Thesis Project Portfolio

Student Receptiveness to Circadian-Aware AI-Driven Scheduling

(Technical Report)

Why Lecture Style Classrooms are Dominant in Classroom Design in Higher Education

(STS Research Paper)

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Executive Summary

College students face a dual challenge in higher education today; maintaining focus in classrooms that often discourage engagement and managing complex schedules that often don't align with their biological needs. These issues contribute to rising levels of student fatigue, disengagement, and poor time management, problems that limit both leaming and wellness. While a lot of educational reform efforts have focused on course content and workload policies, there has been far less attention paid to how classroom design and scheduling technologies themselves can directly shape students' learning and wellness. My thesis portfolio examines this issue of how learning environments, and scheduling tools can be better optimized to support student productivity and well-being. To explore this challenge, I conducted two different research projects. My STS paper investigates why the lecture-style classroom remains the dominant form in higher education despite well-documented shortcomings. My technical capstone addresses a different but related problem: how students can leverage AI tools, especially those aligned with circadian rhythms and health data, to build more sustainable and personalized schedules. Together, these projects suggest that optimizing students' wellbeing and wellness requires a redesign of the systems and infrastructures that shape how students work and learn.

For my technical capstone, my team developed and tested an AI-driven scheduling system that aligns student tasks with their biological rhythms using passive health data. Our motivation stemmed from the widespread but inefficient use of generic calendar tools among college students. In an initial set of interviews, we found that while 81.2% of students use AI tools regularly, only 12.5% use them for scheduling, and even fewer use tools that incorporate physiological data. We designed three scheduling prototypes: a manual model similar to Google Calendar, a semi-automatic model using a large language model (LLM), and a semi-automatic model that incorporated health data such as sleep patterns and activity levels. Using Figma mockups, we tested these prototypes in a survey of 102 students who chose a user persona that reflected common college productivity challenges: feeling overwhelmed, exhausted, or disorganized (issues with time management). Across all groups, the prototype using health data was

consistently ranked as the most effective in almost all categories. Statistical analyses confirmed that this prototype significantly outperformed the others on key measures of perceived helpfulness ($p < 0.001$) when all questions were compiled together. Our results suggest strong student interest in AI-assisted tools that adapt not just to preferences but to personal health rhythms.

My STS research paper asks: Why do traditional lecture-style classrooms persist in American higher education despite a growing awareness of their limitations? Applying Actor-Network Theory (ANT), I investigated the social, technical, and institutional forces that keep lecture-style classrooms dominant even with pushes for active learning designs in educational research. I conducted a qualitative analysis of classroom design trends at the University of Virginia and reviewed planning documents from universities across the U.S. My findings show that the persistence of lecture halls is not due to just teaching preferences but also stems from a interwoven network of actors including campus planners, registrar systems, budget constraints, architectural standards, and building codes. For example, scheduling software optimizes seat count and fixed layouts, making it difficult to justify flexible designs. Similarly, remodeling lecture-based classrooms into active learning spaces is often too costly within existing infrastructure and code constraints. Ultimately, I conclude that lecture-style classrooms remain entrenched not because they are better for learning, but because institutional actors reinforce each other's preferences for efficiency, simplicity, and tradition. ANT revealed that each actor, human or nonhuman, maintains the system by constraining alternatives, making change difficult.

Together, these two projects demonstrate that improving student outcomes isn't simply a matter of better teaching or better tools, it requires systems-level thinking about the environments students operate within. My technical work shows that personalized AI tools grounded in health data can improve scheduling efficiency and student satisfaction. My STS work reveals the deep-rooted actors that resist better classroom designs. Though one project is more forward-looking and the other more reflective, both

explain how design, whether classroom space or scheduling software, can change students' learning and well being.