Online Courses at SLCC

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Introduction

Online education at Salt Lake Community College (SLCC) is administered by eLearning. Several years ago eLearning was directed to grow online education to 25% of the college's FTE. That goal has essentially been met. The time is thus ripe for a comprehensive assessment of online education at SLCC. SLCC's Office of Institutional Research and Reporting (IRR) has undertaken that assessment, and this report summarizes the results.

Major findings

- *Online has grown to 25% of FTE annually*, but the semesters differed greatly in the proportion of online taken, with summer being far higher than fall or spring.
- *Female students, white students and continuing or returning students were more likely to take online courses.*
- *Students received lower grades in online courses (approximately .25 lower on a 4 point scale)*, even after correcting for student demographics (age, gender, ethnicity, cohort year), student performance and preparation (prior GPA, prior credits), and course, instructor, and academic year. They also had higher rates of E and W grades. The difference between online and face-to-face grades, however, varied a lot by course.
- *Better students did better in online courses.* Students with a prior GPAs of 4 tended to get As whether the course was in person or online. Students with lower prior GPAs showed a gap in online compared to in-person grade performance, a gap that grew wider as prior GPA decreased.
- *The more online courses students took in a term the lower their term GPA.* (This point follows logically from the one above but was also observed in the data.)
- *Students who took ENGL 1010 online did just as well in ENGL 2010 as those who took ENGL 1010 in person, and students who took Math 1010 online did just as well in Math 1030 and 1050 as those who took MATH 1010 in person.*
- *Students who took some online courses graduated at higher rates than those who did not.* This is an instance of what is known as the "online paradox": Students get lower grades in online classes but students who have taken some online courses tend to graduate more quickly than those who take only face-to-face classes.
- *Online courses had lower rates of cancellation and higher fill rates.*
- Survey results indicated that *students overwhlemingly chose online courses for the convenience of scehduling.*

Data

The data used for this study included over 2 million enrollments from Fall 2002 to Fall 2017. Different questions required different subsets of the data.

- For performance comparisons we subsetted the data to include only courses that had both in person and online sections and that had been offered at least 50 times from AY 2009-10 to AY 2016-17. (For statistical modeling a still-smaller random sample of this dataset was used: 50,000 enrollments.)

- Graduation rates were defined for VFA students only (students who counted as new students in a given cohort year according to the definitions published by the Voluntary Framework of Accountability).
- Course demand metrics are presented only for Fall 2017.

Results

Growth and usage

Online enrollment has grown steadily through the years, to over 5000 FTE in 2016-17.

SLCC enrollment

FTE by academic year and delivery mode, 2002 – 2016
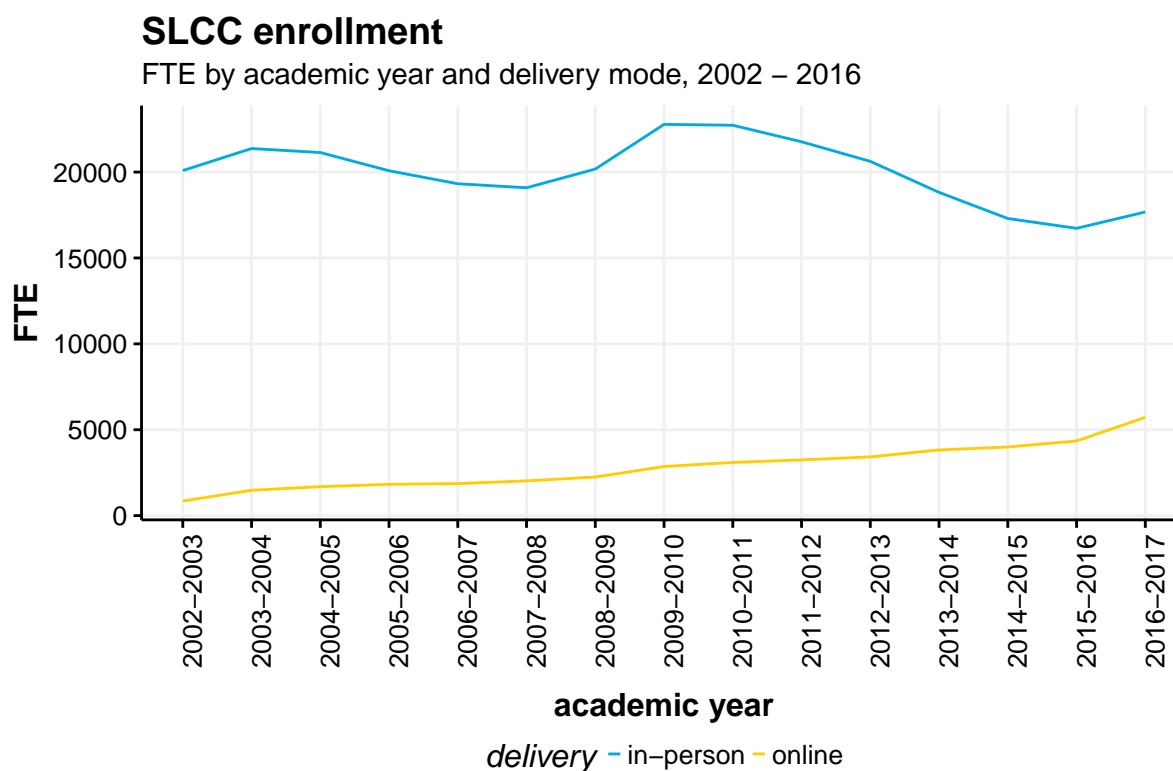

```
## # A tibble: 2,297,182 x 49
##      term    pidm course_subject course_number instructor_pidm    class
##    <int>   <dbl>          <chr>         <chr>            <dbl>    <chr>
##  1 201220 664783             LE          1020             2703   LE1020
##  2 200940 371817            CIS          1020             6285  CIS1020
##  3 200940 371817            FHS          0010           282743  FHS0010
##  4 200940 371817            FHS          0011           282743  FHS0011
##  5 201220 503200           HUMA          1100             7119 HUMA1100
##  6 201220 503200            PSY          1010             7220  PSY1010
##  7 200940 371817            FHS          2600           483161  FHS2600
##  8 200940 371817            FHS          2610           483161  FHS2610
##  9 201220 664783           HLAC          1013           532744 HLAC1013
## 10 200940 371817            FHS          2640           483161  FHS2640
## # ... with 2,297,172 more rows, and 43 more variables: crn <int>,
```

```
## #   campus_code <chr>, credits_attempted <dbl>, credits_earned <dbl>,
## #   registration_status_code <chr>, final_grade <chr>, last_name <chr>,
## #   age <dbl>, term_season <chr>, academic_year <chr>, veteran_ind <chr>,
## #   gender_code <chr>, ethnicity <chr>, native_language_code <chr>,
## #   first_generation_ind <chr>, cohort_term <int>,
## #   ever_concurrent_ind <chr>, ever_pell_eligible_ind <chr>,
## #   transfer_in_ind <chr>, high_school <chr>, prior_gpa <dbl>,
## #   prior_credits <dbl>, reg_status <chr>, pell_eligible_ind <chr>,
## #   pell_received_ind <chr>, num_grade <dbl>, online <dbl>, white <dbl>,
## #   w <dbl>, e <dbl>, cohort <int>, grad_1yr <int>, grad_2yr <int>,
## #   grad_3yr <int>, grad_4yr <int>, grad_5yr <int>, grad_6yr <int>,
## #   fall_fall <chr>, fall_spring <chr>, spring_spring <int>,
## #   spring_fall <int>, cum_gpa <dbl>, vfa <dbl>
```

In 2016-17 online FTE accounted for about 25% of the SLCC's total FTE, but the proportion of online FTE varied substantially by Fall, Spring and Summer. Note that the uptick in enrollment in 2016-17 is due to the fact that this year includes an extra term, as the definition of the academic year year changed.
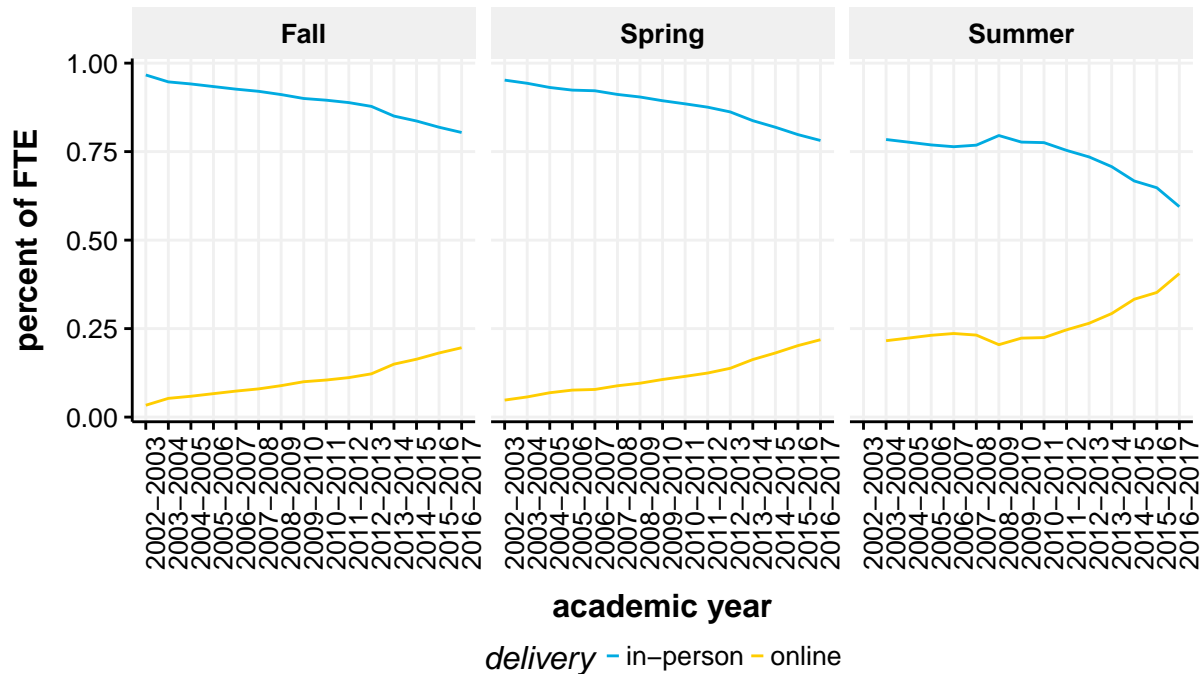
SLCC enrollment

Percent FTE by academic year and delivery mode, 2002 – 2016
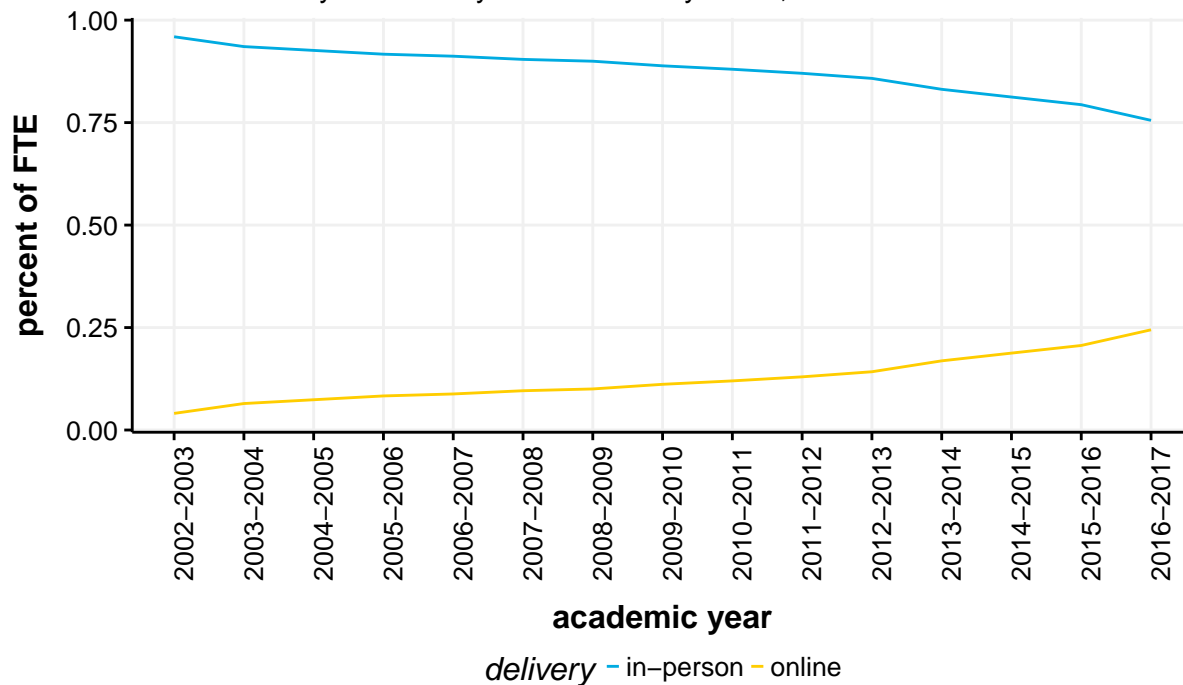
SLCC enrollment

Percent FTE by academic year, semester and delivery mode, 2002 – 2016

Here is a tabular summary of the Fall data from the above plot.

Faculty teaching online

In 2016-17 25% of faculty taught at least 1 online course and 8% of faculty (adjuncts and full-time) taught *only* online.

Departmental offerings of online courses

The distribution of online courses varied by department. The first plot below shows the top ten departments by online FTE, and the second shows the top five departments by *growth* in online FTE. Growth was measured as the weighted average of FTE percentage change over the 2001-2016 time period for departments with an average of 50 FTE or more. Recent FTE is weighted more heavily.

Table 1: SLCC Enrollment: Percent FTE by academic year, Fall semester and delivery mode, 2002 - 2016

academic_year	semester	delivery	FTE	percent_fte
2002-2003	Fall	in-person	10360.67	0.97
2002-2003	Fall	online	358.67	0.03
2003-2004	Fall	in-person	10238.50	0.95
2003-2004	Fall	online	572.13	0.05
2004-2005	Fall	in-person	10129.93	0.94
2004-2005	Fall	online	633.13	0.06
2005-2006	Fall	in-person	9730.23	0.93
2005-2006	Fall	online	689.80	0.07
2006-2007	Fall	in-person	9417.97	0.93
2006-2007	Fall	online	747.00	0.07
2007-2008	Fall	in-person	9171.70	0.92
2007-2008	Fall	online	793.27	0.08
2008-2009	Fall	in-person	9414.63	0.91
2008-2009	Fall	online	918.07	0.09
2009-2010	Fall	in-person	10696.33	0.90
2009-2010	Fall	online	1186.93	0.10
2010-2011	Fall	in-person	10621.43	0.90
2010-2011	Fall	online	1242.53	0.10
2011-2012	Fall	in-person	10117.27	0.89
2011-2012	Fall	online	1269.73	0.11
2012-2013	Fall	in-person	9686.50	0.88
2012-2013	Fall	online	1348.80	0.12
2013-2014	Fall	in-person	8784.80	0.85
2013-2014	Fall	online	1545.00	0.15
2014-2015	Fall	in-person	8182.33	0.84
2014-2015	Fall	online	1599.27	0.16
2015-2016	Fall	in-person	8057.67	0.82
2015-2016	Fall	online	1782.43	0.18
2016-2017	Fall	in-person	7819.23	0.80
2016-2017	Fall	online	1905.40	0.20

Table 2: Top 20 departments in online FTE in 2016-2017

subject	online FTE
MATH	584
ENGL	422
CIS/CSIS	373
HLTH	332
PSY	304
COM/COMM	289
CJ	284
CHEM	258
BUS	244
GEOG	209
ART	198
EDU	158
SOC	152
ECON	143
HIS/HIST	142
FHS	125
BIOL	114
MGT	113
ACCT	111
HUMA	98

Online enrollment by department

Top five largest departments in online FTE, 2002–2016
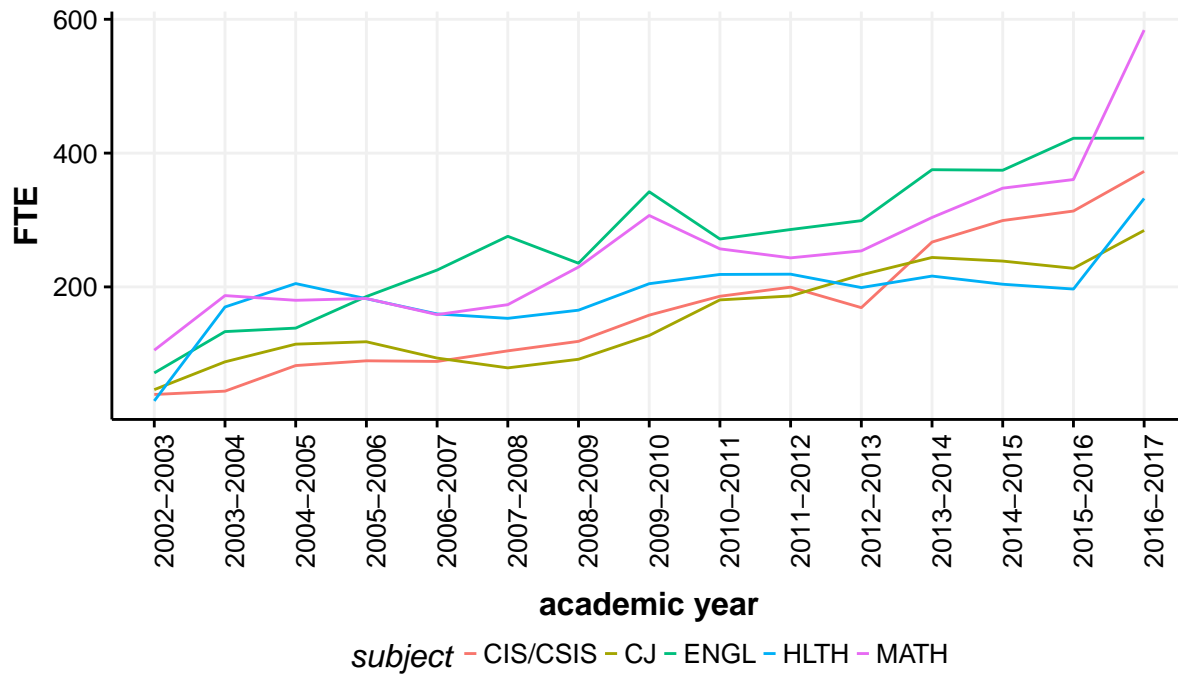
Table 3: Top 20 departments ranked by average percent growth in online FTE, 2002 - 2016

subject	change
GEOG	38.00
EDU	37.51
BUS	31.49
BIOL	20.94
HUMA	19.70
PSY	18.02
CIS/CSIS	16.98
MATH	15.90
SOC	15.84
FHS	15.45
ART	14.62
HLTH	14.61
ACCT	13.91
COM/COMM	13.67
CJ	12.29
CHEM	11.85
POLS	9.64
ENGL	9.40
HIS/HIST	8.23
PHYS	5.45

Online enrollment by department

Top five departments with largest growth in online FTE, 2002–2016
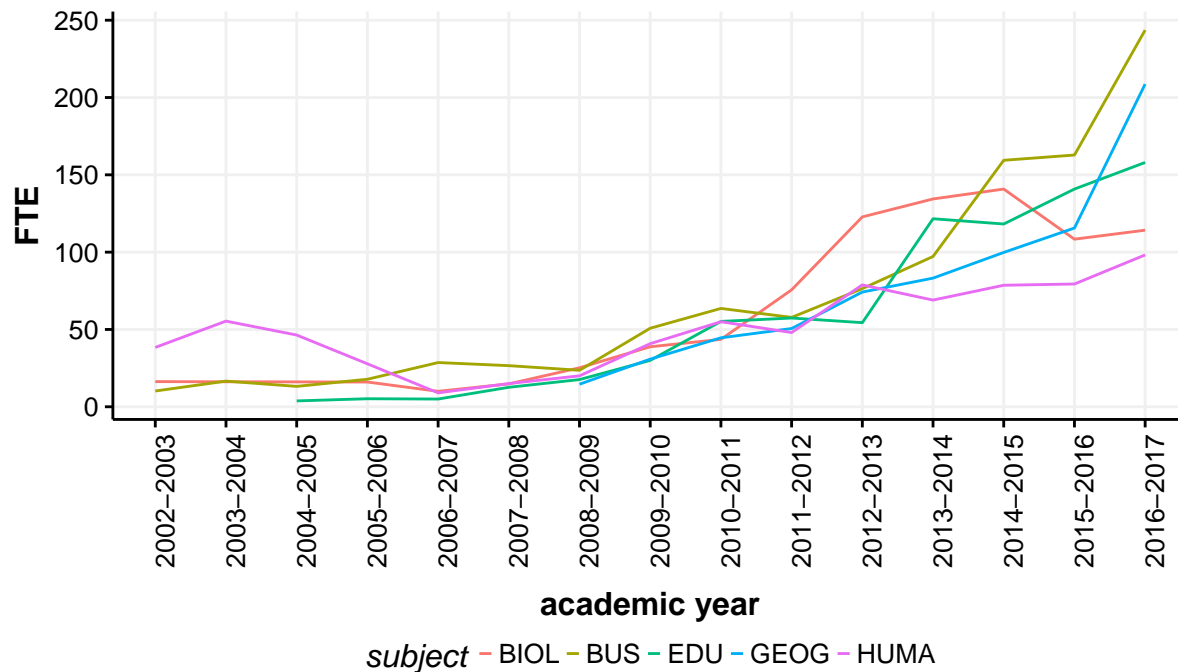
Demographics of online students

Female students, white students and continuing or returning students were more likely to take online courses. The flip side of this last point is that first term students were *less* likely to take online classes.

Specifically, since 2002:

- Among first term students 10% of enrollments were in online courses compared to 14% among continuing students.

- Among female students 15% of enrollments were in online courses compared to 11% among male students.

- Among white students 14% of enrollments were in online courses compared to 11% among non-white students.

- Online students are, on average, slightly older students in face-to-face classes (27 vs. 25.5).

Student performance

Course outcomes in online courses

Student course outcomes—grades, pass rates, W and E rates—were all lower in online courses compared to in-person courses, even after adjusting for student demographic and performance variables as well as course difficulty and instructor grading practices. In particular:

- Grades in online classes were, on average, about .24 lower than in traditional classes, on a four point scale.

- The odds of getting a W went up by about 50% in an online course compared to traditional courses. The raw difference between traditional and online W rates was about 3%.

- The odds of getting an E went up by about 55% in online courses compared to traditional courses. The raw difference between traditional and online E rates was about 6%.

- The odds of passing went down by about 30% in online courses compared to traditional courses. The raw pass rates were, on average, about 69% for both online classes and traditional classes.

Variation in online course outcomes by course

Some classes seemed to work better than others in an online format. While, as noted, average grades were lower in online classes, some were much lower: for example, online MATH 990 was estimated to be .33 below its in-person counterpart, and MATH 950 was .23 below. This result indicates that these courses may not work well in an online format. Math 990 no longer exists due to the change in mathways, but online Math 950 does; the viability of the online version might be reconsidered. These were the only two courses that had significantly worse than average performance in on online format.

**Subsequent course performance after online ENGL 1010 and MATH 1010**

Students who took ENGL 1010 online did just as well in ENGL 2010 as those who took ENGL 1010 in person, and students who took Math 1010 online did just as well in Math 1030 and 1050 as those who took MATH 1010 in person, even after adjusting for student demographics and the grading practices of instructors. For this comparison we selected only students who had taken each course just once.

Completion

Taking classes online increased the probability of students graduating within 6 years, even after correcting for age, gender, ethnicity, former concurrent, Pell, number of classes taken, and cohort year. The following plot summarizes this result.

Probability of graduating from SLCC by proportion of online co

Students who took 5 or more classes
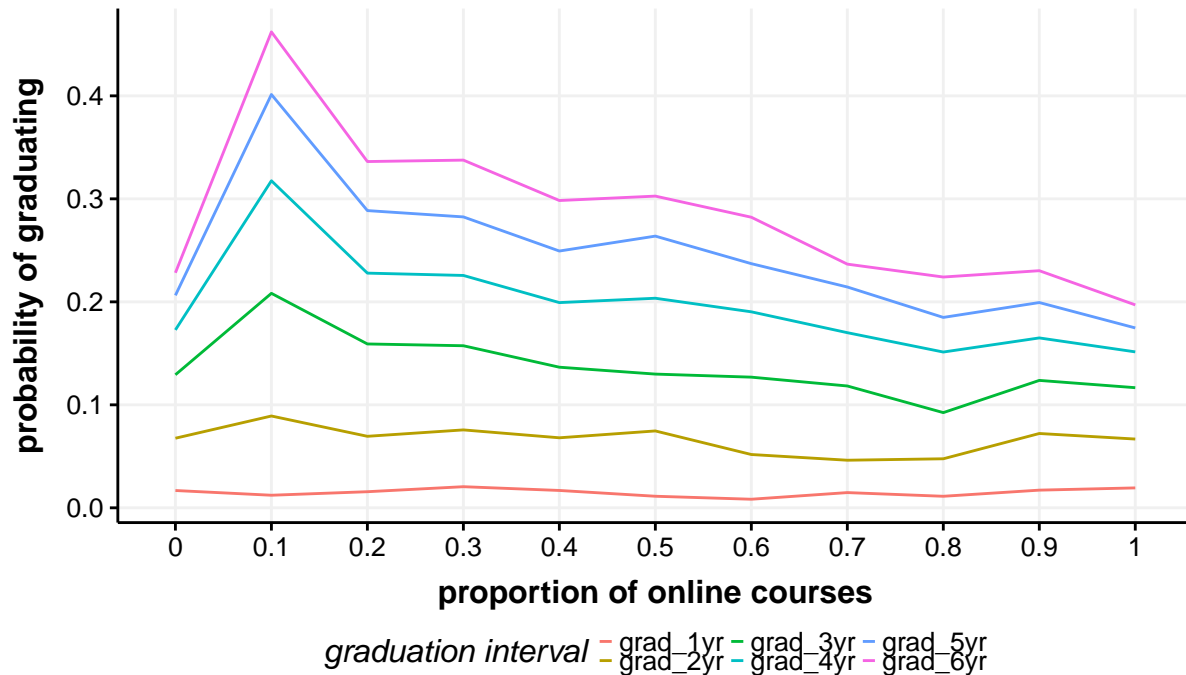
The students considered in this analysis included only those in the VFA cohorts who took 5 or more courses at SLCC. (The average number of courses after applying this filter was 16.) The same pattern is visible at nearly all of the graduation intervals: some online tends to be better than no online for graduation outcomes. The highest probability of graduating for students in this dataset was for those with a modest proportion of online courses: from .1 to .3 was the sweet spot (.4 and above was statistically indistinguishable from 0). This translates into somewhere in the neighborhood of 2 to 5 online courses for the average student who took 16 courses in all at SLCC.

Demand

Course cancellations are a way of gauging demand for courses since courses are usually cancelled due to low enrollment. The following plot compares cancellations by modality from 2010 to 2017.

SLCC course cancellations by fall term and modality

Online vs. in–person (Taylorsville, South, Jordan)
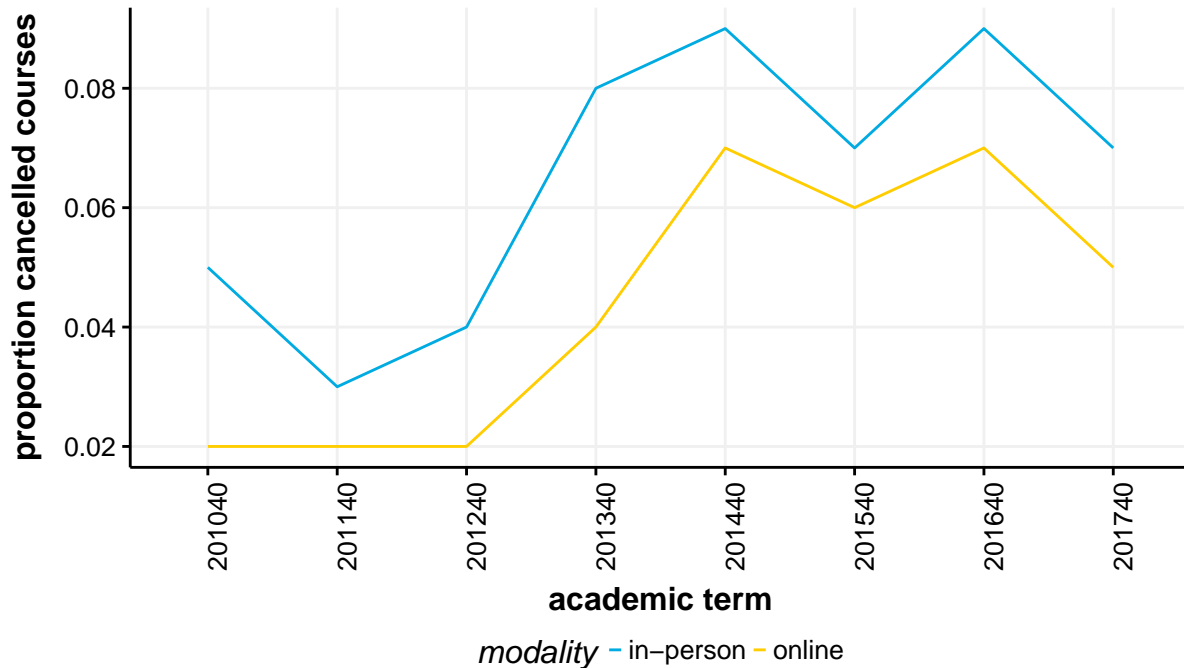
Online courses were cancelled less frequently than in-person courses, which suggests a higher demand. The y-axis, "proportion cancelled courses," is the proportion cancelled within each course modality: online and in-person. Thus, in the last 4 years in-person classes have been cancelled at rates of between 7% to 9% compared to 5% to 7% for online classes.

Another way of gauging demand, of course, is fill rate. The following plot compares average fill rates by modality from 2010 to 2017.

SLCC course fill rates by fall term and modality

Online vs. in–person (Taylorsville, South, Jordan)

modality — in–person — online
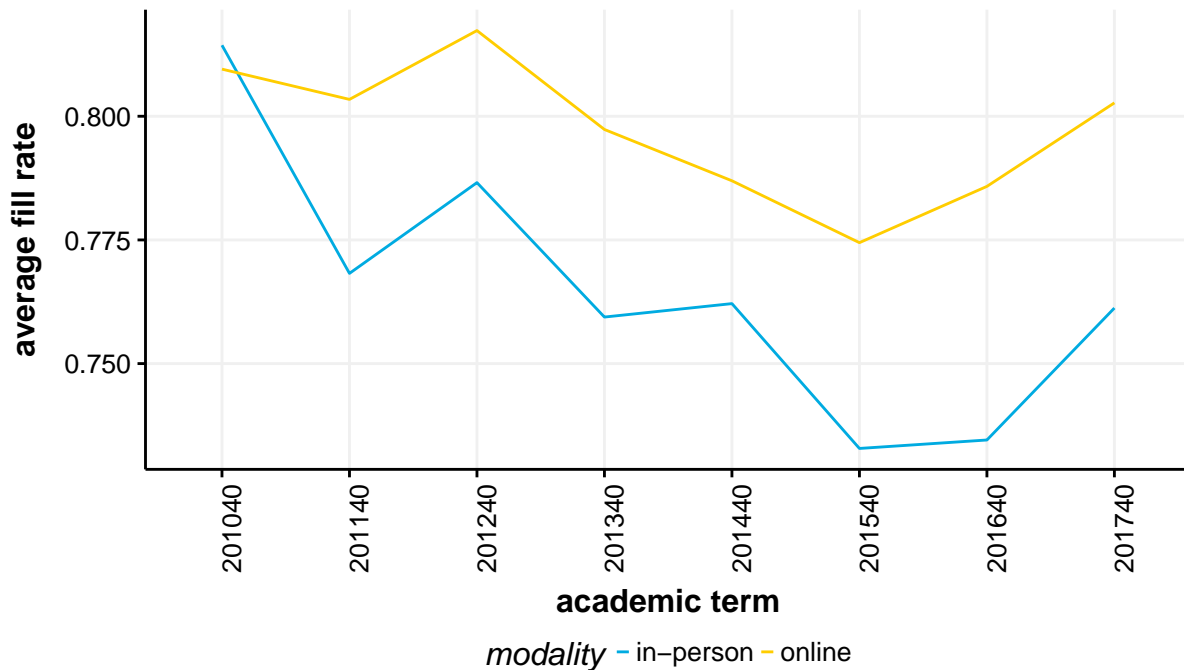
On average, online courses filled at higher rates than in-person courses. This is no doubt partly because of convenience: online courses involve students in no scheduling conflicts. Since online courses do fill at higher rates, however, fill rate is a limited metric for comparing demand *among* online courses. For this reason we created a demand metric that includes the element of time, and which summarizes *how fast* a course fills. This metric allows us to distinguish differences in demand for online courses that fill to capacity, and to thereby discern which online courses might be good candidates for increasing sections. We define demand as the average number of students added to a class up until the point at which the class either fills, or, failing that, reaches a maximum number of students.

Using this demand metric, Table 4 presents the top 15 courses offering possible opportunities for online growth. These courses filled very quickly after the start of registration during the enrollment period for Fall 2017.

Table 5 presents 15 courses that are possible candidates for elimination. These courses either did not fill or filled very slowly after the start of registration during the enrollment period for Fall 2017.

Student survey

IR conducted a survey of three groups of students enrolled in fall 2017: those taking no online courses, only online courses, and some of both. The purpose was to provide insight into students' motivation for taking, and experience of, online courses. The raw data from the survey is included in the appendix. The overwhelming pattern observed in the survey is that students tend to take online courses out of convenience: online courses can be fit in around the margins of a fixed schedule. This is probably why students who take a modest proportion of online courses are able to graduate at higher rates. Dr. Tom Meyer designed, administered and interpreted the survey.

Table 4: Top fifteen online courses by demand

Class	Sections	Average Demand
EDU1020	4	4.09
ANTH1020	3	2.45
HS2050	3	1.75
ART1010	10	1.65
CSIS1030	6	1.52
ENGL2100	6	1.48
FHS2400	3	1.47
SW1010	3	1.30
CHEM1110	4	1.22
ATMO1020	3	1.21
MATH1030	5	1.16
FHS1500	4	1.13
ACCT2010	4	1.03
CSIS1200	4	1.03
POLS1100	5	1.02

Table 5: Bottom fifteen online courses by demand

Class	Sections	Average Demand
MGT2950	3	0.10
COMM1020	4	0.17
ACCT1110	3	0.19
FASH1010	3	0.23
ECON1740	8	0.26
ECON2010	8	0.26
CSIS1020	9	0.27
MGT1600	3	0.27
ACCT2600	3	0.30
BUS1040	3	0.30
CSIS1550	3	0.30
ECON1010	3	0.31
EDU1400	3	0.31
GEOG1000	4	0.31
MATH1040	7	0.31

Discussion

Online FTE at SLCC has been growing steadily, and now accounts for about 25% of FTE annually. It appears to be the case that online could continue growing. Should it?

While students received lower grades in online courses, those who took a modest number of online courses during their SLCC career also graduated at higher rates. This is known as the "online paradox": the discrepancy, noted in numerous studies, between short-term and long-term outcomes.

- short-term: students get lower grades in online courses, but

- long-term: students who take online courses complete at higher rates (completion varies with the proportion of online taken).

Given the higher graduation rate for students taking some online courses—up to a third of their total courses—we think it makes sense for SLCC to continue growing online offerings, but to do so sensibly and strategically.

- Eliminate online courses with poor outcomes: notably MATH 950. Additionally, online course outcomes in the successor course to MATH 990—MATH 980—should be carefully evaluated. It could be that dev level math should not be offered online.

- Add online courses where there is greatest demand and remove online courses with lowest demand. Not all courses are successful online. Courses where students are voting with their feet and not enrolling should be considered for elimination.
- Adopt a measured strategy of growth. How many SLCC courses could be put online? We don't know the answer to that question. But adding online courses consistently each term in high demand domains would be a way to expand online course offerings, and investigate the limits of that demand, while also mitigating the risks associated with a large-scale expansion.

In general, online courses seem to be a positive development at SLCC, helping students fit additional courses around the margins of their traditional, in-person course work, and graduate at higher rates. There is a risk of lower course performance. However, initiatives at eLearning, such as success coaching, seem promising as ways to mitigate this risk.

Further research

Here is a list of questions that could be engaged in further research.

- Take a closer look at the demographic profile of online students, particularly in terms of performance and preparation. This is a concern because online education might work less well for less well prepared or struggling students. In the background is a question about the suitability of online education for such students, since community college students—as a generalization—tend to be less well prepared for college than their 4-year counterparts.
- Has online course redesign (through the Quality Matters framework) had a discernible impact on student outcomes?
- eLearning has created a coaching system for students taking more than 2 online courses, who are early career. Has this program worked to improve retention among online students?
- Which online courses are students most active in? Which online courses are faculty most active in? However, we cannot yet look inside Canvas courses at student/faculty engagement statistics. IR is working on obtaining and structuring this data for reporting and research.
- Do students who take more online courses transfer at higher rates? We cannot easily answer questions about transfer at this time, due to data limitations, and so cannot say whether there is a relationship between online courses taken and rates of transfer.

Appendix: survey results