

**Analyzing factors that influence post-graduate decision**

**CS 4501: Entrepreneurial Applications of Computer Science**

A Thesis Prospectus  
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By  
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## **Introduction**

Computer Science (CS) as a field has been in the center of attention since we have reached the 21st century. Recent trends, such as student count and program size, suggest that universities are experiencing a boom in the student population that are choosing CS as part of their collegiate education. With our reliance on the internet and computers have slowly transformed our world to be more reliant on software, it's easy to see why students are making this decision. The general consensus is that CS majors will be needed in abundance to support the growth in technology and software. However, how universities prepare students, whether it be through graduate school programs or a more diverse curriculum within the CS department, raises an interesting question.

Criticism regarding universities have been brought up as expectations for what these degrees will do have changed. Data collected from major universities suggest that university education has led to positive growth, both personally and intellectually. (Pew Research Center, 2016) However, the following cannot be said for whether or not these programs better prepare students to enter the job market and be competitive. Factors, such as an increased necessity for prior knowledge in employment skills and better access to relevant knowledge, have left CS students questioning their decision. Current CS departments, including the one at the University of Virginia (UVA) place a focus on theory, rather than practicality, that creates a gap between what is taught and what is needed in the workplace (Forbes, 2020).

The argument can be made regarding whether or not it is the university's duty to better prepare students for the workforce. However, if universities are truly the leaders in education, research and technology, it would be fair to assume that universities would adjust their programs to better prepare students for whatever decision they may make post graduation. This point is

supported by the current changes occurring within the CS department at UVA, with massive restructuring to the curriculum taking place to better suit the current CS student population in an attempt to solve some of these issues (Sherriff et al., 2023). All of this culminates into trying to understand the factors that influence students during their undergraduate careers at universities and how this may impact their careers later in life.

The technical report will aim to focus on students transitioning from university undergraduate programs to the workforce. This report will dive into a proposal on how to enhance the knowledge base of CS students by offering a course that teaches relevant business knowledge in the field of computer science companies. The following proposal will describe a basic model of how companies are built from the ground up as start ups, and progress deeper into the inner workings of what fuels the decision making for software development companies.

Meanwhile, the Science, Technology and Society (STS) project will focus on students transitioning from undergraduate to graduate programs. An important part of this is understanding what factors play a decisive role in determining why certain students make the decision to continue their academic studies through graduate school programs. Data regarding these students will be collected through interviews and surveys conducted with a group of postgraduate CS students to understand the different factors that influenced their decision. Each candidate will share their changes in thoughts between why they initially decided to pursue further studies and their reasoning to continue to this day. Both biological and environmental factors, such as sex and socioeconomic background, will be noted and put into consideration when mapping out and understanding how big of a role each of these played in each candidate's decision making process.

## **CS 4501: Entrepreneurial Applications of Computer Science**

With a wealth of experienced faculty and a variety of different research and educational opportunities, UVA's CS department is highly regarded amongst the most recognized within the nation. However, one aspect that the university needs to shed light on is the lack of supplementary courses that prepares students better when joining the workforce. One aspect that we aim to address is the dissonance between the information taught at the undergraduate level and the knowledge needed to better adjust when entering the workforce. Within UVA, major departments are separated into different departments, or schools, that allow faculty to focus on their particular field. This results in course offerings within the department to be more informative and cover a wider range of topics that would be relatively more difficult to achieve without this system. However, this can also be limiting to students when trying to learn different information, specifically crucial business operation knowledge and skills for CS students..

The proposed course, CS 4501: Entrepreneurial Applications of Computer Science, aims to provide support on this end by introducing students with a different set of skills. The course would consist of three major components: 1) a semester-long project; 2) lectures regarding other tools businesses use to help software applications succeed; and 3) guest speakers invited to talk about their experiences with entrepreneurial endeavors. Research suggests that three key components are necessary when designing an effective, learning-centered course design: learning outcomes, learning activities and learning assessments (Whetten, 2007). Each portion of the course will aim to serve each necessary component in order to fulfill the role of an effective course. The lectures will serve as a means to fulfill important learning outcomes, which ultimately culminate in an end result of better preparing students for the workforce. The semester-long project will serve as a supplementary component that will help faculty assess the

understanding of students regarding the topics taught during lectures, but also provide a chance for students to interact with software they will create from a perspective that they otherwise would not have in ordinary courses. Some may argue whether the CS department is obligated to cover these topics. However, if the university is truly there to better support students in their future endeavors, it can also be argued that, at the very least, having a course offering like this accessible to all CS students within the departments is necessary.

After administering the following proposed course, students will be surveyed regarding each major component that comprise the course in order to understand which parts of the course were effective and which sections may need adjustments. Factors, such as satisfaction, effectiveness and time spent on course, that are documented during course evaluation will be collected to ensure that there is worth in this course when compared to other courses existing in the current curriculum. In theory, this should result in a course that will serve to build upon knowledge that CS students can apply in the real world, but also create an overall satisfying learning experience that would be hard to come about in most CS programs. Another point to consider is whether other programs, such as the tech entrepreneurship minor at UVA, would be a satisfactory alternative to this course. While the argument can be made either way, partaking in programs, such as the tech entrepreneurship minor, would limit the students' ability to choose other courses they wish to take. The goal of this course is to provide students with different options when it comes to learning about this crucial subject matter. Rather than replacing what previously existing solutions would accomplish, it provides students with an alternative choice that is much more focused in the realm of computer science and software development, while being much shorter than the credit requirements needed for such minors.

### **Analyzing factors that influence post-graduate decision**

Computer Science as a field of study is currently at an interesting state. Overall enrollment rates, program and faculty size in computer science programs at most major universities have continued to show an upward trend, with data showing that the number of CS majors has more than tripled between 2006 and 2016 (Camp et al., 2017). While this phenomenon can be attributed to different factors, one aspect that many people like to focus on is the resulting economics following their choice to pursue a career related to computer science. With an average of 20-30% projected growth rate and higher than average median salary (Krutsch, 2021), along with a much higher return on investment of 71% on earning a computer science related college degree (Bouchrika, 2023), it's fairly easy to see why students make the decision to pursue computer science as a major during their undergraduate career.

In the pursuit of that idea however, an interesting point of why certain students decide to pursue postgraduate studies in the computer science field poses an interesting question. Unlike the US general education system where students are required to complete elementary and secondary school, higher education programs, such as university and graduate school, are not part of those requirements that students need to fulfill. One point of view that people like to focus on is the economics behind earning an undergraduate degree. Evidence shows that having a college degree are half as likely to be unemployed and earn more on average over their lifetime (Abel et al., 2019). However, this same argument is difficult to apply for postgraduate degrees. On average, a Master's degree in Science costs around \$67,590, with factors such as the school itself, the program enrolled in and the residency of the students themselves causing variation in that number (Hanson, 2023). As a recently graduated undergraduate student, affording a Masters degree can be a difficult process with statistics showing that overall loan balances, resulting from

a Masters degree, has increased roughly 60% between the 1999-2000 to 2015-16 school years (NCES, 2018).

However, economics cannot be the only factor to be considered when trying to understand this complex situation. A recent talk with professors and researchers at universities asked common reasons why students choose to continue their education in post-graduate studies. While there were a variety of different answers, the main factors boiled down to three major train of thoughts: The opportunity to continue with the college experience, to gain more knowledge within the field or to open up more potential job opportunities (Kowarski, 2023). Studies also suggest that the following decision can be somewhat directly correlated to their experiences during introductory CS courses, with lower self-confidence and self-efficacy being major factors that ultimately fuels or deters students from pursuing graduate school (Wofford, 2021). With such varying answers, it is difficult to pinpoint what factors may play a larger role during this decision making process.

The following STS topic seeks to understand the inner workings of what fuels this decision. Interviews will be conducted with CS postgraduate students at UVA to understand their personal experiences and what influenced them into making their decision to pursue postgraduate studies, rather than working in the industry. A similar recent study completed in China collected data from 15 universities across the nation in order to understand the impacts that societal norms of China have on college students, specifically women, when trying to make a decision after they graduate from their undergraduate institutions. Further investigation of the data collected shows that while women represent the majority within China's university institutions, women are also more unlikely to pursue further education, due to a lack of representation in science, technology, engineering and mathematics (STEM) fields and parenthood timing (Yao, 2023).

Thus, our aim is to conduct a similar research on CS graduate students, particularly from the University of Virginia, in order to see if there is anything specific amongst the graduate students at UVA that may differentiate them from other universities and potentially draw correlations between the decision to pursue further education and student's personal background. Accounts and information will be collected through a series of interviews with UVA CS graduate students. Important information, such as biological factors, environmental background and social upbringing, will also be documented using surveys as these factors play a major role in influencing one's thought process. The hope is that the following collection of individual accounts and data, along with our understanding of actor-network theory, will allow us to come to an understanding of what factors play a larger role in influencing graduate students, particularly UVA graduate students, to choose to continue with education in graduate school.

Further discussion with those that enter the industry immediately after their undergraduate careers may be necessary in order to understand the differences in thought process in order to craft a discussion behind why individuals make certain decisions in regards to post-undergraduate opportunities.

## **Conclusion**

This prospectus aims to outline a project proposal for a CS course at UVA to enhance student's understanding of factors that influence decision making in organizations, as well as understand the reasoning behind why certain students make the decision to further their education. Both the technical report and STS project delves deeper into understanding the decision making process of different aspects that make up the CS field, one being industry and the other being academia. The technical report will focus on providing an outline for a potential



solution in providing CS students with means to gain knowledge regarding corporations. The goal is to help these students better understand the state in which these organizations operate in and how different factors may influence decisions that impact the software development cycle. Meanwhile, the STS project focuses on understanding the anomaly that is CS students that pursue further education after graduation, rather than diving into the industry. The aim of the overall research topic is to help us understand what knowledge and choices better suit CS students in setting them up for success.

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