Utilizing technology for good:
An analysis of technology's effects on learning, memory, and attention in university STEM
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Within higher education in the digital age, tremendous variation exists at the institution, department, professor, and student level on how technology is utilized, either for good to benefit learning or to the detriment of educational outcomes. Proper usage is mediated through equitable access and skill development, combined with understanding the inherent strain technology has on attentional resources. Both are the key to maximizing educational success in higher education. Currently, the differences in access to technology at the institutional level are very prevalent. Does this differential access impact how students at these institutions view technology, utilize it, and effect their attention and classroom performance?

The present study aims to investigate whether differences in access to technology at private and public universities in Maine are associated with variations in the utilization of technology and perceived and observed distractions in introductory STEM classrooms. A possible explanation for the correlation between access and technology utilization, according to Van Dijk's paradigm (Soomro et al. 2020), is that the combination of access and skill development enable students to use technology as a tool rather than a distraction. By becoming familiar with technology as an educational resource, students may learn to manage it effectively for academic advancement while being aware of its potential for distraction.

My research focused exclusively on introductory STEM classes at two universities that differ in size, class size, funding, location, and private or public status but focus exclusively on introductory STEM classes. By evaluating students' usage of technology, access to technology, notetaking methods, educational technology usage, class preferences, and on-task/off-task or MMT(media multitasking) behavior in classes through observational data analysis and survey data, we can begin to understand how differences in access lead to differences in technology usage.

Students at College 1 may have developed the necessary skills described by van Dijk's paradigm, through their access to personal technology provided through technology initiatives. This materialized in the classroom preferences of students, with more preference for classroom activities utilizing technology, preference for technology as a means of notetaking[Figure 1],more educational technology usage, as well as less off-task behavior/MMT observed in the classroom[Figure 2].
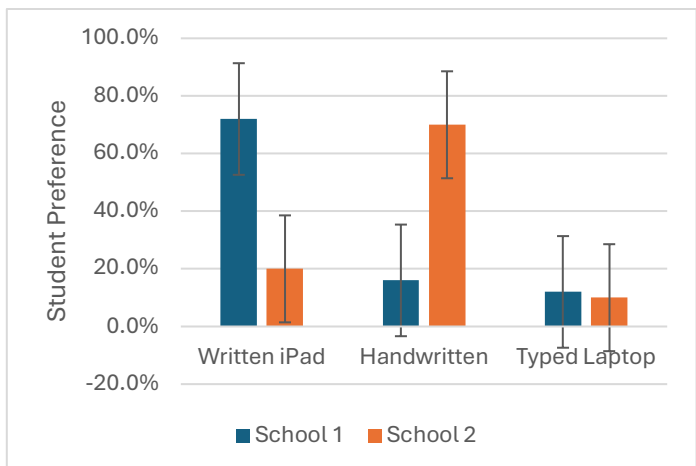

Figure 1: Notetaking Preferences Among University Students. Students asked to select their preferred notetaking method for the class they completed the survey for introductory Chemistry and Biology Classes. Students at College 1(n=25) preferred utilizing notetaking apps on iPads, while longhand was the preference at schools 2(n=10).
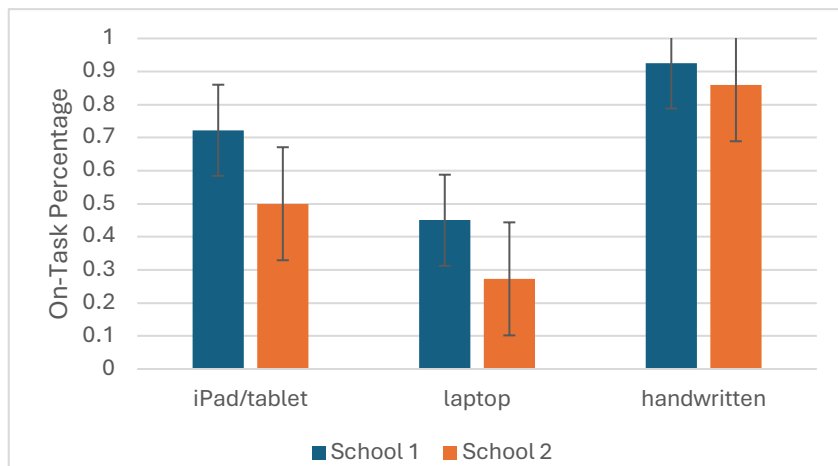

Figure 2: Observed Distraction and On-Task behavior of University Students. Two students per minute were observed throughout a 55-minute session, and their note-taking method and on-task/off-task behavior recorded. 10 students were selected at random at schools 1 and 2. Laptop notetaking across all 3 schools had the least amount of on-task behavior. Handwritten notes had the most on-task percentage. Tablet and laptop on-task percentage was higher at College 1 than at College 2, with tablets better overall for on-task percentage at both schools.

References:

Soomro, Kamal Ahmed, Ugur Kale, Reagan Curtis, Mete Akcaoglu, and Malayna Bernstein. "Digital Divide among Higher Education Faculty." *International Journal of Educational Technology in Higher Education* 17, no. 1 (April 20, 2020): 21.