



Investigating the Impact of Online Classes on Degree Completion

SHARON WAVLE
ASSOCIATE DIRECTOR, DECISION SUPPORT AND REPORTING
OFFICE OF ONLINE EDUCATION

INDIANA UNIVERSITY

Welcome!

I am Sharon Wavle, and I currently serve as Associate Director for Decision Support and Reporting for the Office of Online Education at Indiana University. My staff and I handle a variety of tasks but are primarily responsible for:

1. Working with all of our campuses to ensure that our classes and programs are coded properly to allow for accurate reporting and decision making;
2. Designing and maintaining several interactive dashboards for self-service analytics in the areas of online student demographics, online headcount and credit hour trends, online marketing analytics and yield analysis, and we are just getting our feet wet in learning analytics by digging into learning management system data warehouse, Canvas;
3. Responding to surveys in the online education space, including US News and World Report best online bachelors degrees;
4. Managing and tracking the online program approval process at the university, including the development of collaborative degrees;
5. Managing and reporting on the sharing of online classes among our university's 7 campuses; and
6. Responding to a variety of ad hoc reporting requests and digging into interesting questions regarding how students are using online education to achieve their educational goals.

This webinar will review one particular research study that looked at the impact of taking online classes on student degree completion.

Presentation Overview

1. Literature Review
2. Purpose of the Study
3. Methodology
 - a. Research Design
 - b. Data Sources
 - c. Data Analysis Methods
4. Results
5. Discussion/Questions



INDIANA UNIVERSITY

In this presentation, I'll review the entire research study process, including a review of relevant literature, definition of the purpose of the study and the specific research questions asked, and the methodology used. We will look at the results of our statistical analysis and discuss what this means for students who take online classes, and what further areas of research may be needed.

Publication:

Wavle, S., & Ozogul, G. (2019). Investigating the Impact of Online Classes on Undergraduate Degree Completion. *Online Learning*, 23(4). doi:<http://dx.doi.org/10.24059/olj.v23i4.1558>



INDIANA UNIVERSITY

And before we go too far, I'll provide the citation for this study that did finally publish in last December's *Online Learning* journal. I'm pursuing an Ed.D. in Instructional Systems Technology, and worked with my advisor, Gamze Ozogul on this project. It seemed to take forever and it's nice to see this in final form.

So If you are interested in learning more or reading the full study, you can do so any time you'd like!



SECTION 1

Literature Review

So let's start with the literature review and motivation for our study.

Literature Review

Students Taking One or More Online Classes

- National Center for Education Statistics
- Fall 2017: 33% of all postsecondary students (was 25% in 2012)

- "normalization of online learning"

Doug Lederman, "Online Education Ascends", Inside Higher Ed, 11/7/18

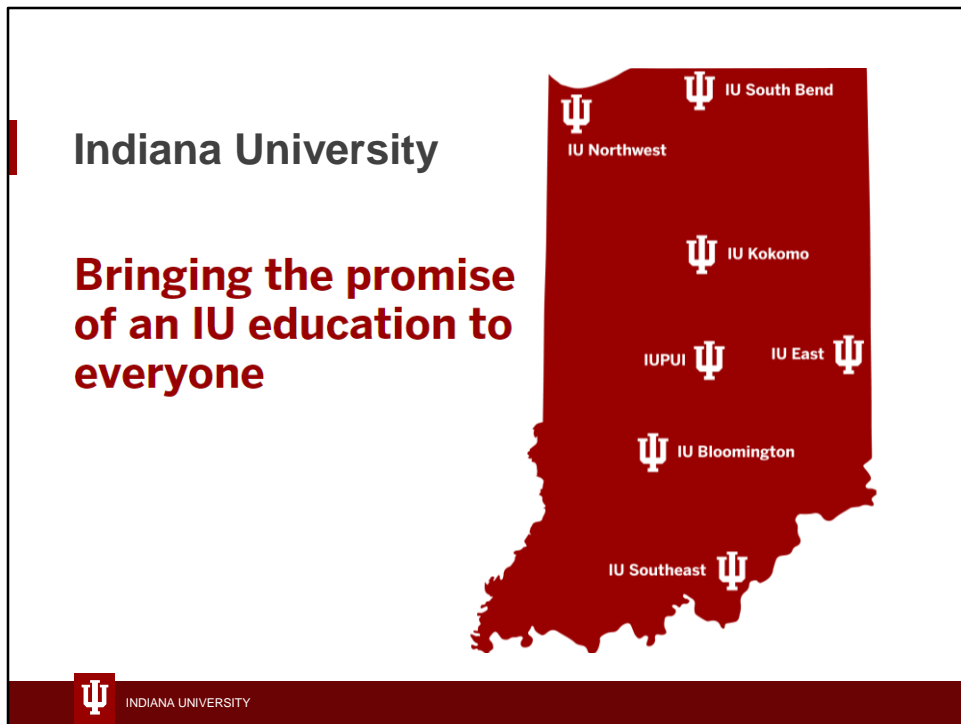
All Enrollments and Online Enrollments, 2016 and 2017

	2016	% of 2016 Total	2017	% of 2017 Total	% Change, 2016-17
All Students	20,224,069		20,135,159		-0.44%
Enrolled Exclusively Online	2,974,836	14.71%	3,104,879	15.42%	4.19%
Enrolled in Some Online Courses	3,325,750	16.44%	3,552,581	17.64%	6.38%
Enrolled in No Online Courses	13,923,483	68.85%	13,477,699	66.94%	-3.31%



INDIANA UNIVERSITY

National statistics on online learning clearly indicate that the number of students taking one or more online class in a given term are increasing at a steady pace, even though the total number of students is relatively flat or slightly declining. We've grown from one quarter of all students nationally taking one or more online class in the fall of 2012 to one third in the fall of 2017. This is all part of what Doug Lederman called the "normalization of online learning" in a 2018 article on the growth of the online space in higher education.



Those trends are also reflected at Indiana University, where collectively the 7 campuses of the university offer over 2,500 online class sections each semester. About one-third of our students enroll at our traditional flagship campus in Bloomington, IN. Another third enroll at our urban campus located in Indianapolis, and the remaining third enroll in one of our regional campuses around the state in Gary, South Bend, Kokomo, Richmond, and New Albany.

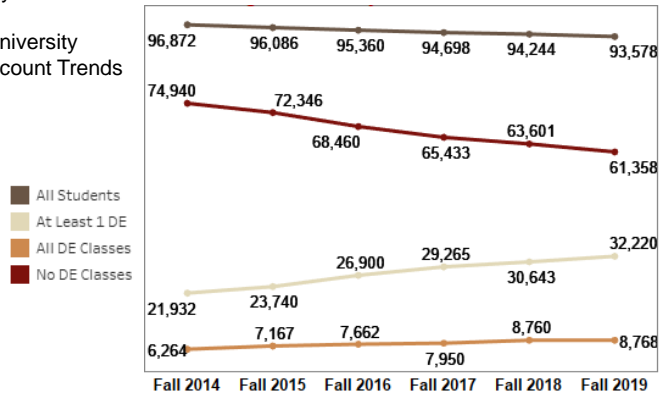
Some of our online courses are shared between multiple IU campuses in support of our collaborative online programs, leveraging the strengths of our faculty across the state in the delivery of these degrees.

Literature Review

Students Taking One or More Online Classes

- National Center for Education Statistics
- Fall 2017: 33% of all postsecondary students (was 25% in 2012)
- Indiana University: 34.4% in Fall 2019

Indiana University
Fall Headcount Trends



INDIANA UNIVERSITY

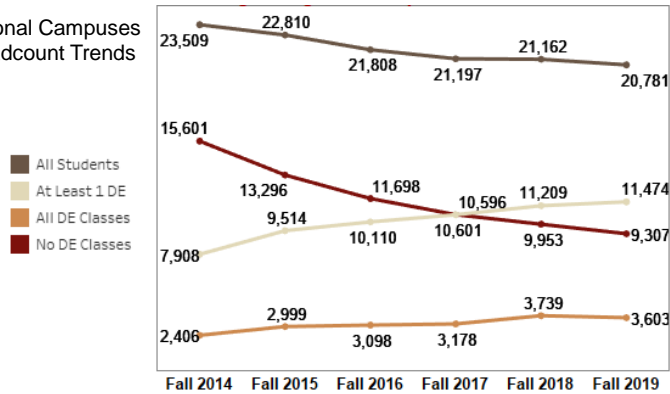
When we look at specific fall headcounts of students at IU, we can see that our numbers do indeed reflect the national trends. The dark top line you see here represents all university students at all of our campuses, which has declined slightly over the past 5 years. The downward trending crimson line represents students taking none of their classes online, and of course the upward trending cream line underneath that is the number of students taking one or more online class in that term. By the fall of 2019, 34.4%, or just over one-third, of all IU students were taking at least one online class.

Literature Review

Students Taking One or More Online Classes

- National Center for Education Statistics
- Fall 2017: 33% of all postsecondary students (was 25% in 2012)
- IU Regional Campuses: 55% in Fall 2019

IU Regional Campuses
Fall Headcount Trends



INDIANA UNIVERSITY

When we restrict our view to just the Regional campuses of the university – those located outside of the Bloomington and Indianapolis area - we can see even more dramatic numbers of students in the online space. In fall 2019, 55% of all regional campus students took one or more online classes as part of their schedule. We can also see the total number of students – represented by the dark line at the top of the line chart – has decreased over the past 5 years by about 12%. The number of students taking no online classes has gone down 40%, but the number of students taking one or more online class has increased by 45%. We can see that at our regional campuses the lines actually crossed in fall 2017. Now, at our regional campuses, more students take an online class in a given term than not.

This is a big change. And many faculty and administrators are asking some very good questions about it. Is online education helping our students succeed, or not?

Literature Review

Online Course Impacts on Course Completion

Study	Course Completion Outcomes
Jaggars & Xu (2010)	Students more likely to fail or withdraw from online course
Xu & Jaggars (2011)	Students more likely to fail or withdraw from online course
Johnson, Cuellar Mejia & Cook (2015)	Pass rates in online courses lower than traditional face to face
James, Swan & Daston (2016)	<i>Online courses do not impact course completion rates</i>
Shea & Bidjerano (2017)	Online course GPAs lower relative to on campus course GPAs
Hart, Friedmann & Hill (2018)	Outcomes in online courses poorer than face to face



INDIANA UNIVERSITY

A review of existing research on student performance in online classes isn't all that promising. This table summarizes large-scale studies conducted since 2010 comparing student outcomes between online and traditional face to face courses. The red outcomes are negative, and I've shown neutral or positive outcomes in blue italics for easy comparison. Of those studies I reviewed, almost all found that students were less successful in online classes. The only exception was the 2016 study by James, Swan, and Daston that found no difference between online and traditional course completion rates.

Literature Review

Online Course Impacts on Degree Completion

Study	Degree Completion Outcomes
Jaggars & Xu (2010)	Taking online classes in early semesters lowers retention and degree attainment
Xu & Jaggars (2011)	Taking online classes in early semesters decreases retention, and a high % of online classes slightly decreases completion
Pontes & Pontes (2012)	<i>First-generation low income students taking online classes show increased progress toward degree</i>
Shea & Bidjerano (2014)	<i>Early participation in online predicts higher rates of degree attainment, even for those at risk</i>
Shea & Bidjerano (2016)	<i>Significantly more students engaged in online classes attained a degree than those who did not; women students graduate more quickly when taking online classes</i>
Shea & Bidjerano (2017)	<i>Students taking online and on campus classes 1.5 times more likely to complete degree; female, white, full-time, older students more likely to take online and on campus</i>
Shea & Bidjerano (2019)	Higher proportions of online classes decreases degree completion (tipping point = 40%)



INDIANA UNIVERSITY

When it comes to the impact of online class taking on degree completion, the picture is a bit different. Again, I've shown negative outcomes in this table in red, and positive outcomes are in blue italics. We can see that the early studies, which were conducted at the community college level, found that early online class taking lowered student retention and had a negative impact on degree completion. Later studies, however, show increased rates of degree completion when students took online classes as part of their degree program, particularly for populations more at risk of not completing, such as first generation, low income students. Positive impacts were also found for women students and older students in particular. It seems that for some populations, online classes are particularly beneficial.

The latest study by Peter Shea showed an interesting effect by looking at how many classes students took online, not just whether or not they took some. In this latest study, they found a tipping point at which taking too many online classes had a detrimental effect on degree completion.

SECTION 2

Purpose of the Study

So now we'll look at the specific research questions we established for our study.

Purpose of the Study

Research Question 1:

Does taking one or more online classes during a student's program of study increase the likelihood that a first-time, full-time undergraduate student will complete their degree within 150% of the stated program length?

Research Question 2:

Is there a difference in student performance, as measured by course grades, between online and on campus classes?



INDIANA UNIVERSITY

The primary question for this research study was to determine if taking online classes increased the likelihood that a first-time, full-time undergraduate student would complete their degree “on time” – which by our university standards is 150% of the typical length needed to complete the program. So for example, a bachelor’s degree student completing their program of study in 6 years would count as a completion.

The secondary question looked at student performance in online classes compared to their traditional face to face classes. Did students perform differently in these two types of classes?

Definitions

Online (broad definition):

Any course that uses technology to deliver instruction to students who are separated from their instructor - supporting regular and substantive interaction between the student and instructor - 76-99% of the time.

May be synchronous or asynchronous, including live video and/or audio conferencing.

On Campus:

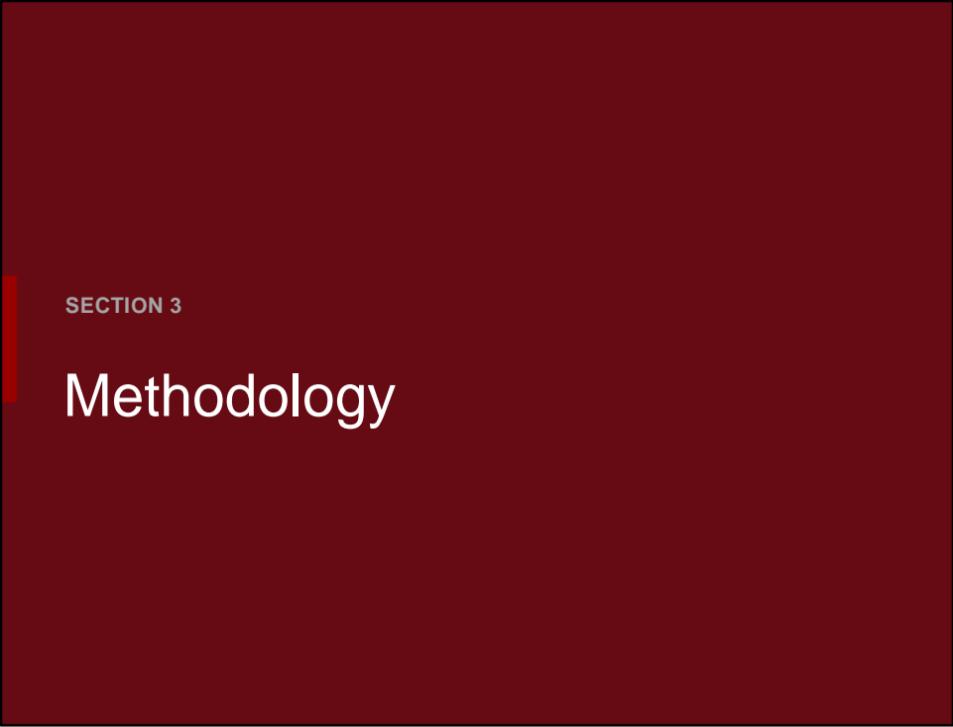
A course that does not meet the above definition, including face-to-face, hybrid (on campus and online), internships, and independent study



INDIANA UNIVERSITY

And before we go too far, it's important for me to establish the definitions we use for an online course. These are based on federal and state regulators that define distance education, and we use the broadest definition to include any technologies where the student and instructor are separated by distance, including completely asynchronous online classes (which means any time and any place), and synchronous live video courses (which means any place but the student must be on video at specific times).

On campus (or face to face) courses are anything not in the online category. For this study we didn't exclude independent study or internship classes.



SECTION 3

Methodology

And now to look at our methodology.

Methodology

Research Design

Quantitative analysis of existing data

Data Sources

Official University Census Graduation Rate Data (Excel)

Degree completion indicator (150% of program length), Campus Type, Pell/Stafford indicator, tuition residency, age at time of enrollment, ethnicity, gender, first generation status, SAT/ACT composite score, 1st semester GPA

Official University Census Course Enrollment Data (SQL)

Online credit hours and quality points, on campus credit hours and quality points, calculated online GPA, on campus GPA, "1 or more online" indicator, online percentage

Data Analysis

Demographic Analysis: Crosstabs, ANOVA

Research Q1: Logistic Regression

Research Q2: Paired samples t-test



INDIANA UNIVERSITY

For this study we used existing datasets that were available at the university. Excel files containing official census graduation rate data as well as student demographics gave us the base information we needed for the study. To that data, we added information about each student's course taking behavior over the course of their degree. We looked at official course grade data, and totaled each students' credit hours and quality points for the grades they received, grouping the data by whether the courses were online or not. We used the credit hours and quality points to calculate a students online GPA and on campus GPA, and then created a "one or more online" indicator to tell us if the student had taken at least one online class. This data was paired back to the graduation rate files to create our study dataset. In order to look at a 6-year graduation rate period, the cohort we were able to use at the time we began this study was the fall 2010 cohort.

Because I am currently a graduate student and my statistical skills are still under development (I've had one graduate level class, really enough to be dangerous), we employed a statistician from the Indiana Statistical Consulting Center, located on the IU Bloomington campus, to help us with our analysis phase. We wanted to look at the demographic characteristics of students taking online classes compared to those who don't, and a variety of crosstabs and analysis of variance tests were used for this. We also used these same tests to compare students between our traditional flagship campus, urban campus, and our regional campuses. We did this to confirm our own descriptive statistics that show distinct differences between these three types of

students.

To answer our first research question – does taking an online class increase the likelihood that a student will complete their degree within 150% of the program length – we conducted a logistic regression.

To answer our second research question – was there a difference in course performance between online courses and on campus courses - paired samples t-tests were used.



SECTION 4

Results

And now to summarize our results.

Results – Demographics by Campus Type

	All Campuses	Flagship	Urban	Regional
All Students (N)	12,840	6,935	2,647	3,258
Resident Students (%)	79%	63%	95%	98%
Pell/Stafford Recipient (%)	51%	38%	65%	67%
Female (%)	56%	52%	60%	60%
Underrepresented Minority (%)	15%	13%	18%	19%
First Generation (%)	31%	19%	42%	46%
Average Age	18.9	18.6	18.9	19.6
Average SAT/ACT Composite Score	1100	1199	1013	944
Average 1 st Semester GPA	2.84	3.06	2.78	2.44
Students Taking 1 or More Online Class (%)	40%	29%	64%	46%
Students Completing Degree (%)	59%	77%	47%	30%
% Completion: Students Taking At Least 1	69%	85%	65%	52%
% Completion: Students with No Online	52%	74%	16%	12%

- Differences by campus type significant at $p < .01$ level for all variables
- *Bonferroni corrections: Gender, Pell/Stafford, and Underrepresented minority different between flagship campus and urban/regional, not between all 3 groups*



INDIANA UNIVERSITY

This table summarizes the demographic comparisons as well as completion rate comparisons among students at the 3 types of IU campuses: our traditional flagship, the urban campus, and our 5 regional campuses. You can see that the overall N for this study was almost 13,000 first-time, full-time students. Of the demographic characteristics shown, all groups were statistically significantly different from each other except those noted in blue above. Bonferroni corrections looked at these characteristics further – pell/Stafford recipient status, gender, and underrepresented minority status, and found that the urban and regional campuses did not differ significantly on these characteristics, but the urban and regional students together were different from students at the flagship campus.

To highlight some of these quickly:

Our flagship campus is more likely to have out-of-state students, with only 63% of those students being Indiana resident students.

Students at our urban and regional campuses tended to be lower income, using pell/Stafford recipient status as a proxy.

Students at our urban and regional campuses are 60% female, compared to 52% at the flagship, and have higher representations of underrepresented minority as well as first generation students.

You can see that the average age increases as we go from the traditional flagship campus, to the urban campus, to the regionals.

What was really interesting to see what the percentage of students at each campus, broken out by those who took an online class and those who did not. Overall, degree completion rates at the urban and regional campuses are lower than at the flagship campus. The differences in degree completion rates between those taking online classes and those not taking online classes is much wider as well. 52% of regional campus students who took online classes completed their degree, compared to only 12% of the regional campus students who did not take any online classes. Those percentages are 65% and 16% for urban campus students taking at least one online compared to no online, and 85% and 74% for flagship campus students taking at least one online compared to no online classes.

Results – Demographics by 1 or More Online

	All Students	No Online Classes	One or More Online Class
All Students	12,840	7,666	5,174
Resident Students (%)	79%	73%	87%
Pell/Stafford Recipient (%)	51%	49%	55%
Female (%)	56%	53%	61%
Underrepresented Minority (%)	15%	15%	15%
First Generation (%)	31%	27%	35%
Average Age	18.9	18.9	18.9
Average SAT/ACT Composite Score	1100	1125	1063
Average 1 st Semester GPA	2.84	2.75	2.98
Students Completing Degree (N)	7,557	3,988	3,569
Students Completing Degree (%)	59%	52%	69%

Differences by online class category significant at $p < .01$ level for all variables except age and underrepresented minority.



INDIANA UNIVERSITY

We did the same types of demographic comparisons between the populations of students who didn't take online classes compared to those who did during their program of study.

All of the demographic characteristics shown were statistically significantly different except underrepresented minority and age. Those students taking one or more online class were more likely to be Indiana resident students, lower income, female, first generation students with lower SAT/ACT composite scores yet higher first semester GPAs. Once again you can see the difference in degree completion rates between those who didn't take online classes – 52%, and those who did – 69%.

Results – RQ#1 Logistic Regression

Variable	Flagship		Urban		Regionals	
	Sig.	Odds Ratio	Sig.	Odds Ratio	Sig.	Odds Ratio
Age at time of enrollment	n/a	n/a	.348	.410	.130	.347
SAT/ACT composite score	.530	1.000	.017	1.001	.005	1.001
1st semester GPA	.000	3.922	.000	3.463	.000	3.211
Took at least one online class	.000	2.662	.000	8.067	.000	6.177
Pell/Stafford recipient	.000	.695	.051	.804	.120	.847
Gender (Female)	.040	1.152	.023	.780	.853	.980
First generation student	.001	.751	.000	.609	.003	.733
Underrepresented minority	.127	.872	.756	1.043	.000	.555

Models correctly predicted degree completion at 81% (flagship), 76% (urban), 78% (regionals)
Nagelkerke R² = .279 (flagship), .470 (urban), .435 (regionals)



INDIANA UNIVERSITY

As far as our results for our first research question, this chart displays the results of the logistic regression, where we put all of the demographic and academic characteristics into the model. We show the significance levels and odds ratios for the variables that were retained in the model. Anything significant is highlighted in bold. When we look at the row for “taking at least one online class” we can see that at the flagship campus, taking an online class meant that a student was 2.7 times more likely to completely their degree. At the urban campus a student taking an online class was 8.1 times more likely to complete, and a regional campus student taking an online class was 6.2 times more likely to complete their degree.

The R-squared values for the models were considered good, with the models for the urban and regional campuses a better fit that for the flagship. This seems to contradict the prediction rates I’ve shown at the bottom of the chart, but you’ll recall that overall, the flagship campus had a degree completion rate of 77%. So from a prediction standpoint, it’s easier for the model to “guess” that a student did complete than at the other campuses, where overall completion rates were 47% and 30%.

Results – RQ#2 Paired Samples *t*-tests

Campus Type	Online		On Campus	
	M	SD	M	SD
All Campuses	2.84	1.19	2.79	0.65
Flagship	3.04	1.11	2.90	0.51
Urban	2.87	1.14	2.78	0.71
Regionals	2.56	1.29	2.66	0.71

All differences were significant at $p < .05$
Effect size was small in all cases

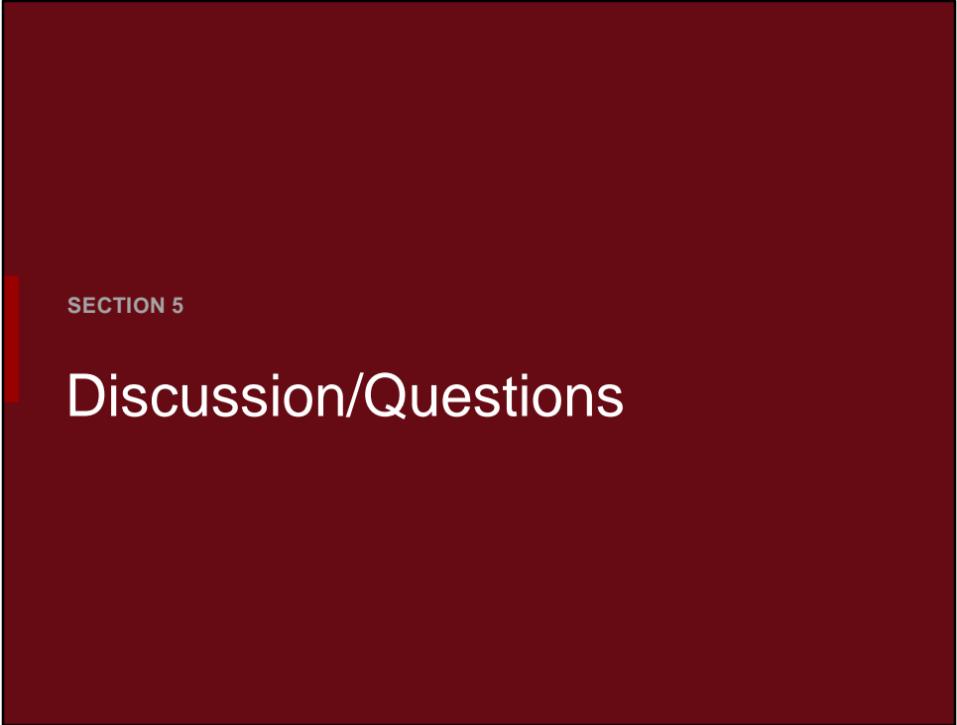


INDIANA UNIVERSITY

Our second research question looked at success rates in online courses compared to on campus courses. We broke this data again out by campus type, and found that all average GPA values differed significantly between online and on campus courses. However, in terms of practical significance the differences were small. The differences were also mixed.

You can see that at the flagship and urban campuses, online GPAs were actually higher than on campus GPAs. At the regional campus, online GPAs were lower, but just 2.6 vs. 2.7 for on campus (or face to face) courses.

All of the differences were small, and we see that as a good thing. What we really want is for students in both our on campus and online classes to have an equal experience.



SECTION 5

Discussion/Questions

So I wanted to be sure to leave some time for a bit of discussion and perhaps some questions.

Discussion

“Online Paradox” (Shea & Bidjerano, 2017)

- Similar findings – online classes as a predictor of degree completion
- Mixed findings – online class performance

Special Populations – Students taking online classes are more likely to be:

- Financial Aid recipients
- Female
- Have lower SAT scores, but higher first semester GPAs
- So *What?*

Future Work:

- “Tipping Point” – use proportion of classes taken online
- Online class timing – is summer significant?
- Why are students choosing online learning?



INDIANA UNIVERSITY

I’ll point out just a few things before finishing up.

There is a phrase coined called the “online paradox” that notes that students taking online classes tend to under perform at the course completion level, yet over perform in terms of degree completion. In other words, it seems that students might be willing to compromise on taking a course online- even at the risk of getting a poorer grade - if it helps them to complete their degree faster. This study confirmed the results of other research studies that found a positive impact on degree completion, but our results here were mixed with respect to course completion. At some of our campuses, students actually performed slightly better in their online classes. That deserves further study.

It’s interesting to note that students who seem to be helped most by online classes are those who are more likely to need help completing their degree in the first place, such as lower income students, first generation students, students with lower SAT scores. This is certainly worth more attention, if online classes are helping some special populations of students complete their degree.

I think the notion of the tipping point is also an important area for further study – if taking too many online classes can have a detrimental effect, what can we do to help our students who enroll as completely online students? This study did not look at the percentage of online classes taken. I’ve also been asked if I’ve looked at when

students take classes online – are online summer classes particularly beneficial, for example?

And overall, I think we make a lot of assumptions about why students choose to take their classes online. We assume it is an option of last resort – they are busy, working, older students who can't take time out to "go to college". This is, after all, why online education started in the first place. But with today's students used to and growing up with technology, could online learning become the preferred modality for some? We get our music, movies, and video games online, order groceries online, and many high schools do a lot of their assignment collection and assessment online. Are some students choosing online programs simply because they feel they learn better that way?

I seem to have more questions than answers here, but I appreciate you taking the time to listen to my study overview.

Thank You!



Sharon Wavle
swavle@iu.edu
@sharonwavle
www.linkedin.com/in/sharonwavle



Acknowledgements

- Dr. Gamze Ozogul, Assistant Professor, Instructional Systems Technology Department, School of Education, Indiana University
- Dr. Dubravka Svetina, Assistant Professor, Counseling and Educational Psychology Department, School of Education, Indiana University
- Hannah Bolte, Assistant Director, Indiana Statistical Consulting Center, Indiana University
- Dr. Chris Foley, AVP and Director, Office of Online Education, Indiana University



INDIANA UNIVERSITY

I had some help along the way with this study, so I have a few people listed here to thank.

And now if there's time, what questions or comments do you have for me?