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Personal Statement (474/500 words)

How your educational and work experiences up to this point have prepared you for doing research on this dissertation topic

What career path you hope to pursue after completing your dissertation.

My longstanding involvement in program evaluation and my graduate education have given me breadth and depth in research methodology and has spurred my interest in leveraging cutting-edge deep learning techniques for data analysis generally and for causal inference specifically.

During my four years as a statistical analyst at the UC Davis Center for Educational Analytics (CEA), I worked on projects that spanned developing randomized control trials for transfer student success to evaluating the effectiveness of a general chemistry open education resource.

We routinely employed techniques such as matching and propensity score analysis to estimate program impacts based on observational data. Throughout this time, I was struck by how much data was available on students and programs and how little was effectively utilized to inform campus-wide policies. For example, instructors in large STEM courses piloted innovative teaching techniques in only some sections but didn't leverage student data in other sections to gauge their new pedagogy's effectiveness.

During my master's training in research methodology at the University of Pittsburgh, I had the opportunity to apply my growing methodological skills to college access issues. I was a graduate student researcher on a national field experiment focused on increasing college-going among high school students through text-based counseling. Using a new machine-learning algorithm, I analyzed millions of text message records to identify prototypical trajectories of student engagement in the intervention. I have honed my analytic skills in my Ph.D. studies through courses in statistics, computational social science, education policy, and machine learning. This has led to various publications ranging from a descriptive analysis of a federal financial aid policy to evaluating a growth-mindset intervention via causal-mediation analysis. I have applied my knowledge by teaching multiple graduate courses on research methodology.

In many ways, my doctoral research's focus returns me to the types of analyses we often relied on at the CEA. Specifically, my dissertation will focus on 1) merging recent advances in deep learning with propensity score-based methods for causal inference; 2) extending this method to causal mediation analysis allowing researchers to uncover the black box underlying treatment effects; and 3) applying these methods to evaluating the causal impact of a college access intervention explicitly implemented in response to the current Covid-19 pandemic. The methods that I develop will be broadly applicable, and the substantive focus of my application could not be timelier.

After completing my dissertation, I plan to pursue a faculty position within a school of education and to conduct research at the nexus of data science and education. I will undertake projects that contribute to the methodological literature and education policy, centering social justice at every opportunity. My substantive domain will be college access, particularly barriers faced by historically marginalized students like myself. My research agenda will provide analytic tools and policy research that contributes to remedying what Gloria Ladson-Billings cogently coined, "our country's education debt."

Short Answers (each 100 words)

- Most scholars now believe...(94/100)

... in the importance of rigorous causal inference. However, as a field, we are still working towards adopting new methodologies complementary to causal methods. Work outside of education has developed sophisticated methods, such as deep learning, which revolutionize our ability to capture intricate patterns in high-dimensional data. Such rich data is increasingly available in education through large-scale administrative datasets.

Yet, these methods have not trickled into education program evaluation. For example, in other disciplines, these methods have been implemented to uncover a deforestation policy's effects using satellite imaging. Education research will need to embrace these new quantitative tools as we gain access to rich, complex datasets that require advanced computational methods.

- As a result of my study... (89/100)

... the field will gain a new method using a contemporary deep learning technique applied to a widely used causal method in educational evaluation. I will illustrate how my method can be used in various educational contexts to evaluate interventions in which randomization is not feasible. Additionally, I will extend my approach to causal mediation analysis, allowing researchers to uncover the black box underlying treatment effects. Finally, I will develop statistical software that will allow applied researchers to implement my methods conveniently in their own work.