Undergraduate Thesis Prospectus

The Current State and Future Needs of Systems Engineering: A Proposed Curriculum
(technical research project in Systems Engineering)

The Promotion of Online Education in U.S. Universities
(sociotechnical research project)

by

Mia Elizabeth Varghese

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technical project collaborators:

TJ Gwilliam
Salem Keleta
Maggie Salomonsky
Vinay Vangala

Mia Elizabeth Varghese

Technical advisor: William T. Scherer, Department of Systems Engineering

STS advisor: Peter Norton, Department of Engineering and Society

General Research Problem

How may online higher education programs approximate conventional programs in educational quality?

The concept of online education as a substitute to the traditional in-person model has sparked debate across the country. Digital learning has been around for years, however the usage has especially spiked after the COVID-19 pandemic, with the online platform Zoom experiencing sales rising more than 40% after the start of the pandemic (BBC, 2021). Proponents for virtual learning have emphasized how remote work allows for flexibility, saving nearly "2.28 million jobs" as well as nearly $832 billion in revenue for the U.S. (Ittelson, 2022). However, conflicting views reside within some students, with a study from the New York Times stating that many students face challenges from "struggling to understand assignments and getting easily distracted to not having reliable internet" (Learning Network, 2020). Some teachers need support in "adapting curriculum, in motivating students, in accelerating them academically, and in assessing their learning" (Schwartz, 2022). Are online programs' advantages in flexibility and cost worth their quality constraints? Will students who take online courses retain the same information as students who do not? It is important to consider educational quality over business benefits in this new and widely accepted platform of education.

An Accelerated Master's in Systems Engineering for the University of Virginia

How may the University of Virginia's Accelerated Master's in Systems Engineering Program best be redesigned for online instruction?

In my capstone project, I plan to design a new Accelerated Master's in Systems Engineering Program for UVA which starts in May 2023. This will be a one-year hybrid

program where classes are held on weekends in an office in Arlington, Virginia. To do this, my teammates (TJ Gwilliam, Vinay Vangala, Maggie Salomonosky, and Salem Keleta) and I will be working with Matt Burkett, our client (and future Professor of some of the program courses), as well as Professor William Scherer in the Systems Engineering Department to propose course sequences, marketing ideas, and admission requirements for the new rollout. The main goal is to have a successful, new program by May of 2023 for students to enroll in, which is important as a Master's in Systems Engineering at UVA can distinguish the college as competitive and flexible in its offerings to students. As seen on the current program's website, admissions "will relaunch in 2023" and shift to a "hybrid format of online and in-person learning" (UVA SEAS, 2022). Due to the long-standing success of the Accelerated Master's Programs within UVA for over 20 years, it is important to constantly grow and improve the programs to keep the UVA brand and prestige.

Currently, UVA has a M.S. in Business Analytics (MSBA) Program, which launched only a month ago, and it focuses on a similar one-year hybrid model with a location in the DC Metro area. On the program's website, it is stated that the purpose of the program is to equip students with knowledge on "emerging data analysis techniques within a business context" (UVA MSBA, 2022). While this program focuses on a data-centric approach to solving business problems, it is geared towards those with less technical experience. Although it is more technical than UVA's current MBA Program within the Darden School of Business, it still lacks the analytical expertise needed for those who specifically want to be leaders within the technology field. This is where my capstone project can bridge the gap – by providing an analytical, project-based degree focused on helping technology professionals specifically become leaders in their field.

To start the plan, my team and I conducted market analysis on similar programs, from nearby colleges such as George Mason, John Hopkins, Virginia Tech, and many more. This way we could gauge the competitive landscape for the program, since it will be located in the Northern Virginia area as many of these other colleges are. From there, we focused on analyzing scheduling and course data from other colleges to create our own unique model, within the budget we designed as well. We also plan to create various marketing efforts and redesign the website with details of the new program. If successful, students will be able to enroll in the Accelerated Master's Program in May 2023, and a certain threshold of students must be met to breakeven on costs for the program. With these efforts, the program will hopefully be successful for years to come and need little remodeling in the future.

A Desire for Digital: The Promotion of Online Learning

In the U.S., how are proponents of distance learning in higher education advancing their agendas?

Over the last two decades, online learning has grown episodically due to factors, such as a "greater choice of programs and coursework; higher levels of comfort with the technology; and the inherent convenience and flexibility that online programs offer" (Hill & Serdyukov, 2007). However, the biggest spike in popularity is due to the recent COVID-19 pandemic that affected in-person education around the country. Now, as learning models have evolved drastically towards the digital space, many organizations are advocating for continuing in that direction. How are these supporters of online learning advancing their agendas?

Researchers have investigated the perceptions of the effectiveness of online learning in comparison to in-person learning. For example, Roubides (2003) found that, among students, "E-

learning is the most favorite mode of distance education today" while Manegre and Sabiri (2020)

found that teachers "generally feel they get to know the students better in virtual classrooms than

in other teaching environments". However, Bailey and Jaggar (2010) conducted a meta-analysis

to find that there is no evidence that "fully online delivery produces superior learning outcomes

for typical college courses". A study in a computer-based English as a Second Language (ESL)

writing course in a conservative Christian college furthered this by stating that technologies are

"almost always implemented in a top-down fashion, which leaves in place traditional teacher-

centered instruction" (Warschauer 1998). There are many studies focusing on learning with

technology as only a supplement, not a replacement.

Major participants in the digital learning space include the United States Distance

Learning Association (USDLA), an organization dedicated to the "development of distance

learning for education" (USDLA, 2020). They achieve this through focusing on the legislation

impacting the distance learning community. They launched the Distance Learning Accreditation

Board (DLAB), claiming that technology implementation into the classroom needs a "*systematic*

approach to improvement" since distance learning has come "from the fringe to the forefront of

education" (Flores, 2004).

Also included is the Online Learning Consortium Institute (OLC), a professional

leadership organization which "integrates online education into the mainstream of higher

education" (OLC, nd). They mainly serve their purpose through educating instructors on how to

adapt to online learning platforms, which is showcased through various programs and resources

on their website. Additionally, they released a report, "Stronger Together", to take actionable

steps to reduce inequities in higher education and were supported by numerous HBCUs as well

as the National Accrediting Commission for Diversity and Inclusion and National Coalition of 100 Black Women.

Another participant to note is Desire2Learn (D2L), which offers "flexible and robust learning solutions" for online learning through the technology it produces (D2L, 2022). Some of this technology includes Brightspace, Wave, and Content Solutions, which are all online course platforms for different needs, whether educational or business-related. The organization has faced backlash in some of its work – with an article from The Spectator, the University of Wisconsin's Student Newspaper, stating that one of its online platforms makes a "three-credit class feel like a five-credit class" (Fay, 2012). However, the organization continues to grow with over "500 universities and colleges already using Brightspace" (D2L, 2022).

There are participants against the concept of distance learning as a future, and they are voicing their concerns. One in particular is a group of students from York University who "came together as a virtual group to discuss what makes in-person classes unique and different from online-learning" (Ong, 2020). This group of students came up with reasons why in-person education is unique, specifically that it enhances focus, community, motivation, and routine. This organization of students is striving to push in-person education back into the forefront of learning.

Lastly, the American Association of University Professors (AAUP) is an organization of higher education professionals who strives to get educators acclimated to changing educational environments. While the organization isn't inherently against the concept of online education, it presents its concerns with the new movement. The AAUP released a statement on online and distance education, stating that it "invariably presents administrative, technical, and legal problems usually not encountered in traditional classroom settings" and raises "basic questions

about standards for teaching and scholarship" (AAUP, 2016). Although the organization cautions against relying too much on technology, it provides resources for educators to navigate the challenges of teaching in a digital environment.

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