

## CYBERSECURITY EXPERIENTIAL LEARNING EDUCATION

**Shalini Kesar, Ashely Tyler**

Southern Utah University, (USA)

Kesar@suu.edu; ashleytyler@suu.edu

### EXTENDED ABSTRACT

This paper is part of the collaborative on-going research between the author and co-author (PI of an educational grant in the Forest Service division). The initial research began a few years ago with the idea of developing or modifying the design curriculum to provide an educational experiential learning using the right ethical practices of National Society for Experiential Education (NSEE, 2009) framework (Kesar and Pollard, 2020, 2021). It started with focusing on undergraduate students in STEM field (computer science, information systems, cybersecurity and technology). As the research has progressed, the context has shifted to online graduate students in cybersecurity. This paper sheds light on how author collaborated with the co-author to design the class and how it was beneficial in creating team building project in cybersecurity as well as adding value to the collaborator.

Founded in 1971, the Society for Experiential Education (SEE) is the premier, nonprofit membership organization composed of a global community of researchers, practitioners, and thought leaders who are committed to the establishment of effective methods of experiential education as fundamental to the development of the knowledge, skills and attitudes that empower learners and promote the common good (NSEE, 2023). The framework consists of eight principals linked with good practices. In this paper, the project conducted with graduate cybersecurity students is discussed that was designed by the instructor (author) as part of an experiential learning activity. The goal was that this experience and the learning will add value to the fundamental of creating an online cybersecurity training as part of a group project. While the authors (instructor and client) collaborated and designed the training, it is hoped that all the parties are empowered to use the right principals mentioned in the framework. Consequently, ensuring both the quality of the learning experience and of the work produced by the students, and in building an assignment that underlie the pedagogy of experiential education. Although the NSEE framework was used, the main thought process was very different when designing the project. It considered the framework as well the research regarding the team projects and importance of training in cybersecurity. This is because this style of pedagogy will provide an experiential learning education environment, which will better prepare the student to face challenges in the ever-evolving cybersecurity field. While developing the team project curriculum, various studies were taken into account, including author's previous published research. Best standards and Guiding Principles of Ethical Practice by the National Society for Experiential Education (NSEE) were used. The NSEE Guiding Principles of Ethical Practices are used to develop the pedagogy to teach ethics and professional as part of an experiential education. This paper describes how the how instructor included ethics and professionalism in this team project. The eight principals are exemplified below.

**Intention:** In this principal, all parties must outline a clear vision on the reason which this particular experience is chosen and the why experience is the chosen approach to the learning. It is expected that the assignment linked with cybersecurity training for the online graduate students is to allow them to share knowledge with their team members as well as demonstrate, apply or result from it. The principal of Intention in general focuses on the purposefulness that enables experience to become knowledge and, as such, is deeper than the goals, objectives, and activities that define the experience.

**Preparedness and Planning:** The main objective of this principal was to ensure the students have a group project experience and each member of the project has a successful experience from the earliest stages of the experience/program. This aligned with the identified intentions, adhering to them as goals, objectives and activities designed as part of the project. As mentioned earlier, the project was to design a cybersecurity training for employees, who are part of the Forest Service division. The project involved students and provided them flexible enough to allow for adaptations as the experience of creating training planning unfolds.

**Authenticity:** In this principal it is important the students have an experience that is in a real-world context. In this project, the students developed a training program for a small set of employees of the Forest service with the intent the training useful and meaningful as part of the employees' annual required training. The three groups comprising of three to four members developed training programs on different cybersecurity topics including Phishing, Social Engineering, and Passwords.

**Reflection:** NSEE refers to Reflection as an element that transforms simple experience to a learning experience. With this principal in mind, the assignment was designed so that knowledge can be discovered and internalized as the students research, test assumptions and hypotheses about the outcomes of decisions and actions taken in context of cybersecurity training. It also gave them an opportunity to weigh as well as reflect the outcomes against past learning and future implications. This reflective process in the assignment comprised of a report writing and presentations at conference and as a final exam. This, according to NSEE, is integral to all phases of experiential learning, from identifying intention and choosing the experience, to considering preconceptions and observing how they change as the experience unfolds.

**Orientation and Training:** The students were required to discuss and show the training they had developed to the client. This not prepared them work as a team but also experience and learn about each other and about the context and environment in which the training will be presented to the small division of the Forest Services.

**Monitoring and Continuous Improvement:** In this principal, it is important to note that any learning activity designed should be dynamic and changing. In addition, the instructor (author) outlined the assignment with the student learning outcomes that included reports and presentation that provided the richest learning possible to the students. Students also had to write a self-reflection on their own progress as well as their team members. This feedback process relates to learning intentions and quality objectives. Consequently, this allows the structure of the experience to be sufficiently flexible that permitted changes in response to what that feedback suggests. Subsequently, monitoring and continuous improvement represent the formative evaluation tools.

**Assessment and Evaluation:** Assessment is a means to develop and refine the specific learning goals and quality objectives identified during the planning stages of the experience. Whereas evaluation provides comprehensive data about the experiential process as a whole and whether

it has met the intentions which suggested it. Based on the NSEE definitions, the outcomes and processes of assignments of the project included systematically reports, presentations, and self-reflection that were linked with the initial intentions.

Acknowledgment: At the end of the project, the assignment also included that students recognize the lessons learned, recognition of learning and impact occur throughout the experience by way of the reflective and monitoring processes and through reporting, documentation and sharing of accomplishments. All the students, instructor and client's experience were noted and included in the lessons learned and reflection in the recognition of progress and accomplishment. Given that this was part of an on-going research where other projects used NSEE's framework, the lessons learned from culminating documentation and the impact of these projects were part of designing as well as helped to provide closure and sustainability to the experience.

**KEYWORDS:** NSEE, Cybersecurity, Training, Pedagogy, online graduate class.

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