WiP: A Qualitative Study of Service-Learning Oriented Cybersecurity Clinics' Processes and Challenges

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1 Introduction

Cybersecurity is critical for all organizations [5, 11] and at-risk users [2] as they protect sensitive data, provide essential services, or face challenging threats (e.g., intimate partner violence, journalists in repressive environments). Unfortunately, security expertise is often out of their reach [4, 15].

To provide access to other historically inaccessible resources, such as legal or medical services, universities have established clinics to serve at-risk populations [3, 22]. Recently, this clinic model has been applied to cybersecurity. This includes Cornell Tech's Clinic to End Tech Abuse (CETA) [23] and UC Berkeley's Citizen Clinic [6], established in 2016 and 2018, respectively. Services tend to be catered to clients' needs, but can range from performing risk assessments to penetration testing to writing incidence response plans. Currently, there are at least 15 such clinics.

Prior work has discussed CETA's development [10] and considered the challenges of building trusting relationships with their clients [24]. However, CETA is staffed by volunteer professionals and graduate students, whereas many newer clinics are staffed by students still developing security skills. These student-staffed clinics therefore offer the promise of benefiting students and clients. Clients receive free or low cost cybersecurity assistance, which would otherwise be inaccessible, and students gain practical cybersecurity, program management, and leadership experience [1, 7, 8, 14, 17]. This form of education is referred to as service learning [12].

However, there is significant effort necessary to establish this ideal mutually beneficial clinic relationship. The first consideration is technical. Clinics need to develop sufficient cybersecurity expertise in their students, create robust procedures for collecting information and requirements from clients, and establish practices for securely managing students' access to client systems and data.

Equally important to the service-learning model, is preventing paternalism, entrenching existing inequalities [20, pg. 13]. Without addressing root cause problems and carefully considering inherent power dynamics (i.e., clinics control resources given to clients), service learning can become a "glorified welfare system" [21, pg. 607] or temporary band-aid [16,20,25], only truly benefiting the students. Civics scholars have proposed critical service learning, which emphasizes social justice and systemic change [18]. Critical Service learning reorients service learning around three tenants:

- **Social Change Orientation**: Addressing social issues' root causes, not just symptoms.

- **Building Authentic Relationships**: Creating genuine, reciprocal partnerships between students and clients.

- **Redistributing Power**: Power and decision-making are shared equitably between students and clients.

To understand how clinics consider these challenges of service learning and whether they adopt this critical lens, we conduct interviews with clinic leadership, student clinicians, and clients. We ask each group questions about their clinic experiences and perceptions of the clinic. Each stakeholder group brings unique perspectives and insights, together providing a complete view of clinics. In this paper, we describe our interview structure, as well as preliminary results from an initial round of interviews with members of each stakeholder group from the Tufts University Clinic.

2 Methodology

We conduct semi-structured interviews ranging from 45 to 60 minutes. Before the interview, participants are informed of study procedures and how we protect their data and asked to provide informed consent. We also inform participants that they can end their participation at any time. This study has been approved by the Tufts Institutional Review Board (IRB).

All interviews ask about participants' clinic experience and whether they faced technical challenges or struggled to develop respectful relationships with other stakeholders. Additional questions are tailored to stakeholder groups. Below, we describe each stakeholder group and group-specific questions.

Clinic Leadership. These individuals manage client relationships, train students and provide oversight, and manage other clinic logistics. We ask leadership to discuss their motivations and rationale for the clinic's structure. We also ask how they develop curriculum, including how they help students communicate with clients and consider power dynamics; and how they work with clients before and after engagements.

Clients. Organizations or individuals receiving clinic services. We ask clients to discuss why they participated in the clinic and how they communicate their organization's mission and needs. We also ask them to describe their cybersecurity background before the clinic and what process they followed for getting students access to their technology.

Student Clinicians. Participate in clinic programs and provide direct clients support. We ask students to describe any pre-engagement preparation completed through the clinic, their degree, or otherwise. We also ask them to reflect on their understanding of the client's needs and mission.

3 Case Study: Tufts Cybersecurity Clinic

As a first step in our study, we conducted interviews with members of all three stakeholder groups associated with the Tufts Cybersecurity Clinic. The Tufts clinic is a new addition to the Consoritum of Cybersecurity Clinics. It follows a similar curriculum structure, requiring student clinicians to complete training before participating, including instruction on client interaction methods, legal guidelines, and a guided discussion of the students' personal identities' impact on their service. Students conduct security assessments and provide custom solutions, such as WordPress scans and password manager migrations. The clinic's day-to-day operations are primarily managed by one lead faculty member, with curriculum support and clinic design consultation from other Tufts faculty. Clinic-client relationships are first established by clinic leadership, but project requirements are determined through consulation between the client and students. This was the first semester of the Tufts Cybersecurity Clinic and it served three clients, each supported by 5-7 student clinicians.

As the Tufts clinic is in its infancy, we expect some challenges we identify are more due to growing pains that will be resolved through iteration and experience. However, these initial challenges are still important to capture as many new cybersecurity clinics are expected to be established in the future and they will likely face similar challenges [9].

Tufts also offers a unique case study due to its rich service-learning culture. Tufts' Tisch College of Civic Life is the only university-wide college focused on promoting civic and political engagement [19]. Tisch College runs several service-learning programs, has a history of engagement with non-profits, and is a leader in research about service learning. Further, the Tufts CS department also has history in service learning through its JumboCode program, which develops custom software for non-profits [13]. Many students in the cybersecurity clinic also had prior experience with service learning through JumboCode. Because of this existing service-learning culture, we expect Tufts clinic leadership and student clinicians to be aware of the ideas of critical service learning. In the remainder of this section, we discuss themes in the responses from Tufts Cybersecurity Clinic stakeholders.

Clients know they need cybersecurity support, but are not sure what kind. Throughout our client interviews, they clearly recognized their need for cybersecurity. All clients identified sensitivities in their data or operations, but did not have the time or expertise to solve this problem. They desired to bring in outside partners to resolve these issues and believed the clinic could be useful. Interestingly, multiple clients mentioned there are plenty of free services available to non-profits, but they are unable to determine without significant effort what is applicable to their workflow and circumstances. This demonstrates a clear benefit of cybersecurity clinics to triage these services. In fact, we observed one student group do just that, identifying a secure cloud service with a free license for non-profits, and migrating the client's data.

Most issues are logistical. Throughout our discussions, it was clear the primary challenge limiting the clinic's ability to provide effective services was not technical, but instead logistical. Students and clients cited delays setting up data access and service contracts and challenges scheduling meetings between the busy student teams and clients. We expect this is influenced by the Tufts clinic's youth, as more mature clinics likely have structures to simplify logistics, but it remains an important problem for new clinics worth further investigation to see how it continues to impact clinic operations over time.

Critical service learning is often a secondary concern. Tufts is an institution steeped in service learning and this was evident in our clinic leadership interview. They discussed critical service learning's tenants organically when describing the clinic's mission and focus and included lectures on this topic in the initial curriculum. However, in our interviews with students, it appears these approaches were not put into practice in most cases. Students regularly engaged with clients, but mostly to get technical information (e.g., what technology do they use), not to understand clients' missions and primary goals to determine the best fitting technological solutions. One counter example was a team with a student steeped in critical service learning's concepts due to prior work at Tisch. They described building a relationships with the client to develop a deeper mission understanding. This team was able to provide sustainable solutions allowing the client to not only be more secure, but be more efficient in their technology use.

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