WICHITA STATE UNIVERSITY

Academic Affairs   Office of Planning and Analysis

Comparison of Online and **Face-to-Face Teaching on Student** Performance

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Comparison of Online and Face-to-face End of Term Classes on Grade Performance

Executive Summary: While there are a few bi-variate differences among students who enroll in an online versus face-to-face classes, most differences are related to age in which online students are older. At the multivariate level in predicting class grade, an online class, net of controls (demographics, academic preparation, academic performance) has the same grade outcomes as a face-to-face class.

Course case study: To avoid fall 2020 pandemic effects, fall 2019 is chosen as the time period for analysis. Fall 2019 Biology 106 and Biology 370 are chosen for having more than 40 students per class, a broad mix of students from different college division majors, with matching face-to-face / online class delivery methods, and having the same instructor across the face-to-face/online course set of classes. Preliminary analysis (not shown) shows Biology 106 and 370 are statistically similar in population and metrics, this similarity is also confirmed in the multi-variate analysis displayed in Table 3.

Table 1: Demographics and Academics (univariate/bivariate):

Dimensions:	All	face-to-face	online		All	face-to-face	online
Demographics:							
headcounts	289	214	75				
age (mean years)	21.5	20.5a	24.4b	Origin of residence	100%	100%	100%
% female	55.0%	51.9%a	64.0%a	KS Sedgwick	49.8%	48.6%a	53.3%a
% under-rep minority*	22.8%	22.9%a	22.7%a	KS MSA wo Sedg	12.1%	11.2%a	14.7%a
% first generation	42.6%	41.6%a	45.3%a	KS (southeast exc MSA & Sedg)	3.1%	3.3%a	2.7%a
% low income*	12.8%	9.8%a	21.3%b^	KS (northeast)	10.7%	11.2%a	9.3%a
% underserved*	51.9%	50.5%a	56.0%a	KS (southwest)	4.2%	5.1%a	1.3%a
				Missouri	1.4%	1.4%a	1.3%a
Residency	100%	100%	100%	Nebraska	1.0%	0.9%a	1.3%a
resident	81.7%	80.8%a	84.0%a	Oklahoma	3.1%	3.3%a	2.7%a
non-resident	12.5%	12.1%a	13.3%a	Texas	4.2%	4.7%a	2.7%a
international	5.9%	7.0%a	2.7%a	non surrounding states	2.8%	1.4%a	6.7%b
				international	7.6%	8.9%a	4.0%a
% university housing	23.2%	29.0%a	6.7%b^				
% on financial aid	80.3%	79.0%a	84.0%a				
Academic Preparation:				**Academics con't**			
ACT*	22.70	22.78a	22.45a	College of academic major	100%	100%	100%
applicant incoming gpa	3.33	3.35a	3.27a	Business	20.1%	24.3%a	8.0%b
Incoming Score Composite*	47.96	47.3a	50.4a	Applied Studies	10.0%	7.9%a	16.0%b
Applicant's probability on probation 1st year*	6.7%	6.4%a	7.5%a	Engineering	5.5%	5.6%a	5.3%a
Academics		100%	100%	Fine Arts	5.2%	3.3%a	10.7%b
freshmen	23.5%	30.4%a	4.0%b^	Health Professions	2.4%	2.8%a	1.3%a
sophomore	31.1%	32.2%a	28.0%a	LAS Humanities	4.5%	4.7%a	4.0%a
junior	25.3%	22.9%a	32.0%a	LAS Nat Sci and Math	3.5%	4.2%a	1.3%a
senior	20.1%	14.5%a	36.0%b	LAS Social Sciences	46.4%	44.4%a	52.0%a
% new student	43.9%	52.8%a	18.7%b^	LAS Other	2.4%	2.8%a	1.3%a
enrolled hours (mean)	13.4	13.6a	13.0a	% flagged in SEAS*	15.2%	15.9%a	13.3%a
% full-time	89.3%	91.6%a	82.7%b	% with probation history	22.5%	22.9%a	21.3%a
cumulative gpa (incl trf hrs)	3.00	2.94a	3.17b	degree completion probability*	49.6%	47.4%a	55.9%b
WSU gpa (only WSU hrs)	2.92	2.86a	3.09a				
WSU earned hours	33.5	28.4a	48.1b^				

note: adjacent row cells with dissimilar subscript letters are statistically different at p<.05; ^ effect size greater than .30

Table 1 Summary: At the bivariate level, students in online classes are very similar to face-to-face students. Few demographic differences exist between face-to-face and online students, largely attributed to age in which online students are older (therefore few live in university housing) and more likely to be from low income families than face-to-face students. There are no statistically significant differences among academic preparation and the meaningful effect size differences within academics, student class and earned hours, can largely be explained by the age difference noted in demographics

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Table 2: End-of-Term Course Grade Distribution (univariate/bivariate):

Dimensions:		**All**		**face-to-face**		**online**	
Grades A thru F	headcounts	289	100%	214	100%	75	100%
	A	137	47.4%	95	44.4%a	42	56.0%a
	B	61	21.1%	48	22.4%a	13	17.3%a
	C	45	15.6%	34	15.9%a	11	14.7%a
	D	18	6.2%	15	7.0%a	3	4.0%a
	F	28	9.7%	22	10.3%a	6	8.0%a
	course gpa (mean)	2.90		2.83a			3.05a

note: adjacent row cells with dissimilar subscript letters are statistically different at p<.05; ^ effect size greater than .30

Table 2 Summary: At the bivariate level, letter grade distribution across face-to-face and online classes are statistically similar.

Table 3: OLS Regression on Biology Course Grade End-of-Term Fall 2019 (dependent variable= class grade) (multivariate)

Predictors:	unstd beta	std beta	sig.
online (0,1)	**0.11**	**0.04**	**0.416**
Demographics & Academic Preparation:			
age in years	0.02	0.09	0.062
female (0,1)	0.15	0.06	0.171
underserved (0,1)*	-0.20	-0.08	0.068
applicant incoming gpa	0.65	0.26	0.000***
Academics:			
full-time enrolled (0,1)	0.07	0.02	0.706
undecided major (0,1)	-0.22	-0.04	0.290
earned hours (student class proxy)	0.00	0.01	0.770
SEAS activity (0,1)*	-0.87	-0.24	0.000***
Probation history (0,1)	-1.47	-0.47	0.000***
Biology 370 class control	-0.07	-0.03	0.548
adj R-sq (n=289)	0.539	n=289	0.000***

*** p < 0.001; ** p < 0.01; * p < 0.05; ns non-significant

Table 3 Summary: Multivariate analysis shows that being in an online class does not have an independent effect on grade outcome net of controls (demographics, academic preparation & academic performance) demonstrating that online and face-to-face share the same outcomes in terms of grading criteria. As expected, academic preparation and academic performance have direct independent effects on grade outcome net of controls. Confirming what was stated in the case study logic, biology 106 and 370 have similar properties as noted in the non-significant biology 370 control.

* Under-represented minority includes American Indian/Alaskan Native, Black non-Hispanic, Hawaiian & Hispanic; Low income are families whose total income is 125% of poverty or less controlling for family size; Underserved includes under-represented minority, first generation and low income; ACT SAT converted to ACT scale; Incoming Score Composite is a standardized composite of ACT, high school gpa and high school percentile, converted to a centile (1-100), scores under 25 are students 3 times more likely to be on probation their 1st year; SEAS Student Early Alert System where faculty in real-time flag students for attendance, participation, assignments and exams; Degree completion probability is based on EAB's SSC scoring.

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