

**DESIGN AND PROTOTYPE LOW-COST EDUCATIONAL VERSION OF EXISTING
LABORATORY INSTRUMENT**

**THE EVER-EVOLVING CLASSROOM: THE EFFECT OF TECHNOLOGY IN EDUCATION
ON POLICY MAKING**

An Undergraduate Thesis
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By

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Sociotechnical Synthesis

As technology becomes increasingly integrated into the classroom environment, educational technology policy makers need to understand the national sentiment towards this movement and involve multiple key stakeholders when developing these guidelines. The technical report for this Thesis describes the product development process for a miniaturized plate reader, which would be used by local high school biology and life sciences' teachers in the Charlottesville community, to improve upon the quantitative analysis taught in these classrooms. The STS research paper for this Thesis delves into who develops the policies for technology and education and attempts to dissect their motivations. Because the technical report describes an example of educational technology, the STS research paper parallels the report by explaining the purpose and outcomes of educational technology policies at the federal and state level in the United States.

Multi-well plate readers have become an integral part of any laboratory conducting biological research because of their ability to detect and quantify biological, chemical, or physical events within the wells of a microplate. However, current plate readers are large and very expensive, therefore they are not easily accessible for educational purposes, especially in a high school classroom. Because the high school biology and life sciences curriculum in Virginia Schools focus primarily on qualitative analysis and lack a thorough method for teaching quantitative analysis, this Capstone project aims to develop a miniaturized plate reader and accompanying module to explore an improved method of teaching quantitative analysis. After interviewing local high school teachers and receiving feedback on the project, the authors developed a computational 3-D prototype which would have been incorporated into the classroom. Due to the current pandemic situation, the project aims were shifted to focusing on the accompanying module as the part of the final deliverable.

The main research question considered for the STS research paper looked at the motivations of current and past educational technology policy makers and how these individuals take this role. The STS research paper provides a foundational understanding of the policy makers by providing information on the Department of Education, the Office of Educational Technology, a 2019 census of teachers' perception of the effectiveness and incorporation of technology in the classroom and some of the issues regarding technology in education. From this key information, the paper highlights the importance of involving key stakeholders in the development of these policies, the necessity for training teachers to be proper digital leaders in their schools and the disparity between the effectiveness and integration of technology.

Without effective policies, technology in education will not see the benefits of its potential in the classroom at any level. By providing proper guidelines and training for teachers to incorporate educational technology, students will be able to expand their knowledge and learning outside the bounds of the classroom by accessing resources around the globe in a safe, sustainable and scalable manner.