

Thesis Project Portfolio

Enabling Public Transportation Access for Underserved Communities in Austin, Texas
(Technical Report)

The Effectiveness of Online Coding Courses
(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Technical Report Abstract

The technical project addresses a critical transportation barrier underserved communities face in Austin, Texas. Many residents in these areas lack reliable access to jobs, education, and healthcare due to insufficient public transportation. To mitigate this issue, we designed and deployed a simple, user-friendly web application that allows residents to register for a new van-based transportation program initiated by the University of Texas at Austin. I developed the app with accessibility and inclusivity, featuring a streamlined registration process, multilingual support, and mobile compatibility. The back-end system includes secure authentication and data storage mechanisms, while the administrative panel provides real-time insights into user registrations and demand.

During the pilot, over 500 residents successfully registered on the platform. We highlighted ease of use by the community as critical, especially among those with little knowledge of digital technology. Future development includes integrating GPS tracking to enable real-time vehicle status updates and incorporating SMS alerts to increase rider communication. This application increases access to essential services and demonstrates how tailored technology can promote equity in urban mobility. This project models how we can ethically design digital tools to support social infrastructure by prioritizing user feedback and community needs.

STS Project Abstract

The STS research project investigates the effectiveness of online coding courses and the extent to which they prepare learners for real-world programming tasks. While platforms like Udemy, Coursera, Codecademy, and freeCodeCamp offer widespread access to technical education, many learners find themselves stuck in "tutorial hell," able to follow guided lessons but unable to solve coding problems independently. This project applies concepts from Science, Technology, and Society (STS), including the Social Construction of Technology (SCOT) and constructivist learning theory, to examine how these platforms' design and business models influence learning outcomes.

The study uses a mixed-methods approach to evaluate course structure, learner feedback, and community engagement across multiple platforms. Project-based, hands-on learning environments like those offered by freeCodeCamp and The Odin Project support independent coding skills better than video-heavy, instructor-led platforms. Furthermore, financial incentives in subscription-based models often shape course content around engagement rather than long-term retention or skill development.

This research highlights the important disparity between the convenience of online learning and the potential of online learning to prepare students for software development as a profession. The research calls for reevaluation of the manner in which coding platforms are structured and requires greater emphasis on real-world projects, collaborative community work,

and open learning paths to bridge this gap. It underscores the importance of designing educational technologies with scalability, learner autonomy, and real-world application in mind.

Technical Report Relation to STS Project

While the technical and STS projects address distinct domains, transportation access, and online programming education, they unite through a core concern: how social contexts shape digital technologies. Both projects demonstrate that simply creating accessible technology is not enough; the effectiveness of a tool depends on how it engages with its users' needs, skills, and lived experiences.

The technical initiative is an inclusive design to meet digitally underserved populations' transport demands. It emphasizes creating easy-to-use, safe, and adaptive systems with user input. Similarly, the STS project shows how the design of online coding platforms influences learner outcomes through interface or content, pedagogical models, and platform incentives.

In both cases, the social construction of technology is evident. The transportation app had to be molded by community input to be successful, just as coding courses must stand by learner behavior and broader educational values. Both projects call for a user-centered approach grounded in ethics, accessibility, and responsiveness to real-world challenges.

These initiatives emphasize the importance of incorporating STS principles into engineering practice. Whether developers and engineers build applications for public

consumption or evaluate education systems, they need to appreciate how to interweave social and technical systems. Being attuned to such interdependencies is critical to developing technology that works and enables.

The shared understanding of the relationship between society and technology pushes engineers to go beyond technical proficiency and consider the broader implications of their work. It means anticipating how design choices can empower, exclude, simplify, complicate, support, or undermine users. By grounding technology development in empathy and iterative feedback, both projects advocate for a future where digital tools are innovative, equitable, and genuinely impactful.