PROJECT MOTIVATION AND RELEVANCE

Although computer literate, today's engineering students don't enter college with the same level of hands-on experience with hardware that prior generations exhibited. Experimentation provides students with a sense of where things deviate from theory, offering the opportunity to explore non-ideal conditions; while also giving them the chance to play with hardware and gain the experience and expertise that helps them become successful designers.[i,ii] For example, electronics technicians who had vast hands-on experience were able to reproduce large portions of complex circuit diagrams after only a few seconds of viewing; whereas novices could not.[iii] This was due to their ability to chunk the individual circuit elements that functioned together as an amplifier. Expert scientists and engineers are able to quickly recognize patterns of information; for example, physicists recognize problems of river currents and problems of headwinds and tailwinds in airplanes as involving similar mathematical principles, such as relative velocities.[iv] Gone are the days when students were ham radio operators, played with Erector/LEGO sets, tinkered with electronic kits or simply taken things apart for fun. As a result, students have less "gut intuition" and expert skills than prior generations possessed when entering the job market.[v]

Notwithstanding the recent advances in educational technology, we still need to incorporate more dynamic, hands-on opportunities to reach and motivate more diverse populations.[vi,vii,viii] Today's students do not enter college with the same amount of practical experience that prior generations had.[ix,x] Ultimately, we can enable scaffolding and improve retention of concepts using interactive computer based hardware/software, since users can guide themselves through materials and explore at their own pace and level.[xi, xii, xiii] Therefore, the focus of this project is *to develop a low-cost, experimentation centric pedagogy that allows faculty and students to implement laboratory instrumentation based **Mobile Studio** environments **anywhere** (classroom, library, union, dorm, etc.), at **anytime** (24/7) to enhance STEM education*.

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