

LLMs as a Bridge to Accessibility: Enhancing the Learning Experience for Engineering Students with Disabilities



A. Abstract

This project aims to explore the potential of large language models (LLMs) as an accessible learning tool to support engineering students with disabilities at UW ECE. By adapting LLMs to accommodate various disabilities, such as visual, hearing, and cognitive impairments, we aim to create an inclusive and equitable learning environment that facilitates academic success for all students. Through the development and evaluation of tailored LLM-based resources, the project targets the enhancement of diversity, equity, and inclusion in the ECE community.

B. Project Goal

To develop and implement accessible LLM-based learning resources to support engineering students with disabilities at UW ECE.

B.1. Objectives

- Conduct a needs assessment to identify specific accessibility requirements for students with disabilities.
- Collaborate with experts in accessibility and LLMs to develop tailored learning resources.
- Pilot test the adapted LLM-based resources with a group of engineering students with disabilities.
- Evaluate the effectiveness and impact of the LLM-based resources on student learning outcomes.
- Develop recommendations for broader implementation and future improvements.

C. Background

Students with disabilities face numerous challenges in STEM education, including engineering, due to a lack of accessible resources and accommodations [1, 2]. In recent years, there has been a growing interest in using technology to support diverse learning needs and create more inclusive educational environments [3, 4].

Large language models (LLMs), such as ChatGPT, have demonstrated potential in various applications, including enhancing personalized learning experiences [5]. However, research on the potential of LLMs to support students with disabilities in engineering education remains limited. By adapting LLMs to accommodate different learning needs and styles, we can create an inclusive learning environment that promotes success for all students, regardless of their abilities [6].

This project aims to bridge the gap in the literature by investigating how LLMs can be tailored to support engineering students with disabilities at UW ECE. Through the development, implementation, and evaluation of accessible LLM-based learning resources, we seek to enhance diversity, equity, and inclusion in the ECE community.

D. Project Description

The project will be executed in four phases over a 12-month period. In the initial phase (Months 1-3), the project team will conduct a needs assessment to identify specific accessibility requirements for students with disabilities. Concurrently, the team will review existing literature on accessibility and LLMs to better understand the potential and challenges in this area. During this time, the team will also assemble and recruit participants for the study.

In the second phase (Months 4-6), the team will collaborate with experts in accessibility and LLMs to develop tailored learning resources that address the identified needs of the target student population. Once

these resources are developed, they will be pilot tested with a group of engineering students with disabilities to assess their usability and effectiveness.

In the third phase (Months 7-9), the team will gather feedback from the pilot study participants and make improvements to the LLM-based resources as needed. The improved resources will then be evaluated for their effectiveness in supporting students with disabilities in their learning outcomes. This phase will involve data collection, analysis, and reporting of the findings.

The final phase (Months 10-12) will focus on consolidating the project outcomes and developing recommendations for broader implementation and future improvements. This phase will ensure that the project's results contribute to enhancing diversity, equity, and inclusion in the ECE community at UW and beyond.

Table 1. Project timeline and activities.

TIMEFRAME	Phase	Activities and Milestones
Months 1-3	Phase 1: Planning	Conduct needs assessment - Review literature on accessibility and LLMs - Assemble project team and recruit participants
Months 4-6	Phase 2: Development and Pilot Testing	Develop tailored LLM-based learning resources - Pilot test resources with participants - Gather feedback and make improvements
Months 7-9	Phase 3: Evaluation	Evaluate the effectiveness of LLM-based resources - Analyze data and report findings - Improve resources as needed
Months 10-12	Phase 4: Consolidation and Recommendations	Consolidate project outcomes - Develop recommendations for broader implementation and future improvements

E. Team Description

Our project team will include 1 graduate and 2 undergraduate students from the UW ECE department and one faculty sponsor who will oversee the project and ensure successful completion. Each team member will be responsible for a specific aspect of the project, such as data collection, analysis, or report writing.

- Project Lead/Faculty Sponsor: [REDACTED]
- Graduate Student: TBD
- Undergraduate Students: [REDACTED]
- Accessibility Expert: TBD - UW DRS

F. Budget

Our project budget will include funds for survey administration, data collection and analysis, and travel expenses for team members to attend relevant conferences or meetings. The total budget will not exceed \$5,000. [A detailed budget should replace this more generalized description of the budget](#)

Bibliography

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