UNIVERSIDADE FEDERAL DE PELOTAS
Centro de Desenvolvimento Tecnológico
Curso de Bacharelado em Ciência da Computação

Trabalho de Conclusão de Curso

VideoLearnAI: LLM Powered Web Application para aprendizagem ativa com vídeos do Youtube

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VideoLearnAI: LLM Powered Web Application para aprendizagem ativa com vídeos do Youtube

Trabalho de Conclusão de Curso apresentado ao Centro de Desenvolvimento Tecnológico da Universidade Federal de Pelotas, como requisito parcial à obtenção do título de Bacharel em Ciência da Computação.

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Pelotas, 2025

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Dedico. . .

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Só sei que nada sei.
— SÓCRATES

RESUMO

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Palavras-chave: palavrachave-um; palavrachave-dois; palavrachave-tres; palavrachave-quatro.

RESUMO

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Palavras-chave: keyword-one; keyword-two; keyword-three; keyword-four.

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LISTA DE ABREVIATURAS E SIGLAS

ABNT	Associação Brasileira de Normas Técnicas
NUMA	Non-Uniform Memory Access
SIMD	Single Instruction Multiple Data
SMP	Symmetric Multi-Processor
SPMD	Single Program Multiple Data

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1 INTRODUCTION

1.1 Problem Context

The evolution of educational technologies has radically transformed traditional learning models, shifting from passive consumption to more engaging, interactive approaches. Active learning, a methodology that encourages students to actively participate in their learning process, has gained prominence due to its proven effectiveness. Unlike traditional learning environments, where students merely receive information, active learning involves tasks such as problem-solving, discussions, and peer teaching—methods that significantly enhance understanding and retention.

However, despite the rapid advancement of digital platforms, many high-quality educational resources from leading institutions like MIT, Harvard, and Stanford remain vastly underutilized. College education is notoriously expensive, and many students are unable to afford tuition fees for top-tier institutions. Thankfully, the internet has democratized access to knowledge, offering free educational resources from prestigious colleges that would otherwise be out of reach. Platforms like YouTube host a wealth of content, including recorded lectures, research papers, and open courses.

Yet, much of this content remains passive—primarily consisting of long lecture videos or static reading materials—which limits student interaction and engagement. Without the support of a well-designed platform to help users interact with the content and actively engage in their learning, these valuable resources fail to reach their full potential. The gap between the vast amount of available content and the active learning opportunities it can provide is significant and must be addressed to truly harness the power of digital education.

1.2 Justification

Active learning is a well-established approach to improving student outcomes. According to Bonwell and Eison (1991), "Active learning is not a new fad; it is a proven strategy that enhances student engagement and helps students learn more effectively."This method has been linked to better knowledge retention, improved critical

thinking, and increased motivation among learners. As educational content continues to shift to digital platforms, it becomes essential to transform passive resources into more dynamic, interactive experiences that encourage active learning.

In particular, video-based content, which has become ubiquitous in online education, offers a significant opportunity to incorporate active learning strategies. By integrating tools such as interactive quizzes, chapter summaries, and discussions into video lectures, we can create a more engaging learning environment that prompts students to actively process and apply the material. The availability of high-quality content from top universities and online platforms such as Coursera and edX presents an ideal opportunity to experiment with these approaches and unlock the full potential of digital learning.

1.3 Objectives

The primary objective of this work is to develop a platform that facilitates active learning by incorporating interactive elements into educational video content. Specifically, the objectives are:

- To develop a platform that enhances video-based learning by integrating features such as chapter summaries, interactive Q&A sessions, and true/false questions for each video segment.
- To utilize high-quality educational content from top universities and open-access platforms, adapting it to support active learning methods.
- To evaluate the effectiveness of active learning techniques on student engagement and retention through user feedback and performance testing.
- To explore scalability by extending the platform to a variety of subjects and content types, from technical courses to humanities.

By achieving these goals, we aim to contribute to the growing body of research on the integration of active learning with digital education platforms, helping to bridge the gap between the vast amount of available content and the need for engaging, effective learning experiences.

1.4 Structure of the Work

This document is organized as follows: Chapter 2 provides a literature review on active learning, language models, and SaaS development. Chapter 3 details the methodology, including the development strategy and tools used. Chapter 4 discusses the implementation of the platform and its features. Chapter 5 presents the results of the

platform's performance and user feedback. Finally, Chapter 6 concludes the work with a discussion of the objectives achieved, lessons learned, and future improvements.

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Anexos

ANEXO A – Um Anexo

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ANEXO B – Outro Anexo

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