What does the future of education look like?

A review of distance education and business models

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The nature of higher education is changing. Technology has enabled remote learning, allowing high quality education to be delivered at scale. While sufficiently advanced technology for this task has existed for several years, we continue to see a cultural shift toward acceptance and use of the newfound capabilities.

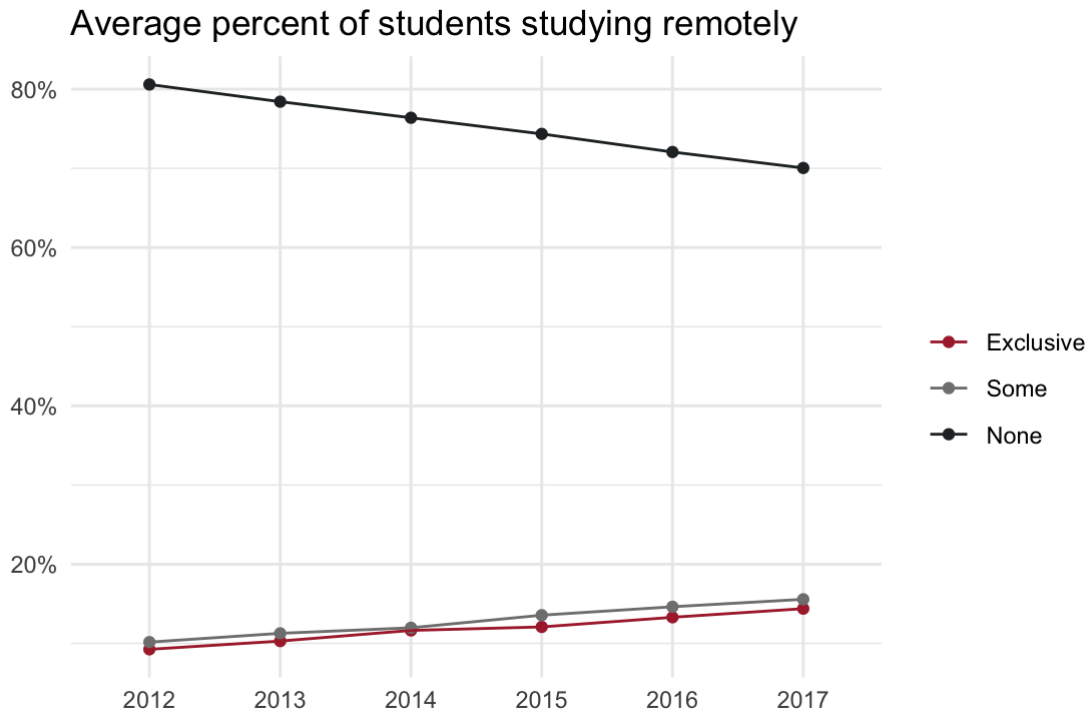
In this brief report, I take a look at trends and implications of distance education. I then build aggregate financial statements for US colleges and universities to understand the current business model of higher education. This serves as a comparison point for innovative new business models that can take advantage of the current paradigm shift.

Distance Education

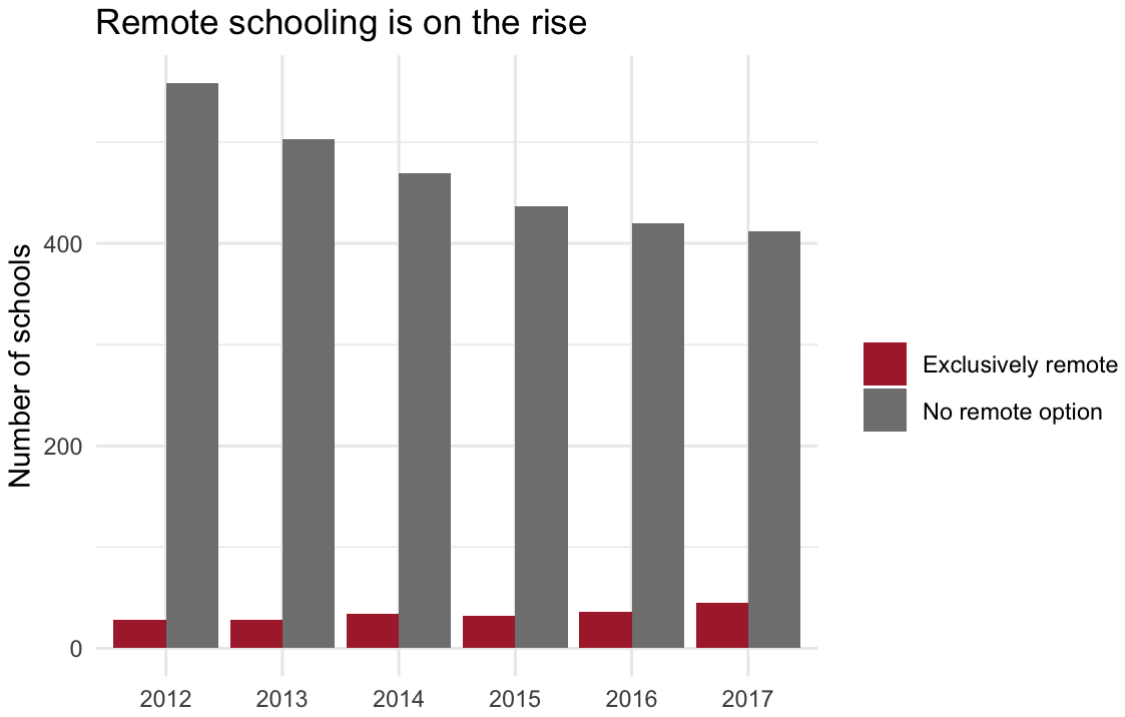
The future of learning is remote. From improvements in video chat quality/reliability to messaging to feature-rich online learning environments, distance education is already arguably a more robust way to learn.

To understand adoption trends, I gathered a dataset from the National Center of Education Statistics consisting of various descriptive qualities and outcome measures for every college and university in the United States.

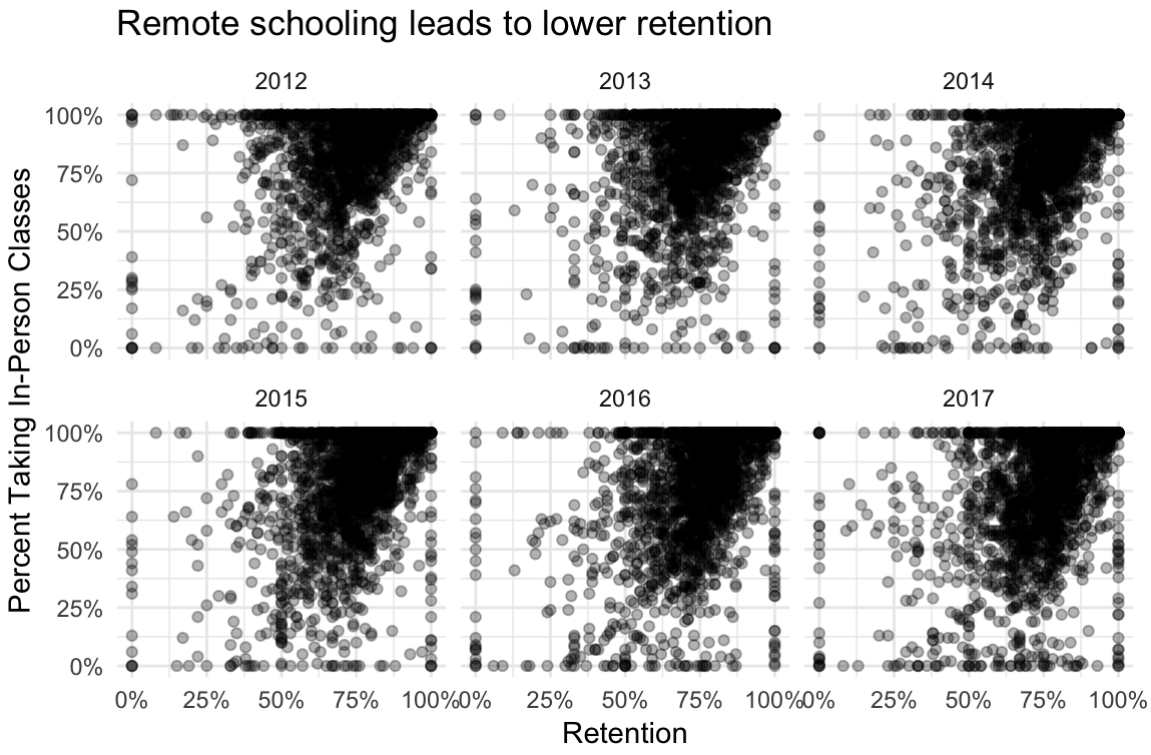
It's immediately clear that remote classwork has become more popular over time. From 2012 to 2017, the average percentage of students taking some or all remote classes has risen from 20% to 30%.



The increased uptake at schools offering a remote option has encouraged the creation of a number of remote-only institutions while reducing the number of schools that don't provide the option at all. From 2012-2017, the number of schools not offering a distance option declined from 558 to 412—a 26% drop. Meanwhile, the number of distance-only institutions has risen from 28 to 45, an increase of 61%.



I was curious if this trend would have an impact on retention rates. The charts below validate this intuition, at least historically. There is a clear negative relationship between retention rate and percentage of students taking remote coursework, and the pattern is consistent across time. My hypothesis is that switching costs are reduced when there is no tether to the physical location of the school.



This data isn't perfect, however. It shows the percentage of students for each university that take remote classes, which could introduce bias as schools with more remote classes could have confounding factors that cause them to have lower retention. In other words, this doesn't show whether the students leaving the school are the ones taking online classes or not. What we would ideally want would be data on individual students at a given university and whether there is a relationship between those taking online courses and retention.

Financial Statements

Remote learning may also call into question the business model most traditional higher education institutions rely upon. If teaching can scale without a drop in quality, new and better business models can be created to better align incentives.

Here I take a look at the makeup of current higher education business models. Using the IPEDS data, I created financial statements going back 5 years for all for-profit, private, and public schools in the US, respectively. The full financial statements can be found at: https://docs.google.com/spreadsheets/d/14IdZzKzizY5vH88ldkZKJoLvQW1fP2KE_yFkKff506Y/edit?usp=sharing (https://docs.google.com/spreadsheets/d/14IdZzKzizY5vH88ldkZKJoLvQW1fP2KE_yFkKff506Y/edit?usp=sharing)

	For Profit	Private	Public
Revenue			
tuition_and_fees	90.43%	33.18%	22.76%
gifts_grants_and_appropriations	3.66%	21.65%	43.74%
investment_income	0.22%	14.69%	2.31%
hospital_revenue	0.00%	11.67%	13.33%
other_revenue	5.70%	18.82%	17.86%
total_revenue	100.00%	100.00%	100.00%
Expenses			
instruction_salaries_and_wages	13.39%	28.06%	28.50%
research_total_amount	0.03%	9.05%	12.27%
public_service_total_amount	0.08%	0.94%	4.73%
academic_support_total_amount	9.24%	7.42%	8.13%
student_service_total_amount	18.38%	7.20%	4.68%
institutional_support_total_amount	30.31%	10.86%	7.30%
auxiliary_enterprises_total_amount	2.13%	8.04%	3.57%
net_grant_aid_to_students_total_amount	0.00%	0.42%	10.44%
hospital_services_total_amount	0.00%	10.27%	12.97%
other_expenses_total_amount	5.91%	3.97%	0.57%
income_tax_expense	4.37%	0.00%	1.80%
total_expenses_salaries_and_wages	33.52%	37.73%	42.59%
total_expenses_benefits	5.19%	10.59%	14.69%
total_expenses_depreciation	3.57%	2.44%	5.77%
total_expenses_interest	0.36%	5.50%	1.73%
total_expenses_all_other	41.63%	30.34%	30.18%
total_expenses_total_amount	87.94%	86.25%	94.96%
*comparison numbers are average percentages of revenue over the available recent history			

Comparison of common-sized income statements

A few notable observations from the financials:

- Public schools are receiving less federal aid, dropping from 10.14% of total revenue in 2012 to 8.37% in 2017. This is partially being made up for by hospital revenue, which has grown from 12.14% of total revenue to 14.41% in that same time. Public schools have also dipped into their research budgets, cutting research expenses from 13.16% of revenues to 11.66% over the 5-year time period.
- Private school incomes can vary wildly year-to-year depending on endowment investment income. In 2013/14 investment income comprised 25% of total revenues, while in 2015/16 it contributed -1.55%. This is a huge swing factor for overall net margins, which have been anywhere between +25% and -3%. This is compared to public schools and for-profit schools both with a margin variance of ~4%. Unlike public and for-profit schools, private schools typically run a net loss when looking at net income ex-investment income.
- For-profit schools earn the vast majority (90+%) of their revenue from tuition and fees, as opposed to public and private schools that have more balanced revenue sources. They also spend far less on instructor salaries and research and far more on student services and institutional support. To me, this says that public colleges and universities are optimizing for learning and prestige, while for-profit schools are optimizing for student success. For-profit schools are often looked down upon for their lack of incentive alignment (i.e. because they're profit-motivated), but perhaps conventional wisdom has that one wrong.

Next Steps

This analysis barely scratches the surface of the available data. We could change the segmentation of the aggregated financials to distance vs. in-person institutions to investigate whether the scale effects show up prominently. We could also look at which school type—for profit, private, or public—utilizes distance education most (and most effectively). We could dig deeper into the relationship between school characteristics and outcome measures for each of these schools to ultimately build a model for predicting student success.