

## Public Summary Bachelor Thesis

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**Title:** "Designing a Mobile Application for Water Education in Underserved Communities"

**Internal Bachelor Assignment:** Humanitarian Engineering Group

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### Public Summary

This assignment was carried out for the research group of **Humanitarian Engineering** positioned in the Department of Design, Production, and Management (DPM), focusing on shaping a world where every individual has access to basic necessities, essential services, and developmental opportunities regardless of their socio-economic background or geographic location.

Underserved communities deal with resource limitations in their daily life. Often, they lack access to affordable water and sanitation systems, healthcare, affordable housing, civil infrastructure, and access to appropriate energy technologies. The nature of these challenges sometimes requires innovative and technological solutions to address these problems in a sustainable manner.

The project addresses the critical issue of limited access to clean water resources, through the implementation of Humanitarian Engineering principles and fostering a culture of innovation, inclusivity, and long-term sustainability. According to The United Nations Sustainable Development Goal 6 (SDG6), there is a pressing global need to address water accessibility challenges faced by marginalized populations. Access to clean and safe drinking water is considered a fundamental human right, yet a significant portion of the global population, particularly in underserved communities, still lacks reliable access.

The situation in Flint, Michigan, in the United States, serves as a poignant example of a failure to provide clean and safe drinking water to the community due to a water contamination crisis. The persistent challenges of inadequate water resources, water quality, and education surrounding water management have profound consequences for the well-being of individuals.

The project followed five phases of the Design thinking process. In the Empathize phase, a contextual analysis and literature review were conducted to gather information about the problem and the community's needs. The contextual analysis revealed educational gaps related to water management and safety. There is a need for comprehensive water education to empower residents with knowledge about their water supply, treatment processes, sustainable water practices and usage, and informed decisions to navigate water challenges effectively. The literature reviewed demonstrated that there is a need for a solution to rebuild trust and address concerns related to water usage and safety.

To achieve sustainable water management practices in underserved communities, it is imperative to prioritize educational tools, ensuring that the community is equipped with knowledge for informed decision-making. While the government has implemented technical solutions, not everyone can afford them. The technological solution should offer a cost-effective

and accessible alternative. Its success will depend on community engagement and the seamless integration of technological solutions into their daily lives.

Building upon the significant discoveries from the context analysis, the Define phase identified a design opportunity centered around developing a comprehensive mobile application for water education. This application is precisely tailored to address the specific needs and challenges encountered within the studied community. Thus, the core aim of this research was to design and develop a mock-up of a user-centric mobile application, specifically tailored for educational purposes for students in underserved communities. This application targets students in schools within these communities, empowering them to understand, value, and efficiently manage water resources. The 'problem' lies in the inadequate access to clean water and the lack of educational resources to address this issue effectively. The application aims to bridge the educational gaps, empower residents with essential water knowledge needed to make more informed decisions, navigate water challenges effectively, and complement existing technical solutions implemented by the government.

After that, the goal design, design brief, and functionality and features ideation were worked out in the ideation phase. The essential features of the application encompass daily water usage tracking with categorized consumption patterns for informed conservation. Users benefit from daily analyses paired with practical tips and real-life examples, enhancing their awareness. The inclusion of daily goals, challenges, and educational quizzes on water-related topics, gamified for engagement, contributes to a holistic learning experience. The app also offers comprehensive water education courses covering conservation, contamination, recycling, and treatment. Furthermore, community forums facilitate support, discussions on water-related issues, information on distribution and pick-up points, and details about testing centers, fostering a collaborative and informed user community.

Based on this phase, an interactive prototype was developed in Figma in the Prototype phase and tested to evaluate the application's user-friendliness, usefulness, effectiveness, and design in the Evaluation phase. Results from the testing showed a positive response to the design and functionality which successfully combines practicality and engagement, fostering a positive user experience for those committed to water conservation.

The initial research design aimed to assess the specific needs of the target users in Flint, Michigan. However, due to geographical constraints in participant recruitment, the evaluation shifted its focus toward usability testing and User-Interaction Design (IxD). This deviation from the original intent moved from contextual needs assessment to a more generalized evaluation of usability.

This testing helped in refining the design, addressing any usability issues, and optimizing the overall user experience. Despite the deviation from the original intent, this adjusted approach allowed for the examination of critical aspects of the product's performance and user experience. The goal of this approach was to see what is happening on the screen and in front of it during the test. Nevertheless, this insightful information was turned into design guidelines and recommendations for later work on the topic.

**Resources:** *GOAL 6: Clean water and sanitation.* (n.d.). UNEP - UN Environment Programme. <https://www.unep.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-6>