WRITEASSIST

Improving Writing Education Using GenAI

Capstone Section 8

Richard Mathews II, Emily McPherson, Sabreena Naser, Patrick Xu, Daphne Lin

Meet Our Team

WRITEASSIST

Richard Mathews II

Project Manager/

Data Scientist

Emily McPherson

App Developer

Daphne Lin

Data Scientist

Sabreena Naser

Data Scientist

Patrick Xu

Data Scientist

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Problem

In grades 6-12 writing education, **overwhelming teacher workloads** result in dissatisfaction and high turnover rates, leading to the **lack of individualized feedback** for students, which hinders their writing development.

77% English middle and high school teachers report feeling stressed or overwhelmed.

1. Source: https://www.edweek.org/teaching-learning/stress-burnout-depression-teachers-and-principals-are-not-doing-well-new-data-confirm/2022/06

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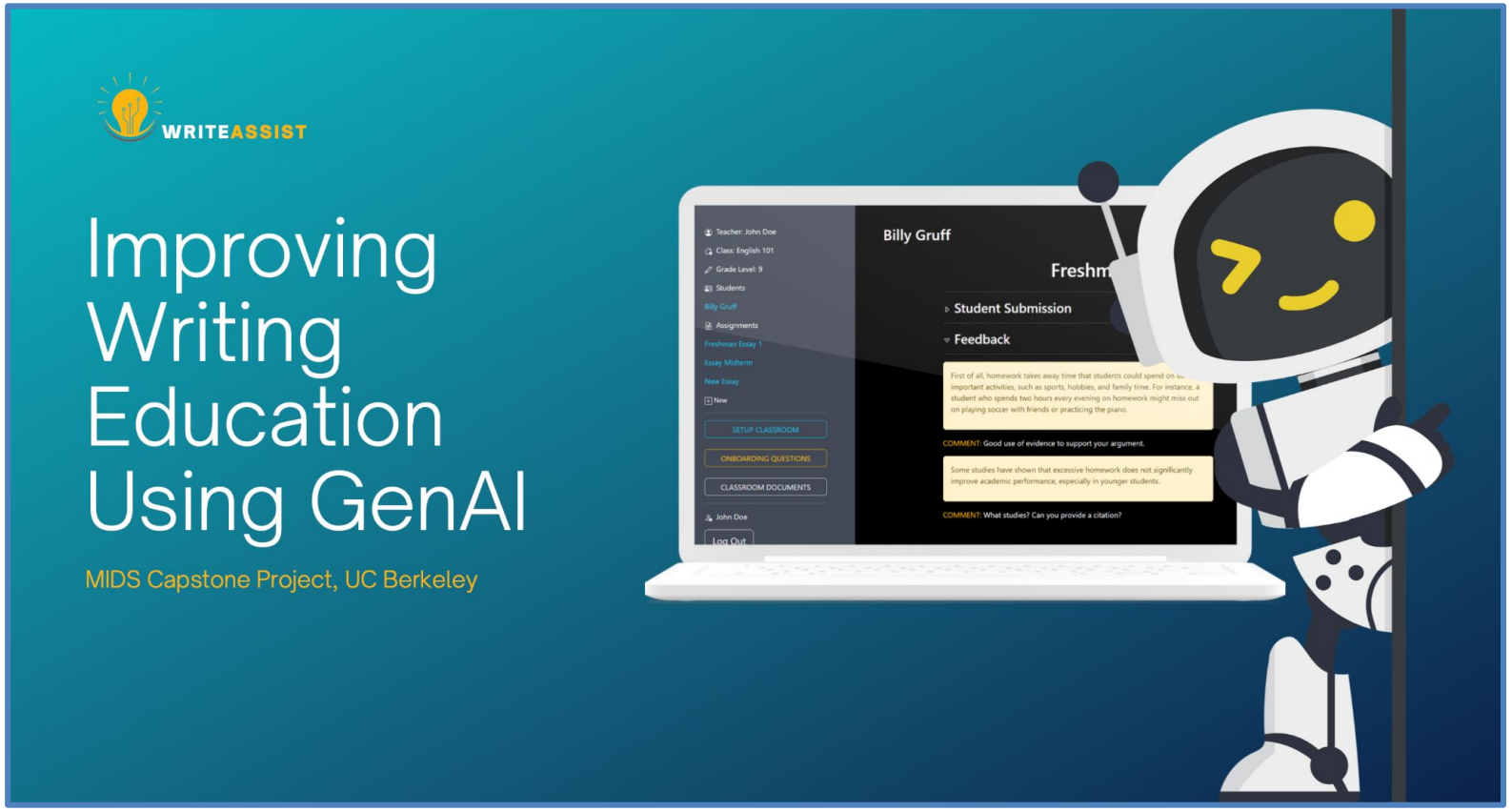
Our Solution

WriteAssist: A classroom aligned AI teacher assistant that **automates personalized feedback** generation and offers 1:1 student counseling, enhancing both teacher efficiency and student writing proficiency



High Market Opportunity

Over 4 million teachers in the U.S.

Over 49 million students in U.S. public schools

- The U.S. education technology market was valued at around **$80 billion**
- Expected to grow at a compound annual **growth rate of >11%**
- Assuming WriteAssist is adopted by 10% of schools in the U.S., the potential reach is around **4.9 million students** and **400,000 teachers**

1 & 2. Source: https://nces.ed.gov/fastfacts/display.asp?id=372
3 & 4. Source: https://www.globaldata.com/store/report/usa-edtech-market-analysis/#:~:text=United%20States%20(US)%20EdTech%20Market%20Report%20Overview,11%25%20during%202023%2D28.

Adopting a User-Driven Focus

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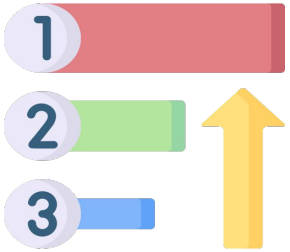
Research and User Interviews

We interviewed 5 teachers and 11 students



Setting Priorities

1. Personalizing the AI to the teacher's goals, style, and curriculum.
2. Students get quality 1:1 feedback on their writing.
3. Teachers write feedback faster.

Objective

Automate as much of the student-teacher feedback loop without sacrificing uniqueness of the teacher/classroom.

MVP Key Features

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Onboarding

Teacher provides information such as goals, preferences, curriculum, rubrics, resources, and previous feedback samples.

Feedback Generation

Teacher can provide feedback to essays, or generate feedback suggestions using AI.

Student/AI Conferencing

Student interacts with their essay feedback via teacher AI chat conversation.

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Demo: 7th Grade Persuasive Essay

Mr. Williams

Billy

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User Feedback

"I really like the concept of the app - especially how easy it is for both the teacher and the student. It provides quick and effective feedback for the student. The feedback is also clear and appropriate based on the students grade level! I also like the AI teacher assistant tool a lot for students to gain a better understanding!"

Amaya Hodges, 8th Grade English Teacher

"The WriteAssist site showcases a promising tool for improving writing efficiency and quality!"

Sonia Khan, High School Senior

TECHNICAL APPROACH

Map Diagram

WRITEASSIST

1. Training Data

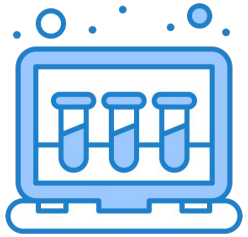
ASAP++ Dataset

Synthetic Teacher Personas

2. ML Pipeline

Create Proprietary Dataset

End-to-End GenAI Experimentation



Evaluation

3. MVP - live demo

Teacher Onboarding and Inputs

User-input

Student Essays

Real Data

Teacher and Feedback Generation Models

Student Conferencing

https://writeassist.my.canva.site/

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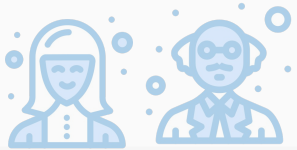

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TECHNICAL APPROACH

Proprietary Dataset

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ASAP++ DATASET

input

Prompts

"Write a letter to your local newspaper in which you state your opinion on the effects computers have on people. Persuade t he readers to agree with you."

Rubrics

Evaluate Ideas & Content. A score 6 denotes that the writing is exceptionally clear, focused, and interesting. [...] Main ideas stand out and are developed by strong support and rich details suitable to audience and purpose. [...]
"

Essays

"[...]Before my famiy had a computer complete dedicated to papers files that your so important & that we could not lose. When up got picture, typed up paper, saved our was empty! I hope that this letter has proves to you computers effect on our society. [...]"

Scores

EssayID	Content	Org	Word Choice	Fluency	Conventions
919	3	4	3	3	3

input

Synthetic Teacher Personas

Synthetic Teacher 1

- Prioritizes grammatical accuracy and adherence to language conventions.
- Focuses on the clarity of the thesis
- Looks for strong development and support of arguments
- Looks for a conclusion that effectively summarizes the thesis.

GPT-4o

output

Proprietary Dataset

"The essay you provided has a clear understanding of the main ideas regarding the positive effects of computers on society. However, it struggles significantly with clarity, grammatical accuracy, and logical organization. [...]To improve, the essay needs a thorough revision to enhance grammatical precision, logical organization, and clarity of expression."

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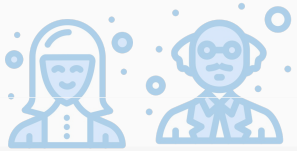

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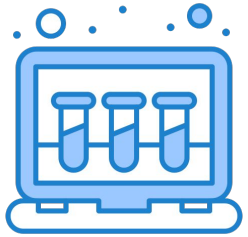

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TECHNICAL APPROACH

Inference System

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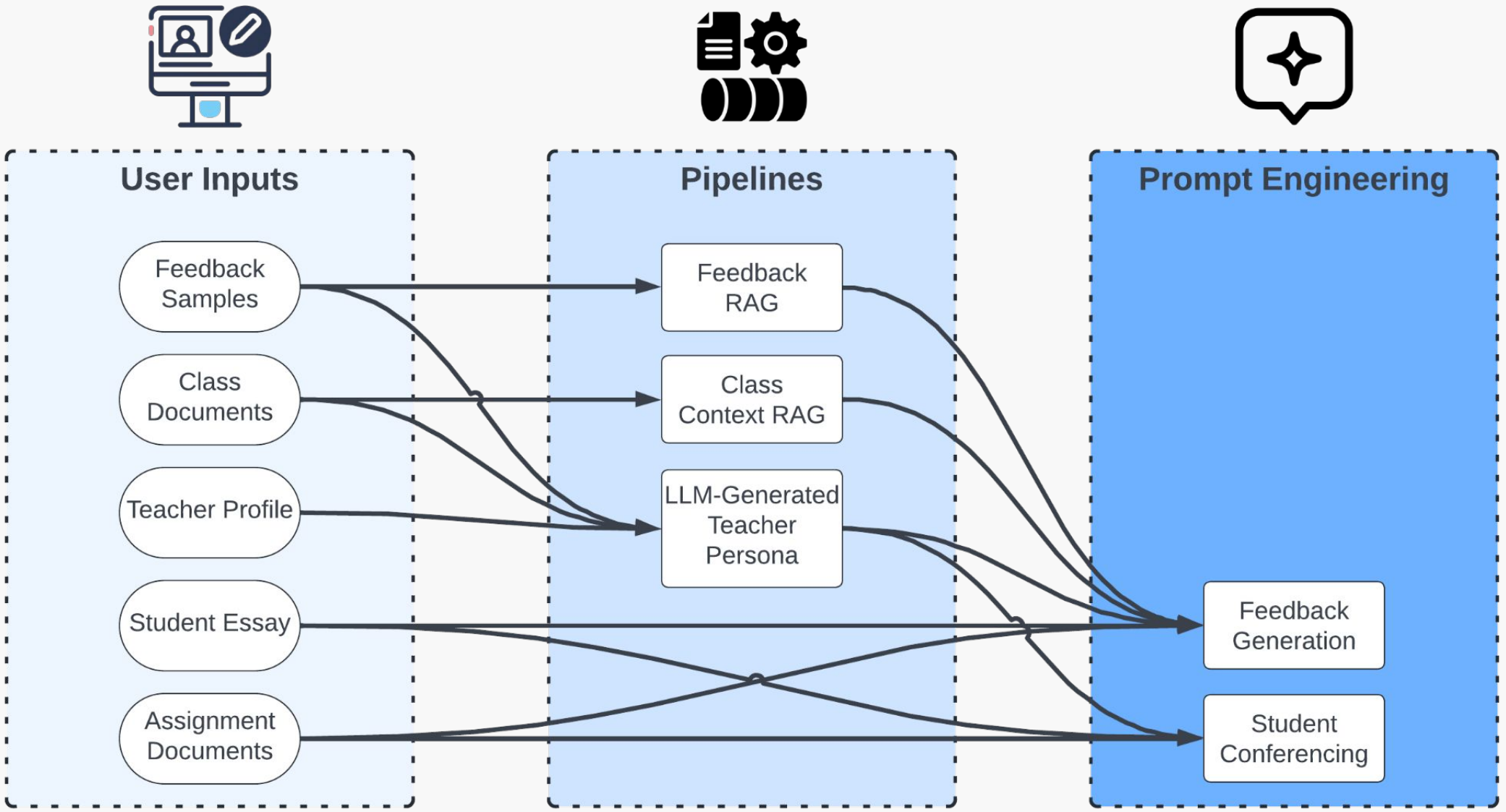


TECHNICAL APPROACH

GenAIOps System

Hypotheses

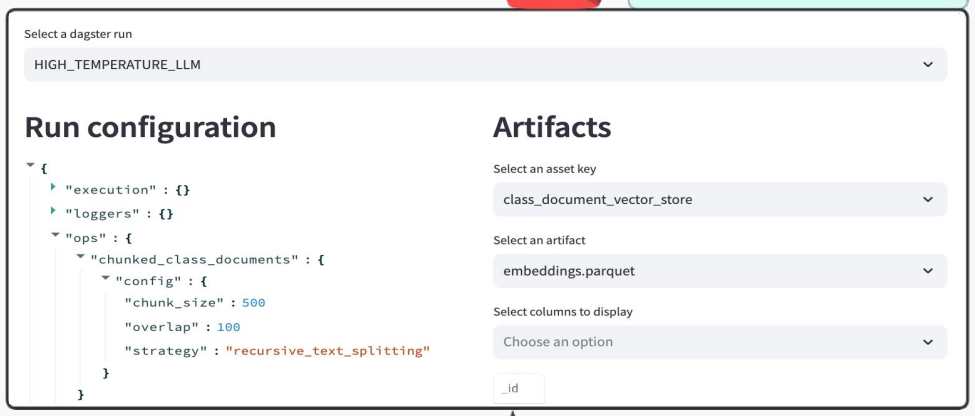
30+ Experiment Treatments

- Ablations
- Enhancements
- LLMs
- Chunking Strategies
- LLM/Chunking Parameters
- Prompt Engineering
- Embeddings

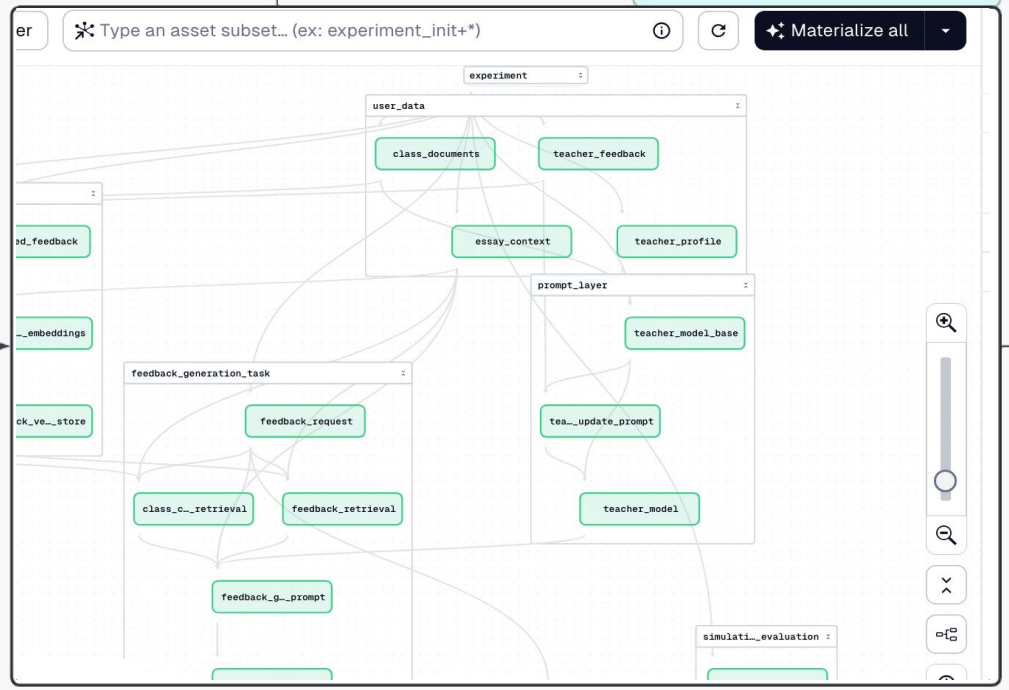
Tracking System

mlflow™

Evaluation App



Dagster Pipelines



Artifact Store

Prompts

Responses

Costs

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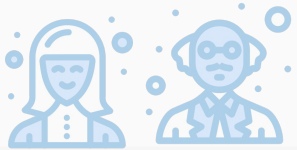

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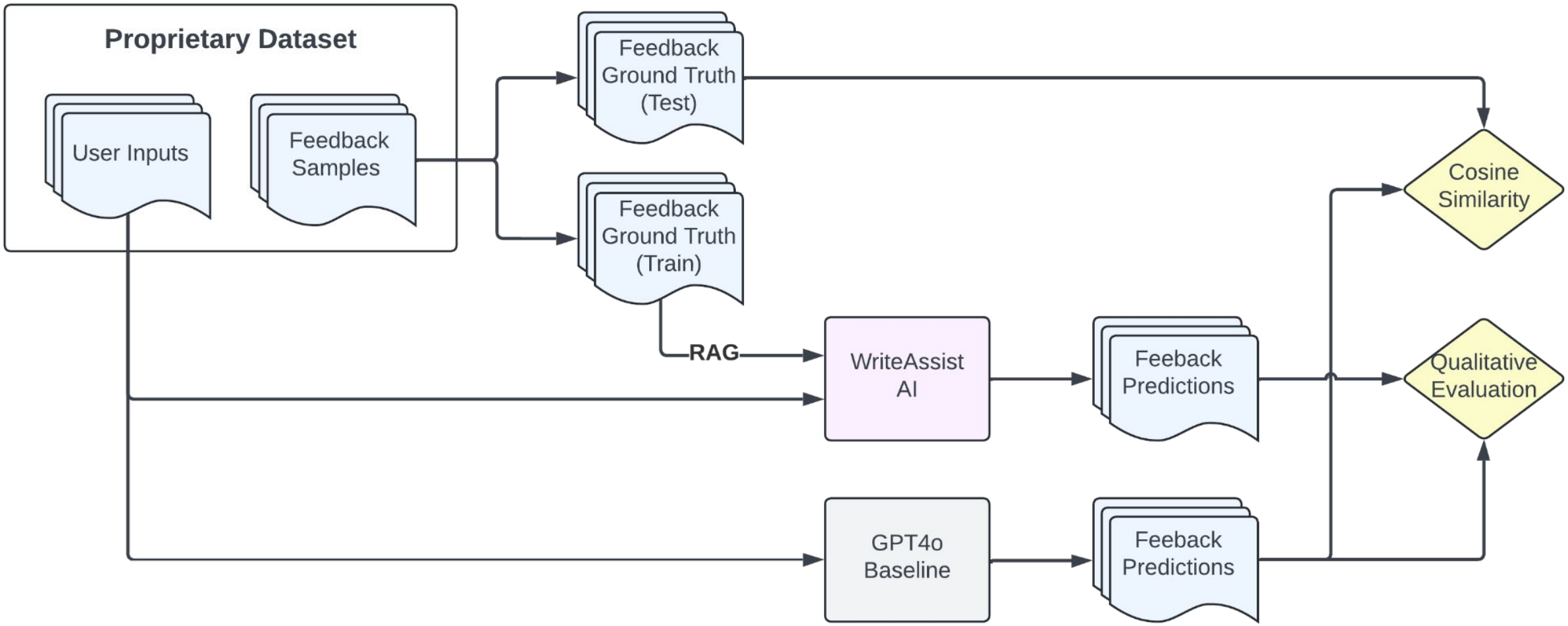

Dataset Summary

	essay_id	essay_set	essay	rater1_domain1	rater2_domain1	domain1_score
3499	4694	2	Do you think that certain materials should be ...	4.0	3.0	4.0
7167	11913	5	In the memoir, "Narciso Rodriguez from Home: t...	2.0	2.0	2.0
5976	9532	4	The Author concludes this story With the @CAPS...	1.0	1.0	1.0
5588	9143	4	The author wrote this paragraph at the end of ...	1.0	1.0	1.0
12314	20791	8	Laughter @MONTH1 be the best part of life. It...	20.0	18.0	38.0
1859	3054	2	Do you believe libraries should remove items s...	3.0	4.0	3.0
7058	10620	4	I think the Author ends this as the concluding...	2.0	1.0	2.0
11720	18979	7	A day that I was patient was, one day I was re...	8.0	10.0	18.0
4454	6851	3	The setting for the cyclist is a hard and dang...	2.0	1.0	2.0
11587	18834	7	Two week sago meandmy family went to siyflags,...	8.0	9.0	17.0

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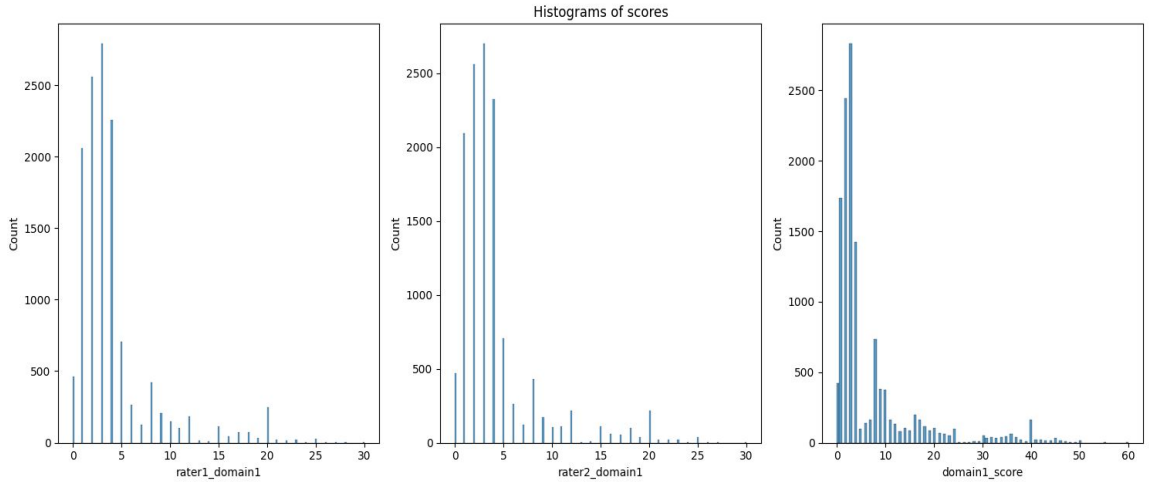
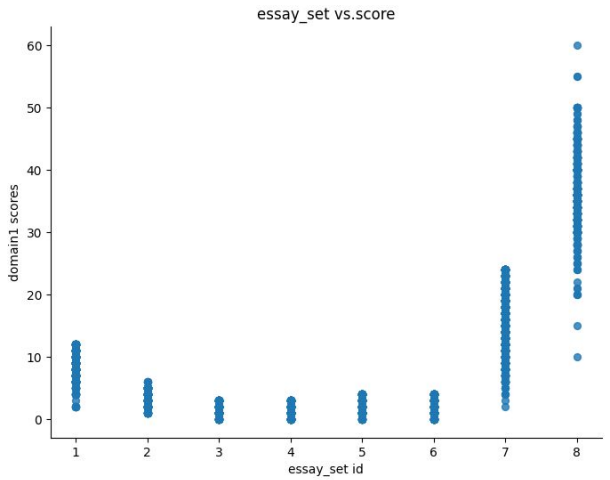
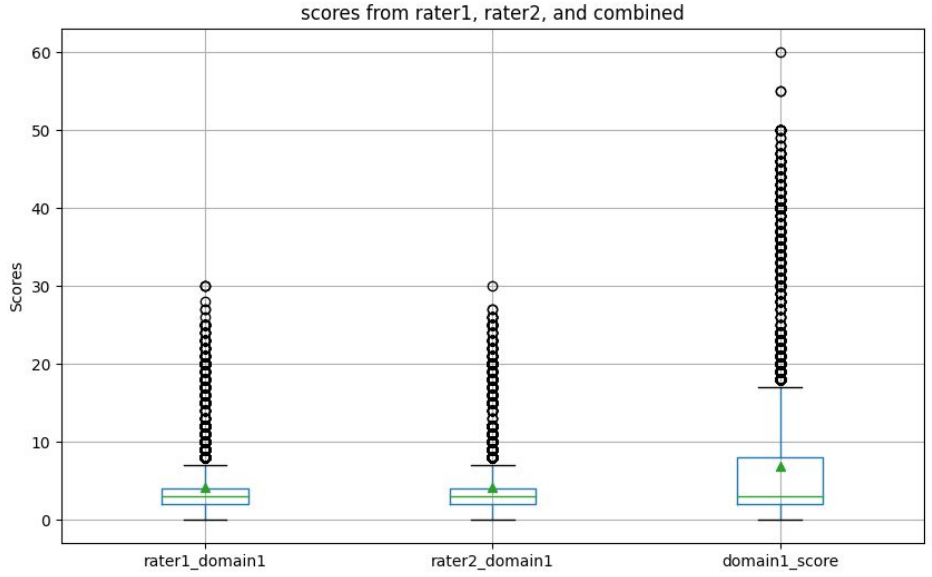
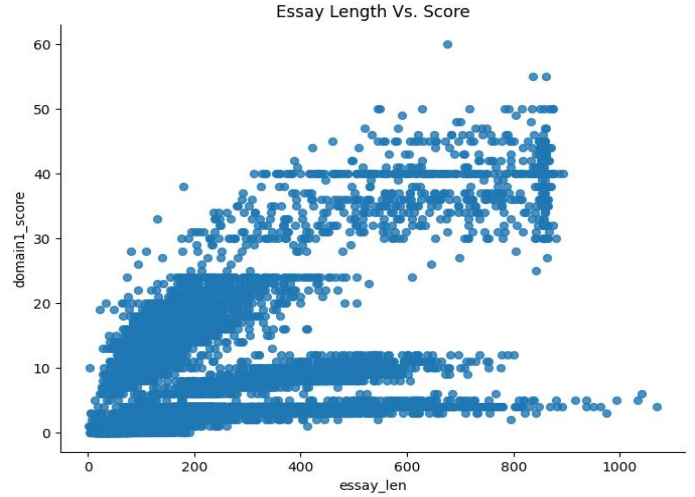


- Automated Student Assessment Prize (ASAP)
- 12977 student essays
- 8 prompts with rubrics
- Scores from 2 raters







Experiment Results

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Quantitative Results
(Feedback Generation)

- ✓ Few-shot learning
- ✓ Onboarding Q&A
- ✗ Bulleted lists
- ✗ Small chunks

+

Qualitative Results
(Feedback Generation, Student Conferencing)

- Evaluated top 3 (out of 30+) configurations
- Randomly sampled 5 per teacher
- Rated 1-5 on rubrics we developed based on user interviews

=

Final Configuration

- ✓ Feedback RAG
- ✓ GPT4-o
- ✓ Teacher persona injection
- ✗ Dynamic teacher personas

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Recap: Three Innovations

Developed a personalized feedback system

Teacher AI models used for 1:1 student conferencing

Constructed an end-to-end GenAIOps concept

Scalable and Low-Cost

1:1 Counseling Support

Machine Learning, MLOps, GenAI COMBINED

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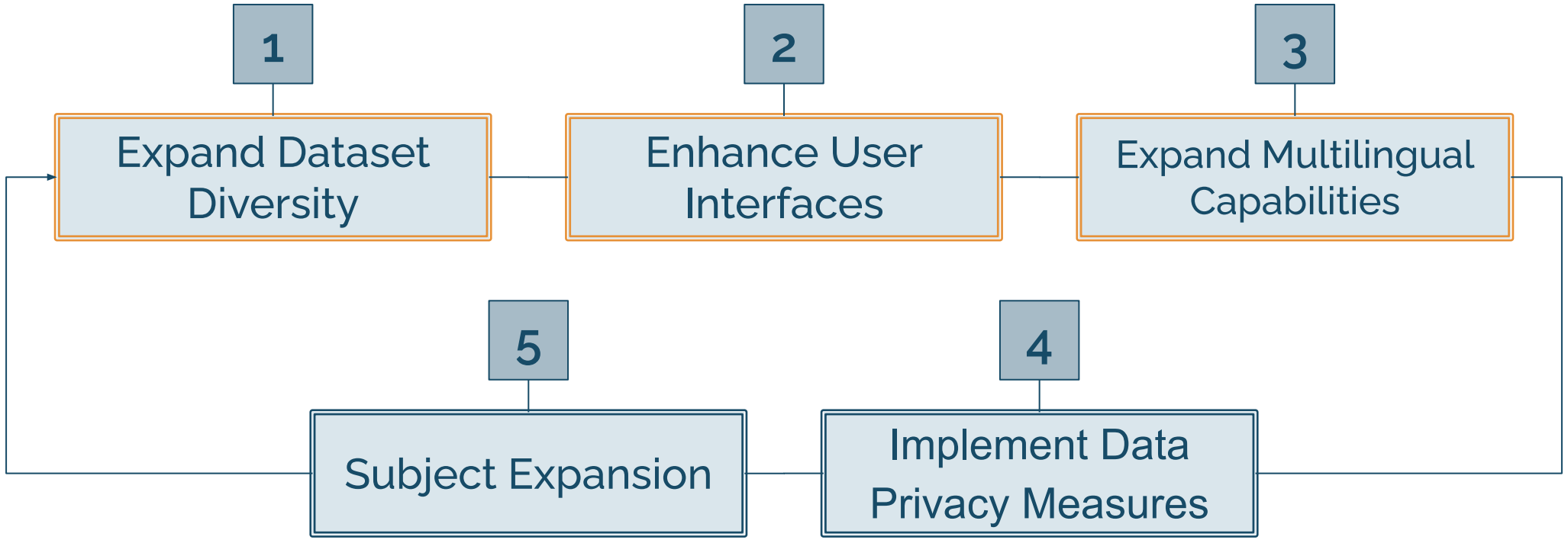
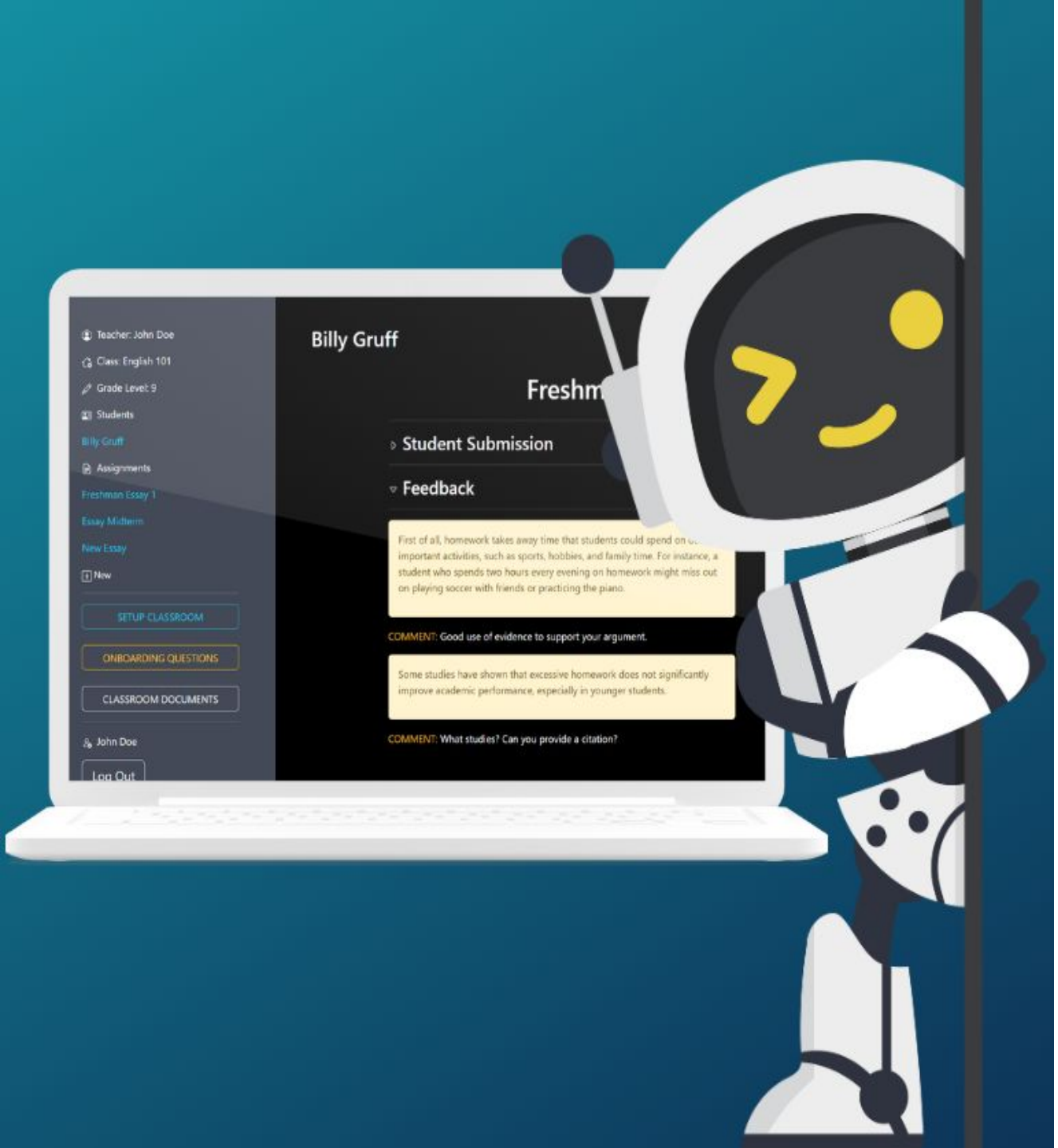
Future Work Roadmap





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Project Mission

Reduce teacher burnout and improve student v
proficiency by equipping teachers with
a classroom-aligned AI assistant that
automates feedback generation and supports
students with 1:1 counseling

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Thanks!

Any questions?

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