



Data Science for Education

Opportunities and Challenges

Stanford Graduate School of Education

Hello!



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Agenda

- 1** What is education data science?
- 2** What are opportunities?
- 3** What are challenges?
- 4** What is the Education Data Science MS?





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Do you think this is Education Data
Science? Why or why not?

Do you think this education data science? Why or why not?



Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app



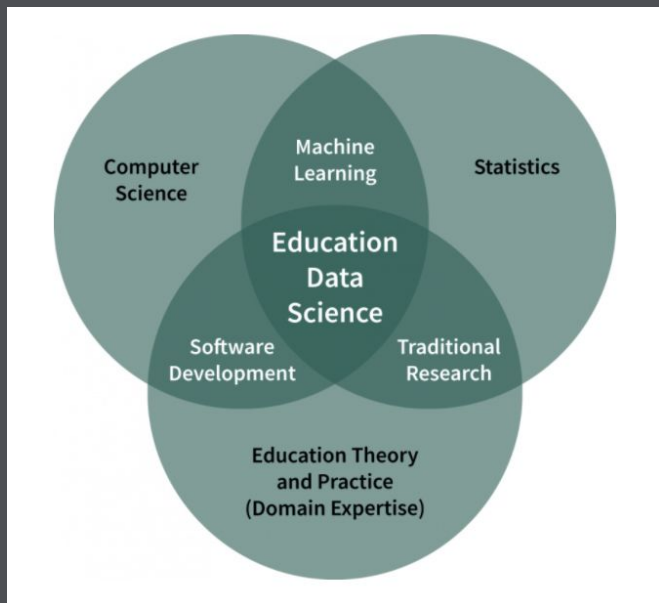
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What are some opportunities and challenges that you can identify?

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What is education data science?



Data 

New types of data 

Computational power 

What do education data scientists do?

Roles

- Building systems to get data to the right people
- Measuring effectiveness of educational programs or products
- Looking for patterns in education data
- Improving quantitative methods

Examples

- Clickstream data from virtual learning environments
- Aggregate school and state data to show inequities
- Social media data to parse text and study social networks

Estrellado, R. A., Freer, E. A., Mostipak, J., Rosenberg, J. M., & Velásquez, I. C. (2020). *Data science in education using R*. Routledge.

What are opportunities and challenges?

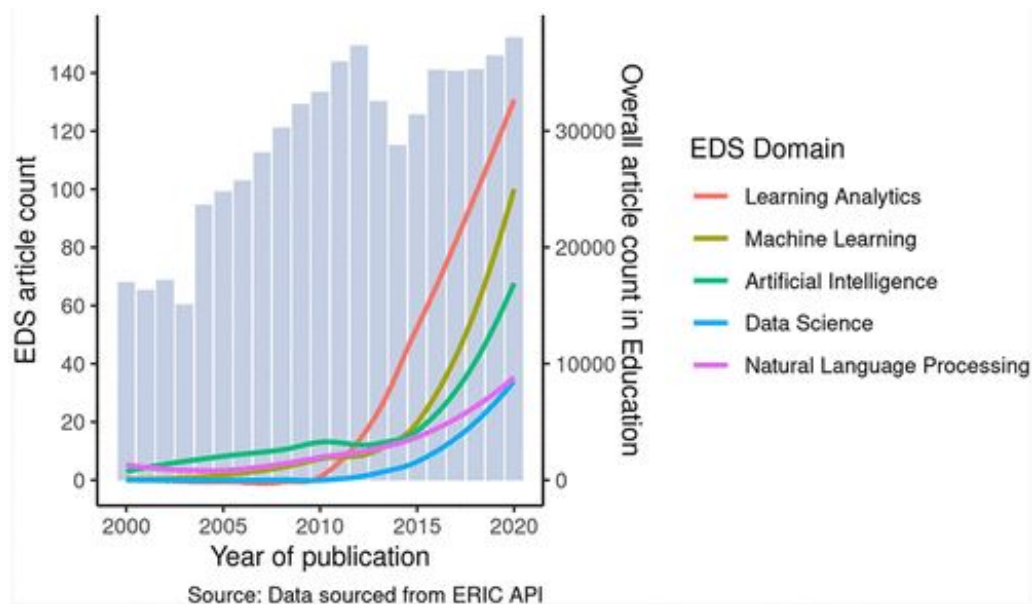
Opportunities

- Understand teaching and learning
- Augment teaching
- Augment learning
- Decrease disparities between students

Challenges

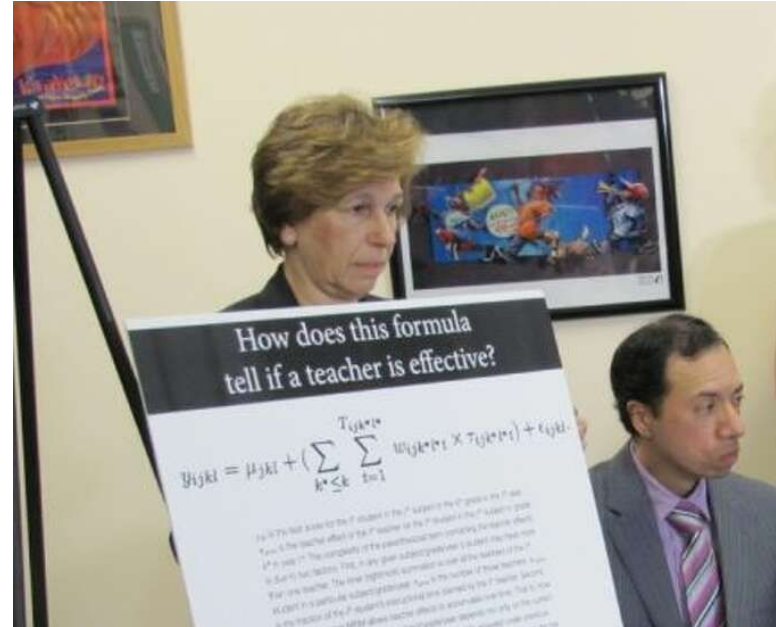
- Privacy
- Accuracy
- Generalizability
- Consequences
- Understanding

EDS is growing in education research



[McFarland, D. A., Khanna, S., Domingue, B. W., & Pardos, Z. A. \(2021\). Education Data Science: Past, Present, Future. AERA Open.](#)

Does data science help learners and educators?



Why the EDS MS program?

- Big, unstructured, rich, (unruly) data
- Variety of computational methods
- Ethical questions



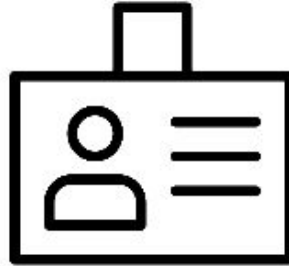
*Need for **education** researchers and professionals with **data science skills***

What does the EDS program look like?

Coursework



Internship



Capstone Project



Coursework

	Year One				Year Two		
	FALL	WINTER	SPRING	SUMMER	FALL	WINTER	SPRING
Required Courses	Education Data Science Seminar (3 units)			Internship (1)	Capstone Project Seminar (3)		
	Statistics (6-10)						
	EDS Data Processing (1-4)	EDS Data Analysis (1-4)					
Education Foundation	Education course (9-15)					Elective (2-10)	Elective (2-10)
Data Science Specialization			Data Science Specialization (1-5)		Data Science Specialization (1-5)	Data Science Specialization (1-5)	Data Science Specialization (1-5)
			Data Science Specialization (1-5)		Data Science Specialization (1-5)		

Example

EDUC 423A: Introduction to Education Data Science: Data Processing

EDUC 347: The Economics of Higher Education

CS 106A: Programming Methodology

EDUC 278: Introduction to Program Evaluation

SOC 379: Methods for Network Analysis

PSYCH 290: Natural Language Processing in the Social Sciences

ECON 293: Machine Learning and Causal Inference

Internships



Capstone Projects

Topics (examples)

- Efficacy research of equitable (online) curricula
- Text analysis of classroom discourse
- Early warning system of high-school drop-out
- New geospatial measure of school segregation

Data sources

- Faculty
- External organizations
- APIs



<https://ed.stanford.edu/eds/symposium>

Studying Data Science at GSE

- World-class faculty
- Small class sizes
- Cohort model
- Student Guild
- Network of education professionals
- Access to data
- Computing resources
- Campus-wide Data Science ecosystem
- Collective focus on education and learning



Prospective Career Opportunities for EDS alumni

EDS alumni bring advanced data analytical skills and a deep understanding of learning
Organizations in need of EDS professionals:

- Education research firms
- School districts and systems
- University systems
- State and federal governmental education agencies
- Ministries of education in other countries
- Education technology companies and educational for-profit ventures



Questions!

Improving lives **through learning**

Explore more: Education data science

- McFarland, D. A., Khanna, S., Domingue, B. W., & Pardos, Z. A. (2021). Education Data Science: Past, Present, Future. *AERA Open*, 7, 23328584211052055.
- Singer, J. D. (2019). Reshaping the arc of quantitative educational research: It's time to broaden our paradigm. *Journal of Research on Educational Effectiveness*, 12(4), 570-593.
- Estrellado, R. A., Freer, E. A., Mostipak, J., Rosenberg, J. M., & Velásquez, I. C. (2020). *Data science in education using R*. Routledge.
- <https://www.eddatadoneright.com/>
- <https://dataqualitycampaign.org/>

And of course: <https://ed.stanford.edu/eds>

Explore More: Learning Data Science

- <https://statquest.org/>
- Baumer, B. S., Kaplan, D. T., & Horton, N. J. (2017). *Texts in Statistical Science: Modern Data Science with R*. Chapman and Hall/CRC.
- D'ignazio, C., & Klein, L. F. (2020). *Data feminism*. MIT press.
- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An introduction to statistical learning* (Vol. 112, p. 18). New York: springer.