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Title: Evaluation of the effect of a required online learning orientation on the success of community college students in online courses.

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Background

Wake Tech's Quality Enhancement Plan (QEP), titled e-Learning Preparedness Initiative across the College (EPIC), has had as its primary goal to reduce barriers and support student learning, persistence, and success in online courses. Historically, readily available Wake Tech data, such as grade distribution reports, have shown that online student performance has consistently lagged behind face-to-face student performance by about 5%, on average. This gap indicated the need to improve student learning in online courses, particularly in high-demand *priority courses* (high enrollment gateway courses). To address this need, since its rollout in Fall 2015, EPIC's interventions and strategies have aimed directly at the development of students' online learning skills and faculty's design and delivery of online courses.

One key intervention is Wake Tech's e-Learning Intro (ELI), a series of online course preparedness modules. Students who wish to take online courses at Wake Tech must take ELI if 1) they are new to online learning at Wake Tech, or 2) if they are returning and have not received at least an A, B, C or P in an online course at Wake Tech within the last 5 years.

Research Question

Summative evaluation activities, which began in August 2016, were designed to measure the extent to which EPIC, in its first five years of implementation, has achieved the intended objectives and outcomes, overall. Data has been gathered and analyzed to answer several questions, including the main topic of our proposed presentation: *Did ELI significantly improve online student success and withdrawal rates?*

Findings

Since ELI launched in Fall 2015, success rates have improved significantly in priority online courses. In the most recent semester, Spring 2019, the gap between the online and seated success rates was down to 3.2%, which is the smallest gap since the start of EPIC. As Figure 1 and Figure 2 show below, success rate comparisons by semesters show statistically significant improvement in success rates from Fall 2014 to Fall 2015 (Figure 1) and from Spring 2015 to Spring 2016 (Figure 2) upon implementation of ELI in Fall 2015. Since no other interventions involving priority courses were started in the 2015-2016 academic year, the statistically significant increases can be attributed to student participation in ELI. Withdrawal rate comparisons by semesters also show improvement from Fall 2014 to Fall 2015 (Figure 3) and from Spring 2015 to Spring 2016 (Figure 4).

Figure 1: EPIC Priority Course Success Rates – Fall semesters.

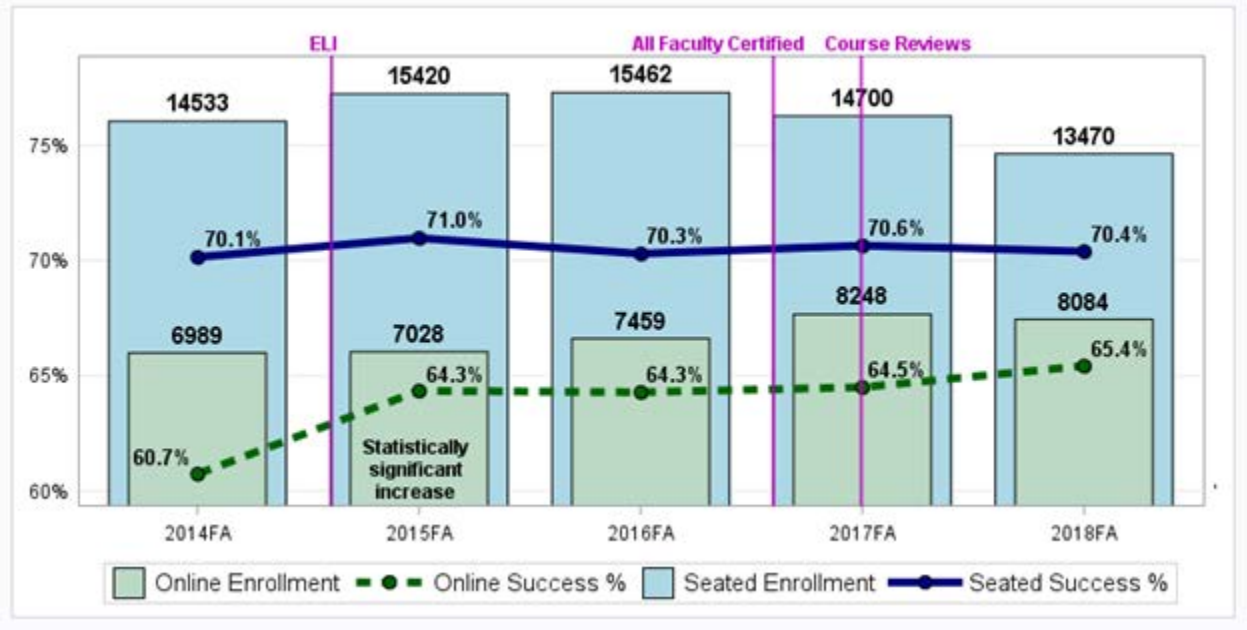


Figure 2: EPIC Priority Course Success Rates – Spring semesters.

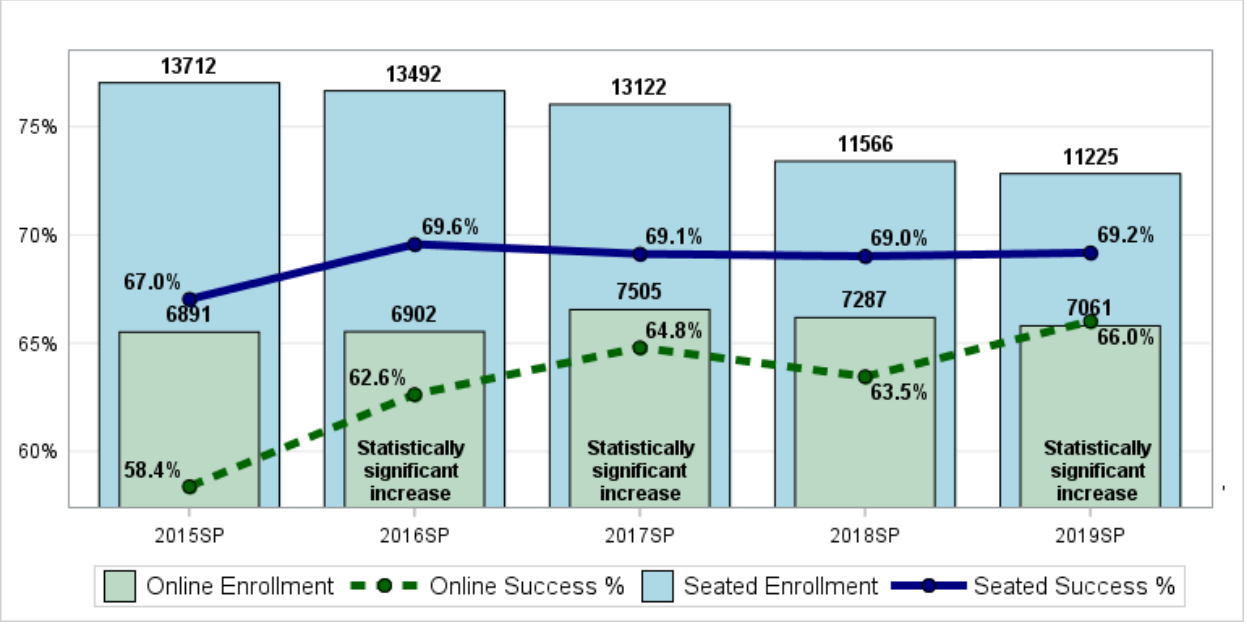


Figure 3: EPIC Priority Course Withdrawal Rates – Fall semesters.

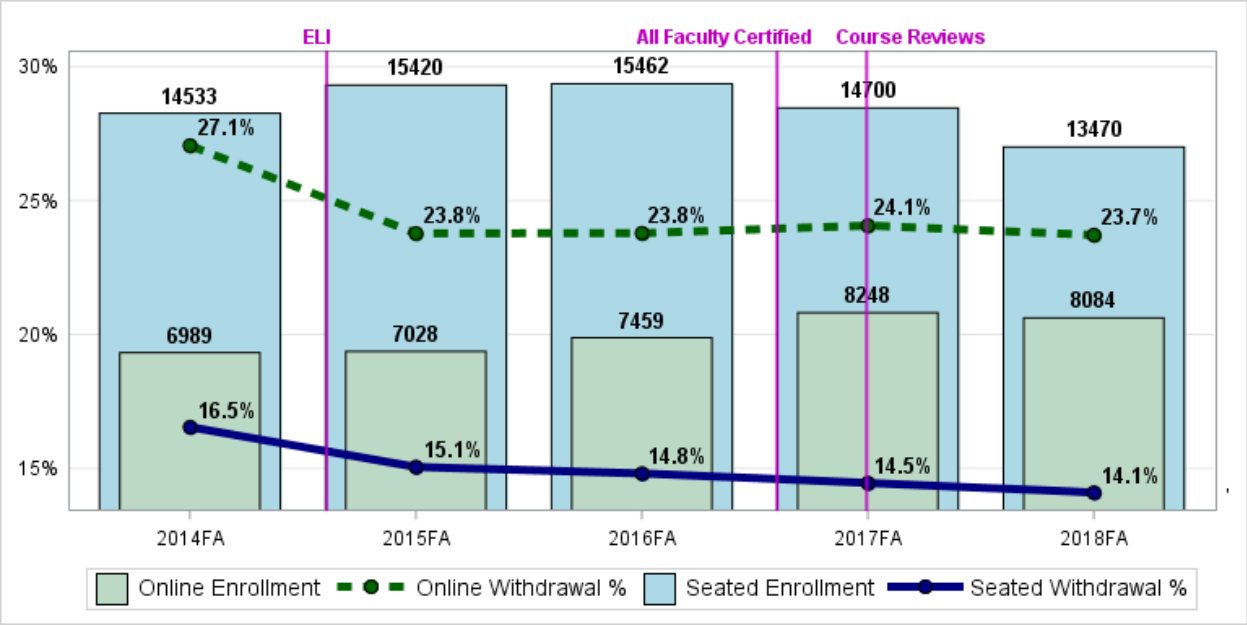
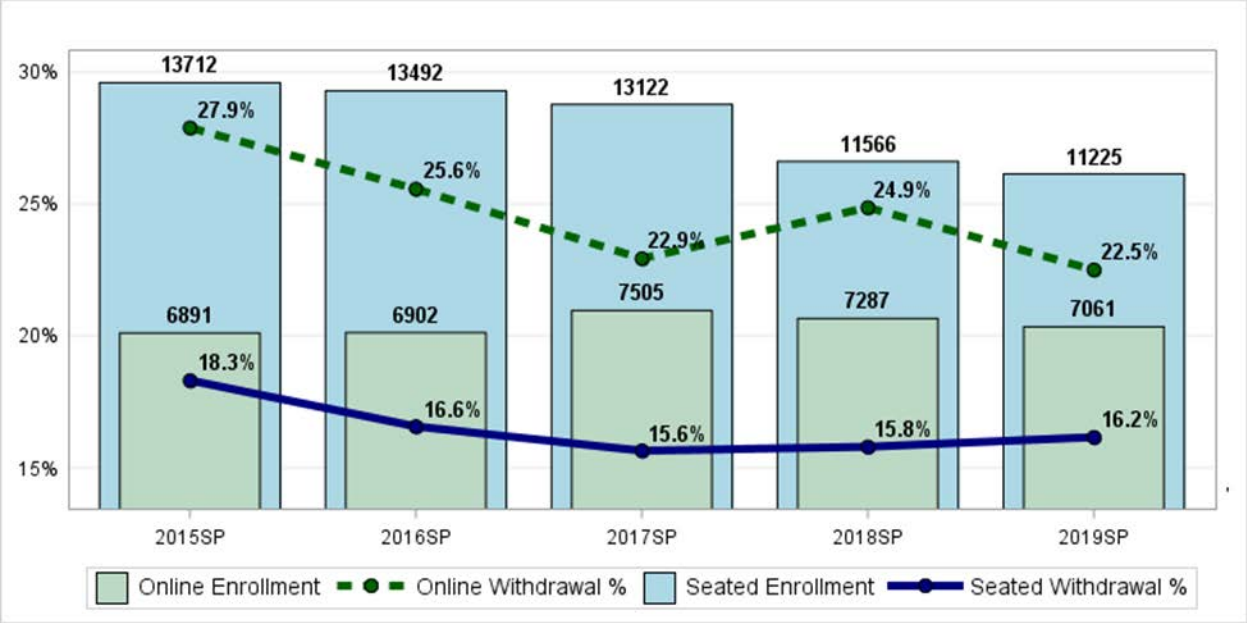


Figure 4: EPIC Priority Course Withdrawal Rates – Spring semesters.



In order to compare the success and withdrawal rates of priority online courses in the semester immediately preceding EPIC and the most recent semester after EPIC, Pearson Chi-squared testing was employed. Success rates increased by 5% in Fall semester comparison between 2014 and 2018, and by 8% in Spring semester comparison between 2015 to 2019.

Using Spring and Fall semester performance data from Fall 2012 to Fall 2018, several predictive models, including neural network, decision trees, and regression were built to predict students' success in online courses. The champion model, logistic regression, has a prediction accuracy of 70.8% (i.e. when a student registers for an online course, this model predicts with 70.8%

accuracy if that student will make a “C” or better grade in that course). The logistic regression model summary is shown in Table 1.

Table 1: Logistic regression model summary for predicting online success.

Effect	DF	Wald Chi-Square	p-value (Chi-sq)
Age group	3	422.4442	<.0001 *
Gender	1	10.4393	0.0012 *
High School GPA	1	911.1441	<.0001 *
Courses	525	4531.7649	<.0001 *
Pell Eligibility	1	12.2404	0.0005 *
Race/Ethnicity	6	2495.0633	<.0001 *
Semester	1	1.5698	0.2102
Completed ELI **	1	13.1503	0.0003 *
Certified Primary Instructor **	1	0.0800	0.7773

* $p < 0.05$ ** EPIC intervention measures

Completing ELI prior to taking an online course is one of the significant predictors of success. According to the analysis of maximum likelihood estimates, students who took ELI are 4% more likely to be successful than who did not.

Propensity score matching (PSM), a quasi-experimental research design, was used to evaluate the causal effect of EPIC. Propensity score analysis seeks to isolate the treatment as the only difference between the treatment and control groups. Pearson Chi-squared testing was done on the two matched groups, control and treatment, obtained using PSM to analyze the outcome.

For ELI, grade data of all first online course enrollments at Wake Tech in the academic years 2014-2015 and 2015-2016, excluding Summer, was used. Propensity scores were calculated using several key variables (see Table 2).

Table 2: Variable Distribution of the Population (ELI Subset – 2014 & 2015 First Online Enrollments; N=5669)

Variable	Population Distribution
Gender	Female-58%, Male-42%
Race/Ethnicity	WH-55%, BL-25%, HIS-9%
Pell Award	Received Pell-56%
Full Time Faculty	FT-68%
Semester Duration	98%-16weeks
Age Group	‘18 to 21’-57%, ‘22-34’-36%, ‘35-49’-4%
ELI Completed	Completed ELI-53%

Results of the Chi-squared test of the matched datasets indicate that success rates of priority online courses among students who completed ELI (treatment) is 63%, while it is 54% for those who did not complete ELI (control). The outcome analysis shows that the differences observed with success rates are significant for both priority and all online courses. Similarly, the differences seen with withdrawal rates of the matched datasets in both priority and all online courses are statistically significant.

Summary

In summary, four lines of evidence indicate a significant and sustained change in online success and withdrawal rates after implementing ELI: (1) descriptive statistics comparing online and seated courses, (2) Pearson Chi-squared analysis, (3) logistical regression model, and (4) propensity score matching. For SREE's 2020 Conference, we propose to present the findings from all four statistical analyses.