Network Science Education for the Next Generation

Background

With the Army’s focus on network-centric warfare, it is imperative that the next generation of Army leaders have a technical knowledge of network science and the networks they use every day to become better decision makers. The Network Science Center (NSC) brings together service members, civilians, and cadets to research and develop significant contributions in the study of network representations of physical, biological, and social phenomena leading to explicative and predictive models. NSC is a thought-leader in this emerging discipline and can leverage that expertise to provide relevant educational and research opportunities for current and future Army leaders.

Networks are pervasive across all aspects of life: biological, physical, economic, and social and our society continues to become ever more connected through the use of social media tools that allow for instantaneous and targeted communication and better situation awareness. This inherently interdisciplinary and cross-generational nature makes network science the perfect tool to engage students in STEM fields. The intent of this project is to expand the study of network science at all levels of education.

Objectives

In anticipation of preparing the next generation of network scientists and officers capable of operating effectively in a complex, network-centric environment; as well as addressing the urgent needs to improve STEM education, the Network Science Center will develop, teach, and assess network science educational modules which support student research and aim to motivate student learning in STEM fields. By drawing on the knowledge, ideas, and creativity of the NSC faculty, the Network Science Center is in a unique position to develop curricula to produce a new generation of students and leaders with the ability to think in terms of networks and complex systems.

Additionally, the project will collect, integrate and analyze data on network education and its impact on decision making (DM). This data will be used to develop a quantitative model of a dynamic DM network. Developing a cognitive/educational impact model for network based decision making would be substantial contribution in decision sciences.
**Approach**

With the ultimate goals of expanding the awareness and understanding of the emerging field of network science (NS) and utilizing predominant use of social networks to teach abstract concepts and re-engage students in STEM fields, the project will:

1. Determine student and teacher baseline knowledge of network science principles and terminology.
2. Develop a series of network science modules and assessments utilizing free and available software which tie properties and applications of network science to concepts already taught as part of the current core curriculum.
3. Compile and catalog resources to teach and engage students and teachers.
4. Establish network science elements that would provide strategic benefits for the military’s current and future decision makers with improved situational awareness and foundational understanding of network science. Then develop network science modules which target these specific areas of decision making. This would represent the first attempt to link network specific training with effective decision making.
5. Work with faculty to implement the modules and evaluate their effectiveness.

**Impact**

This research will be the foundational tool to equip a new generation of leaders with a working knowledge of the networks they use every day and the understanding of how this knowledge can be used to solve interdisciplinary problems. Along with bringing this broader awareness of the field by using network science lessons as applications to teach core curriculum, it also has the capability to re-engage the next generation in the STEM fields.

Network science lessons correlating to decision making skills will enable military leaders to make better decisions in environments where the use of networks and social media tools allow for instantaneous and targeted communication. In addition, the conclusions drawn from the decision making research may offer insights into other areas of network science training and decision-making to further our understanding of sequential decision making. In the future, this work might be coordinated between service academies, drawing upon the resources and expertise of other researchers and having a broader impact on all branches of the military.