Thesis Project Portfolio

The Current State and Future Needs of Systems Engineering Education: A Proposed Curriculum

(Technical Report)

The Impact of Online Learning on College Students

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

On March 11, 2020, the World Health Organization declared Coronavirus a global pandemic (World Health Organization, 2020). Shortly after, we witnessed the whole world change as staying at home, lockdowns, social distancing, isolation, and quarantine were imposed to control the spread of the infection. One of the most crucial parts of society, the education system, was directly impacted as they began to close in-person classes and transition to virtual learning. As schools remained virtual throughout the pandemic era, the idea of online learning especially in higher education became more feasible. While online learning has been prominent in some graduate programs, it was not widely incorporated into colleges and universities. However, as technology continues to advance, it's predicted that online learning will become more prominent in higher education. Given that colleges are shifting from the traditional in person teaching format to online learning, it is crucial to understand the impact of online learning on college students.

The STS research topic focuses on assessing the impact online learning has on college students through literature reviews and frameworks. The literature review assesses the positive and negative impacts of online learning, the impact on students academic performance, and barriers that college students are facing making it challenging for them to succeed in online learning. Additionally, the Social Construction of Technology(SCOT) framework is used to examine how online learning has affected different relevant social groups (students, professors, and administration). By understanding this impact we are able to assess the successes/failures of online learning as well as improvements that need to be made. Using the framework I was able to determine the most critical needs in online learning for students, professors, and administrators. Many of the challenges faced were due to the lack of technological skills and inadequate

planning due to the quick transition to emergency online learning during the pandemic. These challenges can be improved with increased support from the IT department and adequate preparation. Understanding and catering to the needs of students, professors and administrators will help facilitate the planning process to ensure a successful online educational system. Lastly, technological innovations that can be incorporated into online learning are assessed as they can contribute to the improvement of online learning.

The technical project consisted of designing the new Accelerated Masters Program in Systems Engineering at the Northern Virginia location. To develop the program, my team along with our advisors engaged in a variety of tasks such as extensive research on competing programs, budgeting, curriculum design, class structure and marketing for student acquisition. The extensive research done helped us determine important factors that need to be included in the curriculum in order to distinguish our program from our competitors. This masters program was designed to align with the needs of the future systems engineering education and meet the demands of the developing workforce. The program is designed with a focus on enhancing skills needed in the emerging industry and workforce so that students can become technology leaders in their field. The technical research paper stands as our basis for the creation of the masters program. Systems engineering continues to evolve as the complexity of systems and the development of technology continues to increase. The technical paper first identifies the current state of systems engineering by recognizing systems engineering roles, responsibilities and expectations. It explores the future of systems education focusing on content, content delivery, cost, and student cooperation. Additionally, it discusses the changes needed in the systems education so that students acquire skill sets and knowledge that will be critical to the evolving industry. By assessing the evolution of systems engineering and systems engineering education,

we created a masters program that would support the development of systems engineering and align with the needs of the workforce.