CS 411W Lab 1

Access to Quality Education: Minnow

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1 Introduction

Access to quality education is a critical issue, especially for students in underserved communities and students with more diverse learning needs. The traditional methods found in classrooms often fall short in addressing the wide variety of learning styles, disabilities, and socio-economic challenges that face today's students. As a result of this, students are often left without the necessary resources to thrive. This disparity in education has failed to keep up with the advance of technology.

Teachers in poverty zones and less experienced teachers are more likely to report the provided materials are often too challenging for their students. (U.S. Department of Education) Of the teachers that reported their materials are too difficult for their students, math teachers reported that they were less likely to use their materials for their class instruction time. In economically challenged cities such as Baltimore, the proficiency rates for students are consistently below average in comparison with less economically challenged cities. A study conducted by the NAEP (National Assessment of Educational Progress) showed that 81% of fourth graders that qualified for free or reduced-price lunch had lower literacy levels and were four times less likely to graduate high school. The USA as a country spends more money on average for student education than most of the- other OECD countries. (Organization for Economic Cooperation and Development)

A potential solution to fixing this problem with the United States' education problem would be a website that allows students and teachers to bridge the gap their materials and current practices cannot accomplish. This website should have personalized learning, which can be accomplished via adaptive lesson plans, multimodal accessibility tools, and gamified modules

that react to the performance of the student, such as those found in applications like Duolingo. It should foster collaboration with dashboards for students, teachers and parents while providing a resource library for subjects covered in their schools' curriculum. The application should also leverage modular learning, cloud technologies, and real-time communication. This platform enhances engagement and ensures equitable education for all, regardless of any educational or financial disparity.

This website, Minnow, covers every one of these fields, providing an educational platform that personalizes learning experiences through adaptive lesson plans, multimodal tools like textto-speech and close captioning. It will come with built-in accessibility features, gamified learning and multilingual support. With Minnow, education can be made inclusive and engaging at a scale that could make a difference for many students across the country.

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2 Minnow Product Description

Minnow is an adaptive learning platform designed to enhance education through personalized lesson plans and interactive engagement. It supports diverse learners with accessibility features and a collaborative dashboard for tracking progress. While Minnow supplements traditional education, it does not replace formal schooling, provide certifications, or guarantee academic improvement. Instead, it offers a flexible, curriculum-based resource accessible anytime with an internet connection.

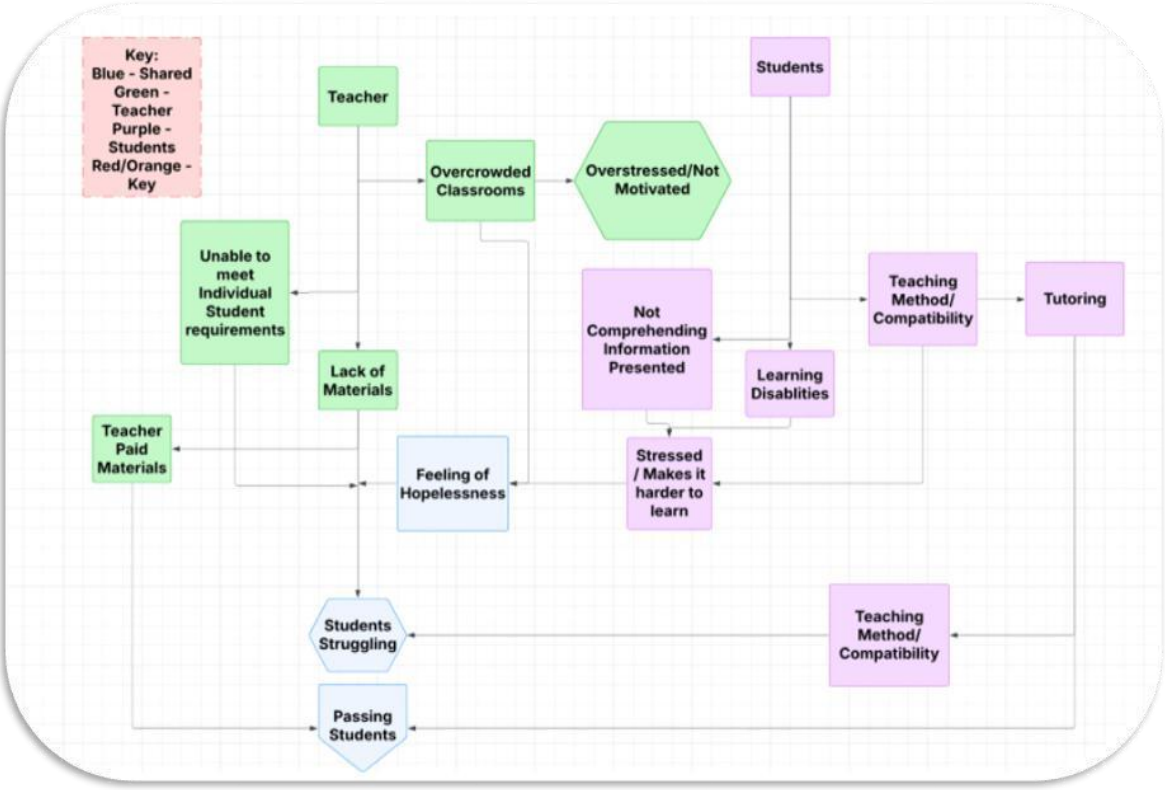

Figure 1: Current Process Flow

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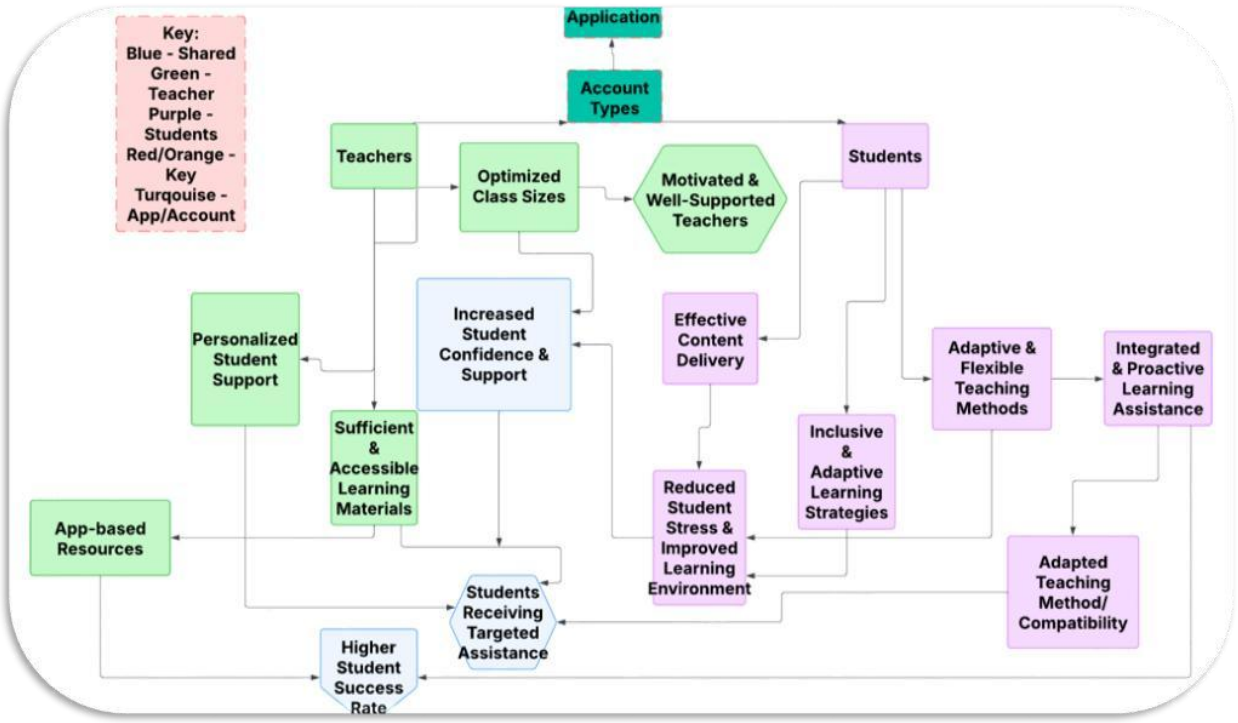

Figure 2: Solution Process Flow

2.1 **Key Product Features and Capabilities**

Minnow tailors lesson plans to individual student needs, adapting to strengths and weaknesses for a personalized learning experience. It incorporates accessibility tools such as text-to-speech, closed captioning, and visual aids to support diverse learners. Gamified modules enhance engagement through interactive lessons and quizzes, while a collaborative dashboard connects students, teachers, and parents for real-time progress tracking. The platform also includes a resource library with videos, exercises, and virtual tutoring options, ensuring a comprehensive and flexible learning experience.

2.2 Major Components (Hardware/Software)

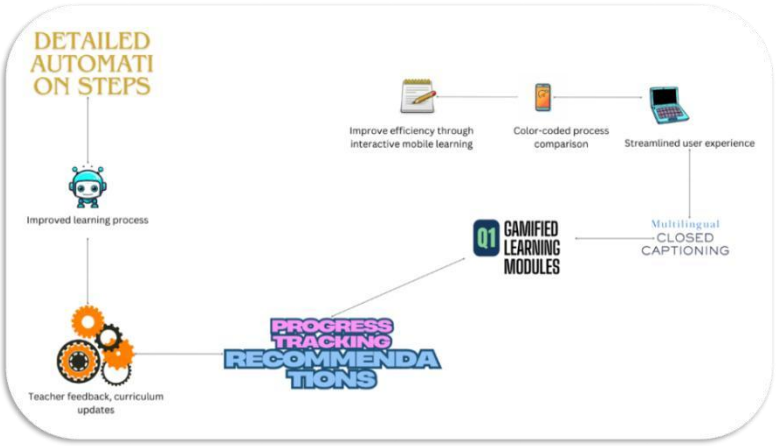

Figure 3: Major Functional Components Diagram

The software will require something like a LAMP stack, using Docker, Django, PostgreSQL, and Python. The software being developed will be an online based mobile application that provides dynamically updated and gamified quiz activities for a wide range of educational purposes. As such, it will require a hosting provider to ensure online functionality.

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3 Identification of Case Study

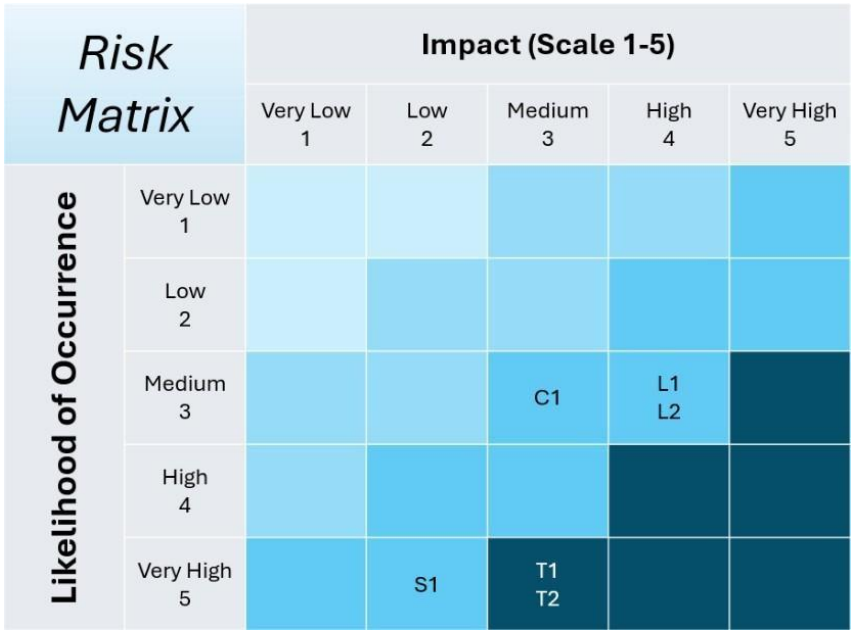

Figure 4: Risk Matrix

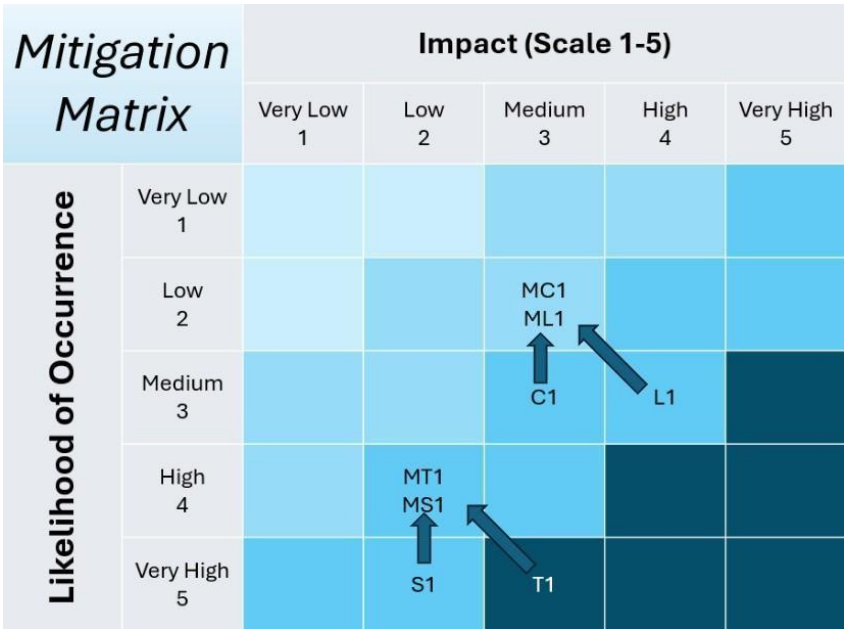

Figure 5: Mitigation Matrix

Minnow is intended for use by academic instructors seeking to supplement their curriculum with an additional learning tool. This software does not provide a complete education on any given topic on its own. However, when paired with additional instruction, it serves as a helpful addition to any lesson plan. That in mind, the software's intended use is akin to something like MyLab Math, where teachers can assign certain exercises or progress goals to be achieved by students. While primarily used by students, the act of its application into a curriculum is performed by an instructor or educational administrator.

In the wake of Covid-19 and a shift towards more online-oriented and asynchronous teaching styles, the need for online educational technologies is more prominent than ever before, with it expected to soon reach a critical role if it hasn't already. (Haleem) This increased need can be answered by the learning website Minnow.

Learning websites like Minnow are linked to educational improvements, including more productive teaching, more inclusive environments for students, and the potential for many skills to be gained. (Haleem)

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4 Glossary

Accessibility Tools – Features such as text-to-speech, closed captioning, and visual aids that support diverse learners.

Gamification – The use of interactive lessons, quizzes, and rewards to enhance student engagement.

Multimodal Learning – An approach that integrates various forms of content delivery, including visual, auditory, and interactive methods.

Personalized Learning – Adaptive lesson plans that adjust based on a student's strengths and weaknesses.

Role-Based Access – A security feature that ensures users (students, teachers, parents) have appropriate permissions based on their role.

Secure Authentication – Measures to protect user privacy and maintain data security.

Virtual Tutoring – Online support resources designed to assist students outside of traditional classroom settings.

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