

STUDENT SUCCESS IN OPEN NEBRASKA COURSES
NU Intercampus OER Research Committee White Paper

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ABSTRACT

The University of Nebraska’s unified open educational resources (OER) program – Open Nebraska – has saved NU students over \$15 million in textbook costs as of May 2023. As Open Nebraska was instituted across campuses, the NU Intercampus OER Research Committee was convened to study the effect of the Open Nebraska program on student success beyond monetary savings. This white paper represents the first systematic findings of that effort. In general, NU students are less likely to fail or withdraw and more likely to earn better grades when instructors implement open educational resources in their courses. Furthermore, in line with previous research, underrepresented students at UNO seem to benefit the most from early access to no-cost and low-cost course materials. At the very least, the implementation of OER in the NU system does not seem to harm academic success while saving students millions of dollars in textbook costs. These promising results suggest that the NU System should continue to support and promote efforts to increase the use of OER in our courses and programs. In addition, the NU Intercampus OER Research Committee should continue to gather and analyze data on student success and best practices related to OER implementation.

PURPOSE

In October of 2020, Dr. Jaci Lindburg, then Assistant Vice President of Learning Technologies and IT Strategy in University of Nebraska’s Information Technology Services division, was awarded an \$84,000 grant from the Women Investing in Nebraska (WIN) philanthropic organization – with a matching gift of \$84,000 awarded from the NU Provost's Office – to promote OER (Open Educational Resources) across the NU System. This funding was to be distributed to the faculty at the Kearney (UNK), Lincoln (UNL), and Omaha (UNO) campuses to recognize their time and effort in redeveloping courses with OER materials. The primary goal was to save NU students \$10 million by 2023, a goal that has been surpassed by over \$5 million as of May 2023. A secondary goal was to write this white paper that assesses student success in courses marked as Open Nebraska – the NU System’s OER program – compared to courses that do not use no-cost and low-cost materials.

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other tools, materials, or techniques used to support access to knowledge¹." But open content is not a new idea. The term was first coined by David Wiley in 1998, but mainly applied to software use. It was not until 2001, with the creation of MIT's OpenCourseWare, that class materials began to be categorized as "open content." In 2002, UNESCO held a forum to explore developing a universal "open education resource" available to everyone². Advocates were largely limited to making appeals to altruism, invoking idea(de)4 (a)4 b-u8224s altruism Ti()TJc0 Tw 1atan5.9

History of OER and Open Nebraska (ONE) at NU

At the January 9, 2015, meeting of the NU Board of Regents, NU Provost Dr. Susan Fritz approached the Chief Academic Officers on each NU campus about an initiative to reduce textbook costs to students, calling it

students, but might there be additional benefits of OER on student success? The goal of this white paper is to be the first systematic examination of the effects of the Open Nebraska program on academic performance across the NU System.

DATA ANALYSIS

Analytic sample

In February of 2022, campus representatives from UNO, UNL, and UNK requested information including student grades, GPA, drop/withdraw/fail (DFW) status, demographic information (including whether the student is first generation), total number of credit hours (current semester and cumulative, and course information (e.g., OER status, modality/format). These data were provided at the student-level, therefore students are the analytic cases throughout the results presented here. UNMC courses were not selected because UNMC does not offer multiple class sections and OER data for UNMC courses was not available prior to 2021.

The data was collected for five classes at UNK (BIOL 103 General Biology, BIOL 106 Biology II, ENG 102 Academic Writing and Research, TE 100 Teaching in a Democratic Society, and PSCI 110 Intro to American Politics), eight classes at UNO (CIST 2100 Organizations, Applications and Technology, CMST 1110 Public Speaking, ENGL 1160 English Comp II, MATH 1130 Quantitative Literacy, MATH 1210 Intermediate Algebra, MATH 1220 College Algebra, PSYCH 1010 Intro to Psychology I, SOC 1010 Intro Sociology), and five classes at UNL (MATH 100 A Intermediate Algebra, MATH 101 College Algebra, MATH 102 Trigonometry, MATH 103 College Algebra and Trigonometry, and MATH 106 Calculus I). These courses were identified as OER based on information from each campus about completion of an OER course development grant and were selected due to high enrollments across multiple sections offered every semester. UNK data includes courses offered between fall 2012 and Spring 2022, with the transition to OER occurring in the Fall 2015 semester. Course data for UNO is from Fall 2018 to Spring 2022, with most conversions occurring in either Spring 2021 or Fall 2021. UNL data is from Fall 2017 to Fall 2019 with OER conversion occurring in Fall 2018, except for MATH 106 which was OER beginning Fall 2019.

Descriptive statistics

Each campus was analyzed separately, with the results for UNO in Tables 1A and 1B; for UNL in Tables 2A and 2B; and for UNK in Tables 3A and 3B. Tables 1A, 2A, and 3A describe the sample characteristics for each campus, respectively. This includes the proportion of students in OER vs. non-OER sections and the modality of those sections (online vs. in-person). For UNO and UNL, proportions that include and exclude the Spring 2020, Summer 2020, Fall 2021, and Spring 2021 semesters are shown for comparison purposes. Because of the unusual nature of those semesters due to the COVID-19 pandemic, particularly regarding the quantity of remote instruction and challenge to student success, subsequent analyses focus on the data with Spring 2020 through Spring 2021 excluded. Analyses for UNK use Fall 2012 through Summer 2019 data for the same reason.

The proportion of students in OER courses ranged from about 44% at UNO to 54% at UNK to 72% at UNL (in a MATH-only sample). Just over half of the students at UNO were taking in-person classes while over 90% of their peers at UNL and UNK were in in-person

sections. For UNO and UNL, proportions for the racial/ethnic, gender, first generation, and full-time characteristics of the students are also included in Tables 1A and 2A. This information was not available for UNK. Overall, the students at UNO were substantially more likely than students at UNL to be racial or ethnic minorities, to be women, to be first generation, and to be less than full-time status. This is likely unsurprising given the overall demographics of the two campuses.

Table 1A. UNO Proportions for OER Designation, Student Characteristics, and Section Modality
Includes SP20-SP21 Without SP20-SP21

Bivariate and multivariate analyses

Tables 1B, 2B, and 3B display the differences in proportions/means between students in OER and non-OER sections across three student success outcomes: DFW rates; the average grade earned on a traditional four-point scale; and the percentage of A's earned. For UNO and UNL, these proportions are further disaggregated by student characteristics. Because these data are not composed of random samples of sections from the three campuses, but instead represent the known population of OER courses in certain departments at a given point in time, statistical significance tests were not reported.

At UNO (Table 1B), students in OER sections had modestly but consistently more positive success metrics than students in non-OER sections: their DFW rates were 4% lower, their final grades were about 0.05 points higher, and they earned about 5% more A's. There were some notable differences in these effects across student characteristics. For example, men earned grades that were 0.15 points higher on average in OER sections, compared to just a 0.01 difference (in favor of non-OER sections) for women. First generation students earned 10% more A's in OER sections, compared to a 4% difference for non-first generation students. The DFW rate was 8% lower for less than full-time students in OER sections, compared to about 2% lower for full-time students.

Table 1B. UNO Student Success Metrics by OER Designation, Student Characteristics, and Section Modality

Group	DFW Rate			Average Grade		Percentage A's		
	OER	Non-OER	N	OER	Non-OER	OER	Non-OER	N
Overall (inc. SP20-SP21)	0.14	0.17	35,987	2.86	2.85	0.48	0.47	30,588
Overall (w/o SP20-SP21)	0.15	0.19	20,084	2.87	2.82	0.49	0.44	16,864

The overall results for UNL (Table 2B) are more mixed than those at UNO: students in OER sections had 4% higher DFW rates than those in non-OER sections, but they did earn final grades that were 0.03 points higher on average and were 1% more likely to be A's. The benefits of OER may have accrued more strongly to White and non-first generation students at UNL. When taking OER sections, White students had average grades that were 0.08 points higher and earned 3% more A's, compared to slightly lower grades and earned A's for racial/ethnic minority students. Likewise, non-first generation students earned grades that are about 0.10 points higher with 3% more A's in OER sections, compared to essentially the opposite pattern for first generation students. Although based on a small sample, it appears that less than full-time 0.49

students at UNL may have benefitted more from OER sections than full-time students, with 4% lower DFW rates, grades that were 0.05 points higher on average, and 4% more earned A's.

The positive effects of taking OER sections on student success metrics were modest but consistent at UNK (Table 3B) as well: students in OER sections had 1% lower DFW rates, 0.09 points higher average grades, and 5% more earned A's. The benefits of OER did not seem as consistent or positive in online asynchronous sections, but these findings were based on a relatively small sample size compared to the in-person sections. Supplemental multivariate tests were performed on data from all three campuses to control for potential spurious effects due to academic discipline or instructor characteristics. Multiple regression revealed that the results shown in Tables 1B, 2B, and 3B are substantively unchanged with the addition of these control variables, so we retained the more parsimonious findings presented here. These supplemental analyses are available from the authors upon request.

CONCLUSIONS

The results reported in this white paper are a promising first look at the effect of the Open Nebraska program on student success. In general, our students across three NU campuses seem less likely to fail or withdraw and more likely to earn better grades when instructors implement open educational resources in their courses. Furthermore, in line with previous research,

underrepresented students at UNO seem to benefit the most from early access to no-cost and low-cost course materials. At the very least, the implementation of OER in the NU system does not seem to harm academic success while saving students millions of dollars in textbook costs.

Still, further research is needed to understand the full extent and reliability of the relationship between using open educational materials and student outcomes. Extending the timeline of research beyond the data available in this study is important for multiple reasons. First, while UNK was an early adopter of a version of the Open Nebraska course marking system, it is a newer process that has yet to be fully institutionalized at the other three NU campuses. Significant post-hoc work was done on the data set used in this study to ensure that the OER variable was as accurate and reliable as possible, yet some course sections that were utilizing no-cost or low-cost materials were almost certainly missed. This would likely result in an *underestimate* of the positive effects of Open Nebraska courses on student success. Second, we need to analyze data that is further removed from the COVID-19 pandemic, when extreme disruption to education caused by shutdowns and sudden shifts to online education added a variable that made it impossible to conduct direct, one-to-one comparisons of OER and non-OER courses. Third, there may be a longitudinal component at play, given that any instructor is bound to experience a learning curve when implementing OER. Assessing the effectiveness of Open Nebraska over time by instructor may yield interesting and helpful results. In general, additional data would allow for more complex analyses that can disentangle student and instructor effects from the implementation of OER itself.

Our data set would benefit from additional information on student characteristics, such as age and socioeconomic status (which could be measured by proxy through Pell Grant receipt). For example, looking at nontraditional students, Clinton-Lissell (2022) found that while grade performance improved for traditionally aged students in OER courses but not for nontraditional students, indicating a possible generational divide in comfortability with e-texts²⁰. Likewise, we would expect that students from lower SES families would benefit the most from access to no-cost and low-cost materials. Still, there are cases in prior studies²¹ and in our data where more privileged students seem to benefit more from OER, and additional student variables would help us dig into that finding. A smaller study that includes a quantitative or qualitative exploration of additional student outcomes such as engagement, confidence, motivation, and belonging may be warranted as well. Additional instructor-level variables could be added to the data set, including their years of experience teaching college-level courses, various assessments of their general teaching effectiveness, and their comfort in implementing OER. For example, Wiley & Hilton (2018) propose a new term, “OER-enabled pedagogy,” to describe the still-emerging field of study looking at best practices for implementation as opposed to simply tracking existing use.

There seems to be significant faculty interest and buy-in around adoption of OER materials, but continued support from university leadership will be necessary to sustain this momentum. A recent study by Sergiadis & Smith, for example, evaluating a university awards program found that the greatest concern moving forward was not advocacy but addressing faculty concerns regarding implementation and pedagogical considerations²². A common faculty

²⁰ Clinton-Lisell, V. (2022). How does OER efficacy vary based on student age and course modality? A multi-institutional analysis. *American Journal of Distance Education*, 1-17.

²¹ Dempsey, M. (2021). The impact of free and open educational resource adoption on community college student achievement. *The International Journal of Open Educational Resources*, 4(1), 25024.

²² Sergiadis, A., & Smith, P. (2022). Is it worth it? Evaluating an open educational resources awards program. *Tennessee Libraries*, 72(1).

anxiety when approaching OER implementation is the impact of moving away from a standard textbook to accommodate an entirely online text. As Salem (2017) points out, the growth in both faculty incentive programs and library centered OER programs means that OER are going to continue to be a component of higher education, meaning assessment strategies are essential for guiding maintenance and continued growth²³. OER education, already an established and permanent component of the higher education ecosystem, is transitioning into a fourth phase of OER implementation, centered around discussion and research focused on broader set of Open Educational Practices, of which OER and open pedagogy are components²⁴. Thus, both financial support and informational campaigns will be critical to increasing the use of the Open Nebraska system among instructors across the Univers(r)3 (s)-1 sU of Nebraska. Fgogy aoun (t)-2y (e)4 (f3 (e)4 nnu2 (c).