

Connecting Higher Education to Workplace Activities and Earnings

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Institutions of Higher Education are a Major Source of Skills

Higher education institutions prepare students with the skills and abilities for the workforce

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Research Questions:

1. What specific skills do universities impart on students?
2. How do these skills affect graduate earnings?

What Specific Skills Do Universities Impart on Students?

Measure what is being taught through syllabi from hundreds of U.S. universities

- Theoretically, syllabi provide, at the class level, what skills a student should obtain from the class

Compare the learning objectives in the syllabi to O*NET's detailed work activities (DWAs)

- DWAs: Readily available, widely accepted measure of skills necessary for an occupation
- Compare using natural language processing (NLP) methods

Open Syllabus Project

- 1M+ syllabi from 800+ U.S. bachelor granting institutions
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- 2,070 activities that are performed at work – will be referring to these as “skills”

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College Scorecard

- Median earnings for the year immediately following graduation by university and field of study for 2016 and 2017 graduates

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Integrated Postsecondary Education Data System (IPEDS)

- Geography and institutional characteristics for sample selection

How to Measure the Relationship Between Syllabi and DWAs?

Approach

Word embeddings applied to both the syllabi and O*NET DWAs

- fastText – constructed from all Wikipedia pages in 2017, the UMBC webbase corpus, and the statmt.org news data

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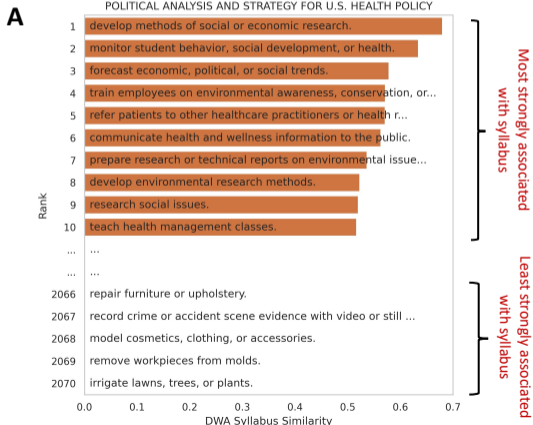
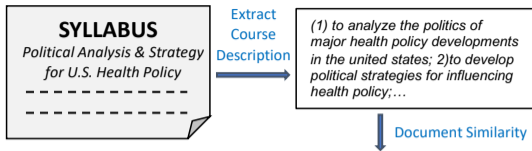
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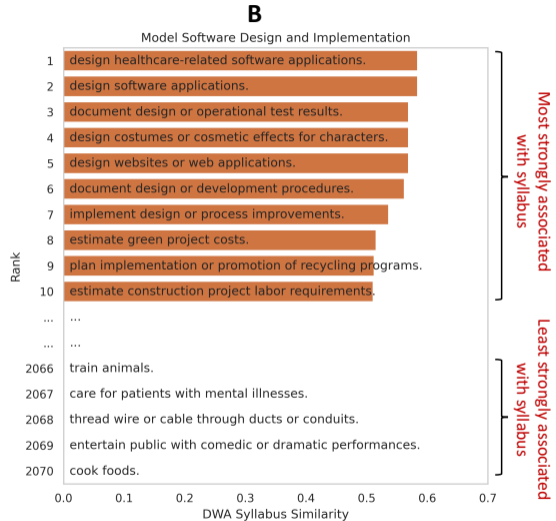
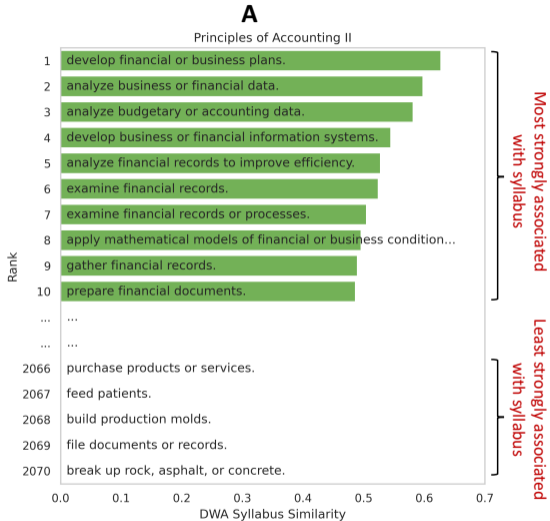
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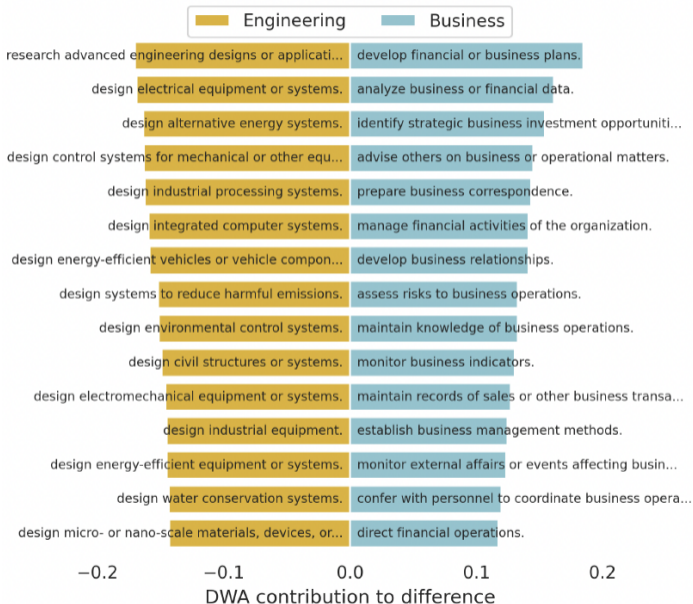
Relationship between a syllabus s and a DWA by comparing their word embedding vector representations with a soft cosine measure – between 0 and 1

- One for each DWA → 2070 dimension for each syllabus

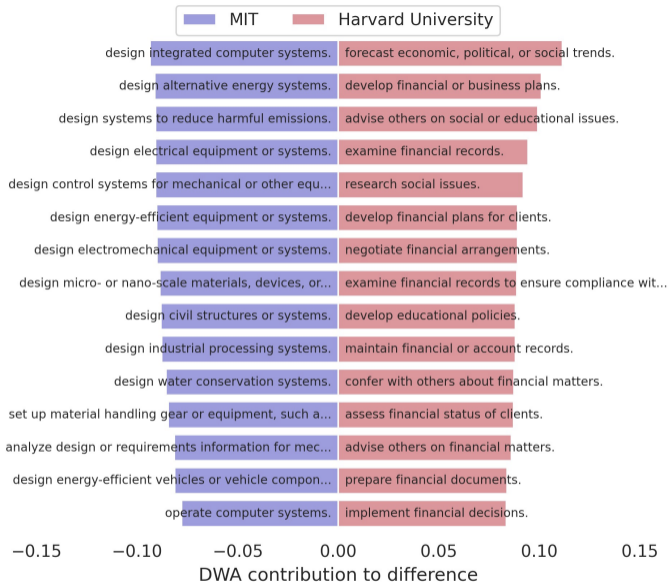


2070 x 1 vector built
based on cosine similarity
for each syllabus



A

C



Do Detected DWAs Predict Graduate Earnings?

Combine syllabus data with College Scorecard measures of median earnings the year after graduation

- Each observation is at the field of study x institution level
- Sample selection: minimum 10 syllabi
- Ideally, we would be estimating a fixed effects regression model
 - Hopefully, we will have a longer panel of earnings data in the future
- Assumption: Syllabi are representative of what students learn

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Regress DWAs from syllabi on earnings the first year following graduation

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- There are a lot of DWAs and we are concerned about overfitting

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Regress Use LASSO and cross-validation to select DWAs from syllabi and assess their effect on earnings the first year following graduation

- Penalizes having too many DWAs
- Estimates the effect out-of-sample
 - Makes it a predictive exercise

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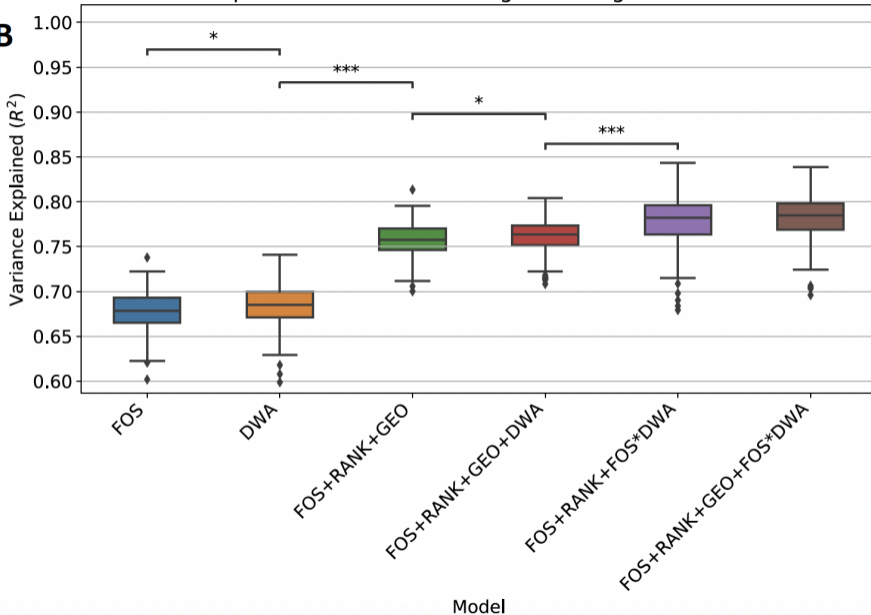
Compare this estimate to the predictive power of

- Field of Study (major)
- University rank
- Geography

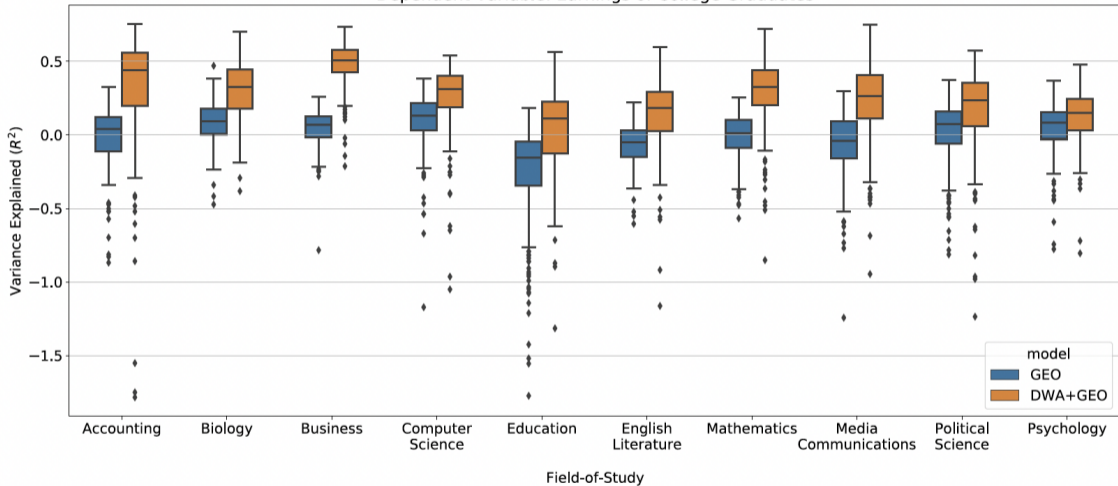
Outcome: R^2

Dependent Variable: Earnings of College Graduates

B



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Skills taught based on syllabi

- Appear to match intuitively represent differences across fields of study and universities

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Future work

- How do skills taught affect workers' career paths?
 - Resume data include field of study and graduation year, providing a basis for combining skills with eventual job outcomes

Thank You!

Any feedback is appreciated!

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