

# Lost Potential: Improving the UVA CS Technical Report for Career-Ready Outcomes

CS4991 Capstone Report, 2025

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## ABSTRACT

The current structure of the UVA Computer Science technical report assignment, which serves as the culmination of a student's learning, fails to provide many students with a meaningful showcase of their skills, resulting in projects that lack substantial value for job applications and career opportunities. I propose a revised framework that emphasizes industry-relevant project design and increased staff oversight, incorporating real-world applications and collaboration with external stakeholders. The proposed approach involves coordinating the UVA CS department to match student groups with non-profits and small businesses, allowing them to apply their technical skills to address real organizational needs. This initiative aims to reintroduce excitement and a sense of purpose among CS students, fostering engagement and motivation in their technical report projects. By implementing this approach, UVA can better serve its CS students by providing opportunities to create impactful, career-ready projects that reflect their learning while contributing to the Charlottesville community. Future work should explore partnerships with industry professionals to provide mentorship and ensure continued alignment with evolving job market demands.

## 1. INTRODUCTION

If you were hiring a recent software engineering graduate, which would impress

you more: a technical report proposing curriculum changes, or one detailing a six-month project solving a real-world problem for a local non-profit? To me, the answer is obvious—I would want to hire someone who, in their last year at college, demonstrated their skill in a tangible way.

At UVA, CS students choose between two technical report paths: an experience-based report, typically drawn from internships, personal projects, or non-profit work, and a conceptual proposal, often suggesting a CS-related solution or evaluating departmental practices. While this approach leaves the door open for the most ambitious students to create a meaningful project related to their applied CS work, most lack the guidance needed to navigate this process. For those students, the CS department's lack of structure and support surrounding the technical report often results in projects falling short of the students' potential or even worse, failing to utilize or showcase their technical skill. The absence of university assigned mentors leaves many CS students completely isolated when it comes to figuring out their technical report. In contrast, students in other UVA engineering programs benefit from structured, long-term projects with departmental oversight, ensuring both quality outcomes and valuable learning experiences.

In past years, CS students had a semester-long capstone project where they worked

with local non-profits on a software development project. These students' technical reports would then outline and discuss this project (M. Sherriff, personal communication, March 26, 2025). Following large increases in CS majors along with too few staff to accommodate this change, the current iteration of the CS Technical Report was conceived as a band aid solution, one that featured the removal of the capstone project, and a technical report that for many was only technical in name.

Beginning next year, the CS department will be testing out a new capstone and technical report model featuring a team-based independent project and a technical report following it meant to address the current models' shortcomings (M. Sherriff, personal communication, March 26, 2025). With that said, there is still plenty of work to be done and student insight that could be beneficial.

## **2. RELATED WORKS**

Many schools across the nation offer more appealing alternatives to the current state of UVA's Technical Report, and I believe that these schools can function as models to build off when looking to improve the Technical Report for UVA CS students.

Bangalore (2024) discussed the co-op program Northeastern leads, in which CS students are connected to university partners to get industry-level experience while pursuing their degree. She posited that co-op experiences are a necessity when today's job market is looking for college graduates who are "employment-ready." These co-ops allow students to create meaningful exhibits of their technical skills at real companies. My proposed solution to UVA's Technical Report deficiencies builds off this sort of co-op program.

According to Andersen (2024), industry partnerships in CS education bridge the gap between theoretical learning and practical application by aligning curricula with current

industry standards, providing students access to innovative technology, mentorship opportunities and real-world projects. These collaborations not only enhance skill development but also increase employability through internships and networking. My report draws from Andersen's emphasis on industry engagement, proposing a structured approach within UVA's technical report framework to foster similar real-world experiences for CS students.

Lauren (2023) explored the implementation of course-based undergraduate research experiences (CUREs) in CS curricula, emphasizing how these experiences enhance student retention, promote active learning, and better prepare students for real-world problem-solving. The study highlighted both challenges and opportunities, including the need for mentorship and resource allocation to support such initiatives. My proposal aligns with Lauren's findings, advocating for a structured, project-based approach within the UVA CS Technical Report framework to facilitate similar hands-on learning and industry-relevant experiences for students.

## **3. PROPOSAL DESIGN**

To address the shortcomings of the current iteration of the CS technical report, my proposal introduces a structured, team-based, project-driven approach that enables students to engage in real-world projects through university-facilitated partnerships.

For students to gain hands-on experience applying their skills, the CS department must establish partnerships with non-profits, small businesses, and industry professionals, both within and beyond the Charlottesville community. These collaborations would benefit not only the students but also the organizations involved, allowing businesses to leverage student talent for technical solutions while providing students with meaningful, real-world experience. Though students would complete this work pro bono,

it would serve as the foundation of their technical report, ensuring that they gain practical experience working as part of a development team—a skill essential for their resumes and career prospects beyond merely fulfilling a graduation requirement.

A key element of this new structure is students completing their technical reports as part of small teams, each matched with or assigned to work with a partner organization. In contrast to the current technical report where students can work entirely on their own, this team-based approach directly reflects the collaborative nature of industry software development, where engineers rarely work in isolation but, instead, operate within teams to design, build and refine software solutions. By working with real clients and adapting to project requirements as a team, students would gain exposure to industry practices such as collaborative coding, version control, agile development and iterative problem-solving. These are crucial skills that current and future model fails to cultivate, leaving many UVA CS students underprepared for the demands of professional software roles.

Beyond industry partnerships, this new technical report structure would incorporate enhanced mentorship and oversight to better support students. Given the large student population in the CS department, faculty mentorship may not be feasible at scale. Instead, the university could recruit UVA alumni working in the CS industry to provide structured guidance. These mentors would not be directly involved in student projects but would offer periodic feedback to ensure that students navigate challenges effectively while maintaining professional standards that reflect positively on UVA. Despite having strong technical abilities, students often lack critical industry skills such as scoping project requirements, effectively communicating with stakeholders, managing deadlines within a team, incorporating peer feedback

and balancing individual contributions within group dynamics. Structured mentorship would help bridge this gap, equipping students with the project management, communication, and teamwork skills essential for real-world CS roles.

A formalized evaluation process is also crucial. Mentors would conduct monthly check-ins with both student teams and their partner organization to ensure progress, accountability and alignment with client needs. This would culminate in a final review, in which mentors and organization representatives assess students based on their technical contributions, professionalism, impact on the organization and ability to work effectively within a team. Given the practical nature of this project, a pass/fail grading system may be more appropriate than a traditional letter grade, as the primary goal is demonstrating competency, collaboration, and engagement rather than achieving an arbitrary performance metric.

#### **4. ANTICIPATED RESULTS**

Implementing a structured, team-based technical report model would lead to higher-quality, more impactful student projects. By working on real-world problems through university-facilitated partnerships, students would produce reports that demonstrate applied technical skills, rather than abstract, theoretical proposals. This shift would ensure that students leave UVA with concrete examples of growth and industry-relevant work, making their portfolios more compelling for prospective employers. Additionally, by engaging with stakeholders and real clients, students would refine their ability to communicate technical concepts, a skill often underdeveloped in traditional CS coursework.

Beyond improving the quality and substance of the reports, this reform would increase student engagement and industry readiness. With clear project goals, structured mentorship, and team-based collaboration,

students would develop skills directly applicable to professional software development. This experience would bridge the gap between academia and industry, ensuring that graduates are better prepared to integrate into technical teams upon entering the workforce. As a result, UVA's CS graduates would be more competitive in the job market, and the program itself could see enhanced reputation and recruitment from students and employers seeking practical, career-oriented education.

## 5. CONCLUSION

As indicated by the CS department's decision to test a new model of the capstone and technical report projects, the current model is severely lacking. While the department is taking a step in the right direction, it is not enough. Their plan, which lacks partnership between students and organizations as well as mentorship from staff or alumni does not provide enough for CS students, particularly when juxtaposed with some of the best CS programs in the country.

My proposed solution offers restores the original spirit of the technical report by connecting students with real-world challenges, placing collaboration, mentorship, and social impact at its core. By engaging with non-profits and small businesses, students would not only apply their technical skills in meaningful ways but also gain critical experience in teamwork, communication, and project management—skills that are essential in industry but often underdeveloped in academic settings. This approach redefines the technical report as more than just a graduation requirement; it becomes a bridge between university learning and professional readiness, with tangible benefits for both students and the Charlottesville community.

## 6. FUTURE WORK

Future work should focus on deepening the connection between UVA CS students and the tech industry by incorporating structured mentorship from industry professionals and potential externship opportunities into the proposed model. These more extensive industry partnerships would ensure that student projects stay aligned with real-world expectations and evolving job market demands. At the same time, the exploration of short-term externships or project reviews by industry partners to further enrich student experience and provide career insights. These enhancements would strengthen the bridge between academic learning and professional application.

## REFERENCES

- Sanvi, B. (2024, August 17). In demand: The colleges where students start jobs right away. *The Wall Street Journal*. <https://www.wsj.com/us-news/education/in-demand-the-colleges-where-students-start-jobs-right-away-80738edb>
- Lauren, P. (2023). A study of course-based undergraduate research experiences and the challenges and opportunities for computer science. In Proceedings of the 2023 Congress in Computer Science, Computer Engineering, & Applied Computing (CSCE). IEEE. <https://doi.org/10.1109/CSCE60100.2023.00188>
- Anderson, G. (2024, January 20). *Unlocking success: The benefits of industry partnerships in computer science education*. MoldStud. <https://moldstud.com/articles/p-the-benefits-of-industry-partnerships-in-computer-science-education>