusions of the efficacy (or otherwise) of OER.

A Z-Test for comparison of proportions was conducted on the DFW rates for each semester, under the same limitations as above. Again, it was desirable only to demonstrate similarity between the groups.

| COMPARISON OF MEAN COURSE SCORES | | COMPARISON OF DFW RATES | |
|---|--|--|----------------------------------|
| Group 1: Non-OER n=73, mean: 0.75, SD: 0.17 | Group 2: OER n=72, mean: 0.75, SD: 0.15 | Group 1: Non-OER n=90, $P_1=0.3$ | Group 2: OER n=97, $P_2=0.38$ |
| $H_0: \mu_1 = \mu_2; H_A: \mu_1 \neq \mu_2, \alpha = .05$ t-value 0.064, p-value 0.949 | | $H_0: P_1 = P_2; H_A: P_1 \neq P_2, \alpha = .05$ z-score -0.849, p-value 0.39532 | |
| No significant difference between the observed sample means. | | No significant difference between the observed DFW rates. | |

SURVEY RESPONSES

A survey was administered at the end of the Spring 2018 (OER) semester to gauge student perceptions of the materials. Likert-style questions were administered to address ease of access and usability, and students were asked whether they would opt for a course using OER again.

| Question | Agreed | Neutral | Disagreed |
|---|--------|---------|-----------|
| The text was easy to access | 93% | 4% | 3% |
| The text was easy to use | 81% | 17% | 1% |
| The online homework manager was easy to use | 78% | 19% | 3% |

Asked whether they would take a course using OER materials again, 85% indicated that they would. Of the 15% who answered “no,” the reasons why were revealing: 40% expressed dissatisfaction with the presentation of the digital materials (e.g. difficult to navigate, not sufficiently “clickable.”); 60% preferred to have at least an option for a paper text; and 60% expressed frustration with the inconsistency in the question/answer formats and verbal styles between questions in the online homework manager.

LESSONS LEARNED AND FUTURE PLANS

Lessons Learned: While OER has been demonstrated in this case to have “caused no harm,” student survey responses and classroom experience speak significantly of the need to improve the quality and homogeneity of the materials.

Future Plans: We plan a continued improvement of the quality and customization of our materials, continued development and sharing of original materials for College Algebra, with re-establishment of the full scale in the Fall of 2019.