AI - Assisted Tutor Authoring

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In an Ideal World

1. Teacher Presents Concept

Absent Students

2. Students Practice Concept

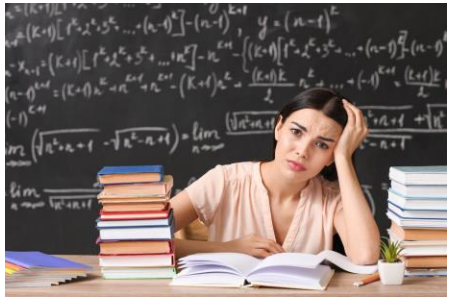
Classroom Management

3. Students ask for Feedback

4. Teacher Provides Feedback

Teacher Shortage

5. Teacher Uses this Understanding to Teach Next Lesson

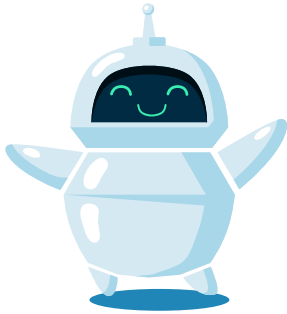


Fewer Prep Periods

1 Teacher Presents Concept

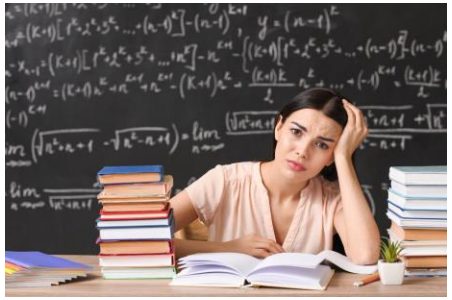
2 Students Practice Concept

With Apprentice Tutors



3 Every Student receives Personalized Feedback

4 Tutor Provides Student Mastery Data to Teacher



5 Teacher Uses this Understanding to Teach Next Lesson

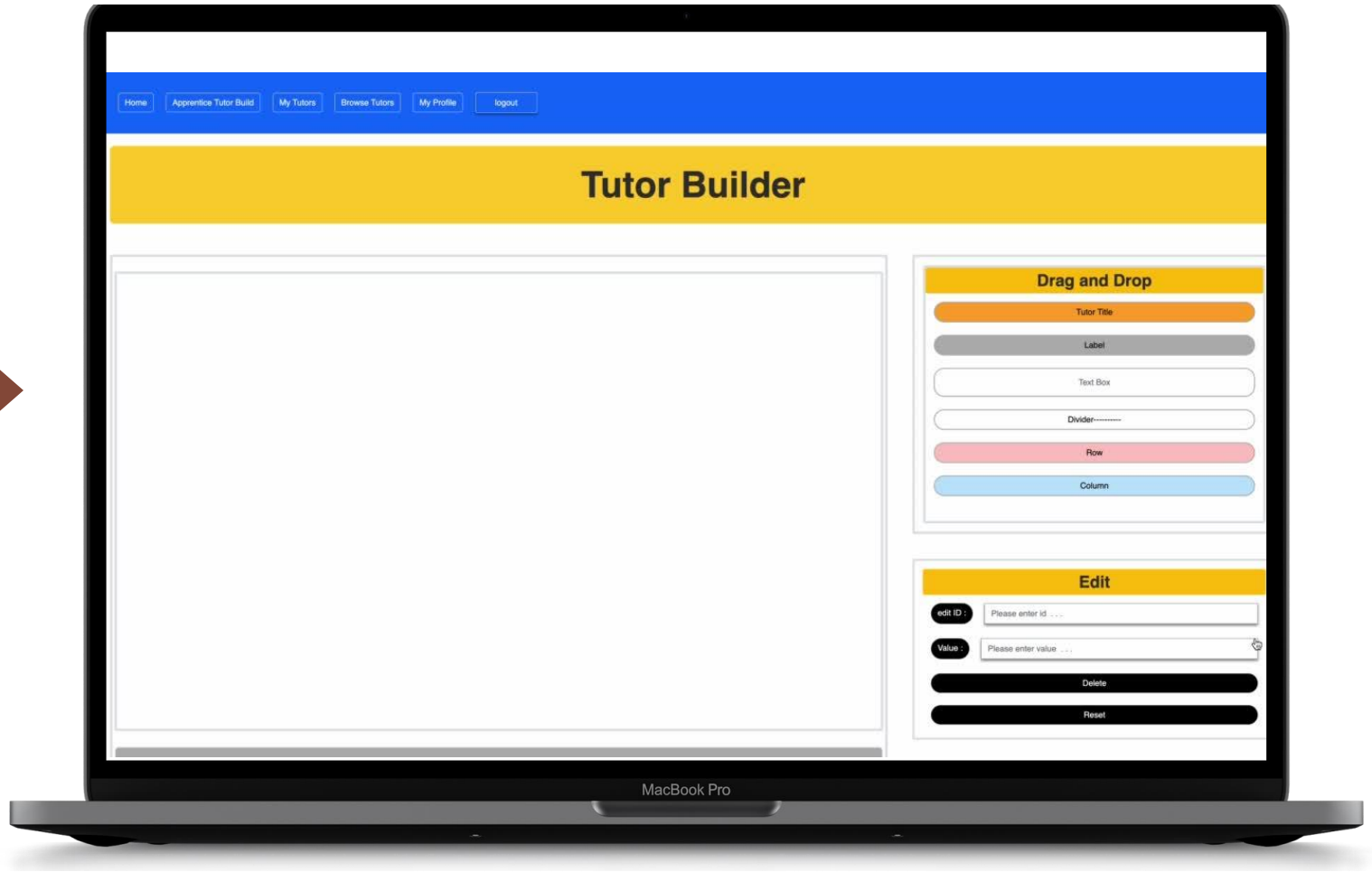
Our Vision for Scaling Personalized Education

Teacher decides
what students need
to learn

Our Vision for Scaling Personalized Education

Teacher Builds Tutor Interface Through Drag & Drop

Teacher decides what students need to learn



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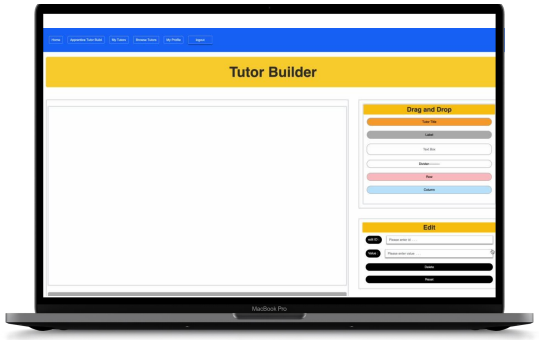
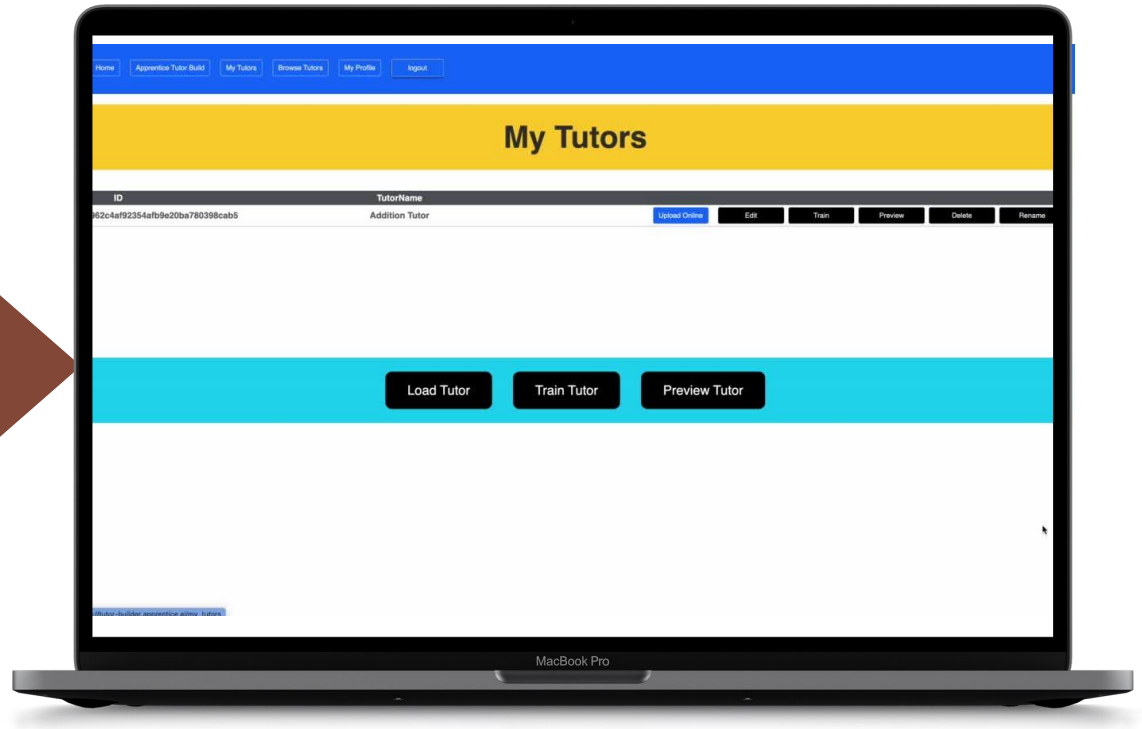


Naturally Train the AI through demonstrations



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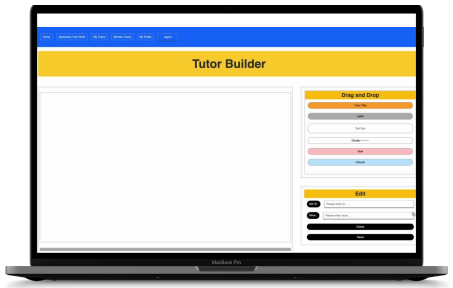

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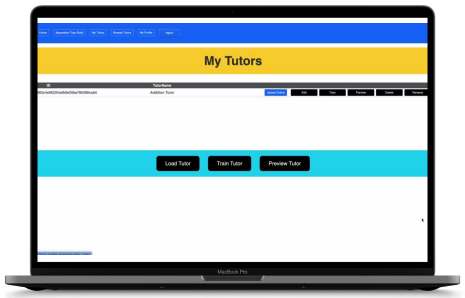

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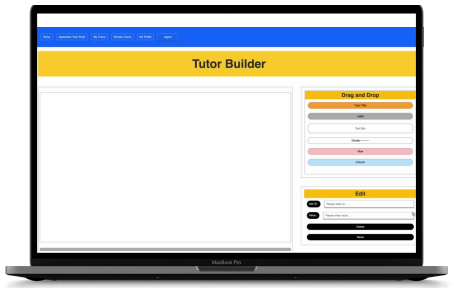
CANVAS LMS

Our Vision for Scaling Personalized Education

Teacher decides what students need to learn

Teacher Builds Tutor Interface Through Drag & Drop



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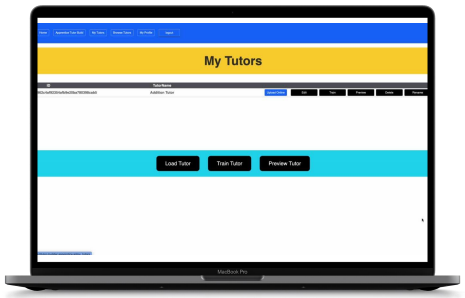

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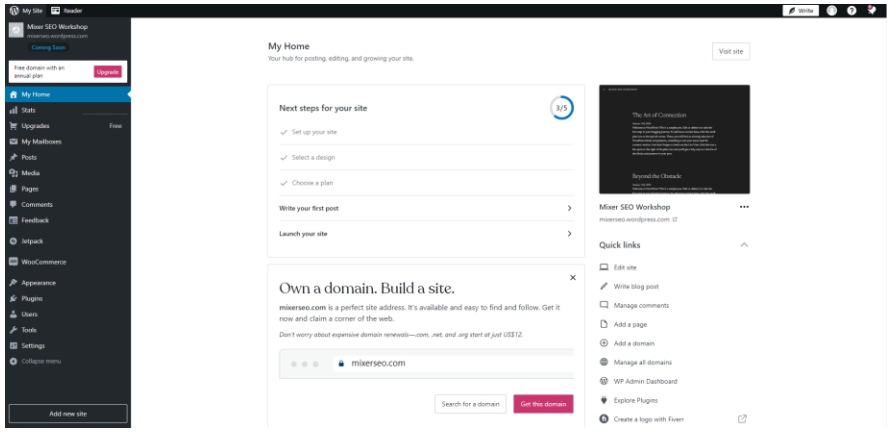
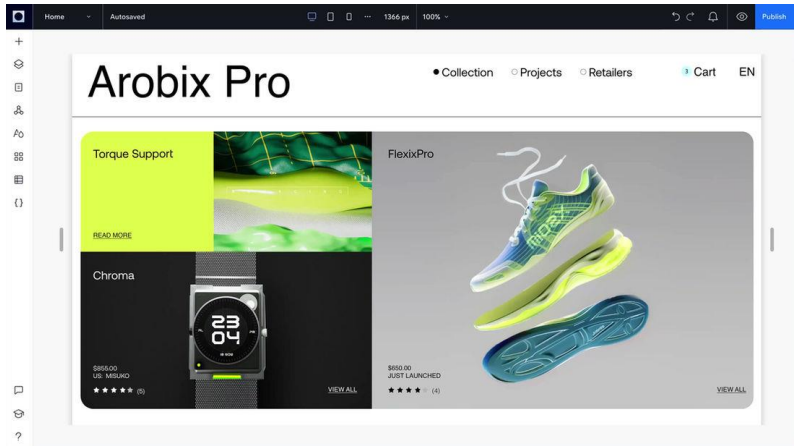
CANVAS LMS

Educators development of tutors interfaces

General Problem: End User Development of Graphical Interfaces

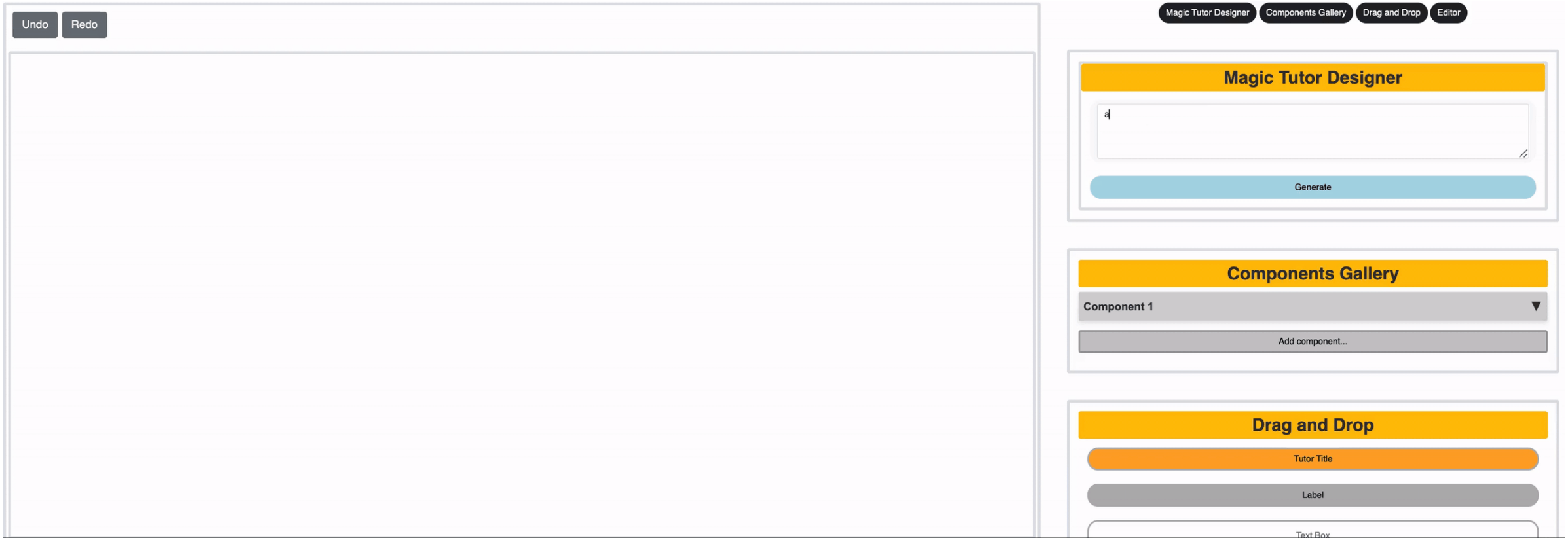
Traditional Solutions: Low/No-Code Builders (Wix Studio, Bubble, etc.)





Our Idea: Leverage Generative AI to translate High Level Requirements to Low Level Artifacts (Code/Domain Specific Languages).

Generative AI Approaches for Creating Intelligent Tutor Interfaces



Preliminary results

- AI-assisted approach substantially reduces time & effort
  - Especially for complex designs

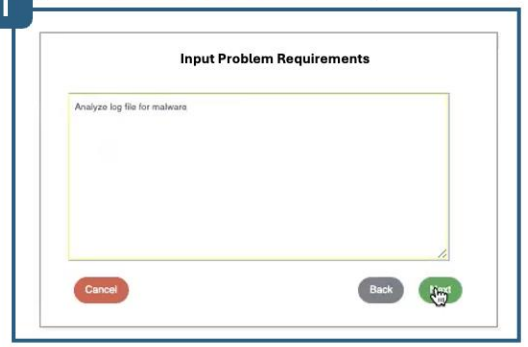
Interface Type	Time (s)			Keystrokes		
	Classical	AI-Enhanced	Reduction	Classical	AI-Enhanced	Reduction
Simple	187	**143**	-23%	184	**126**	-31%
Complex	372	**116**	-68%	141	**74**	-47%

Table 1: Comparison of time and keystrokes required for building tutor interfaces: Classical vs. AI-Enhanced

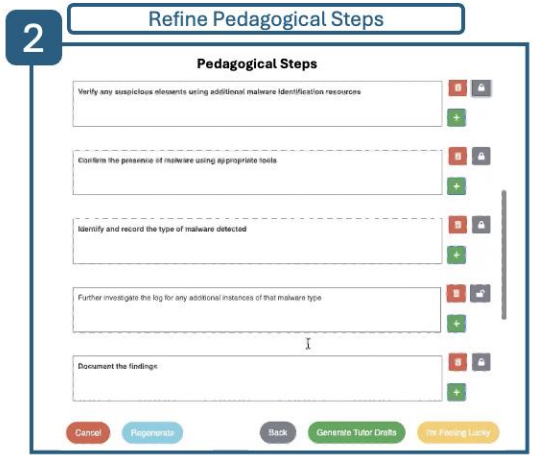
- Further development in partnership with educators
  - Optimally integrate generative AI into workflows
  - Meet requirements of real-world tutoring

An Educator-Centered Framework

1 Input Requirements

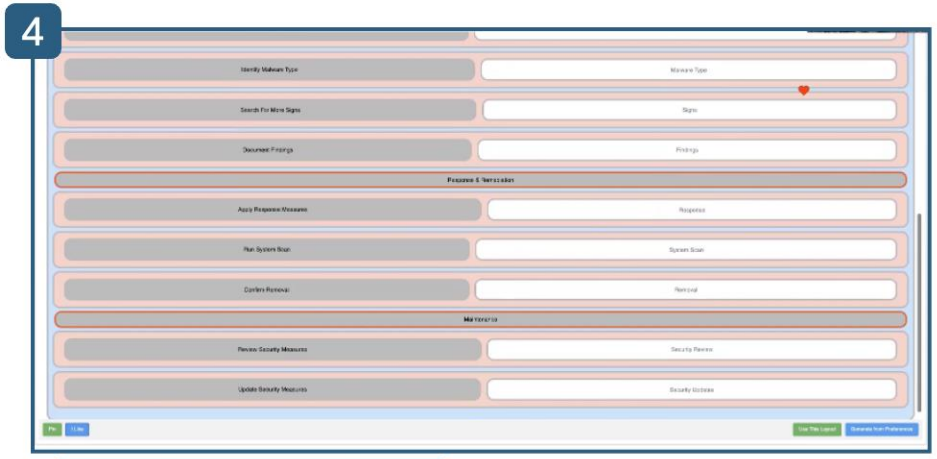


2 Refine Pedagogical Steps



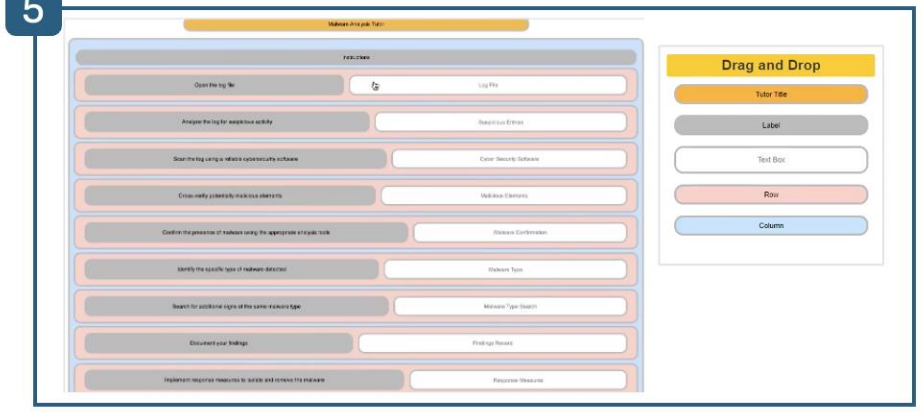
3 Explore AI-generated Designs

4



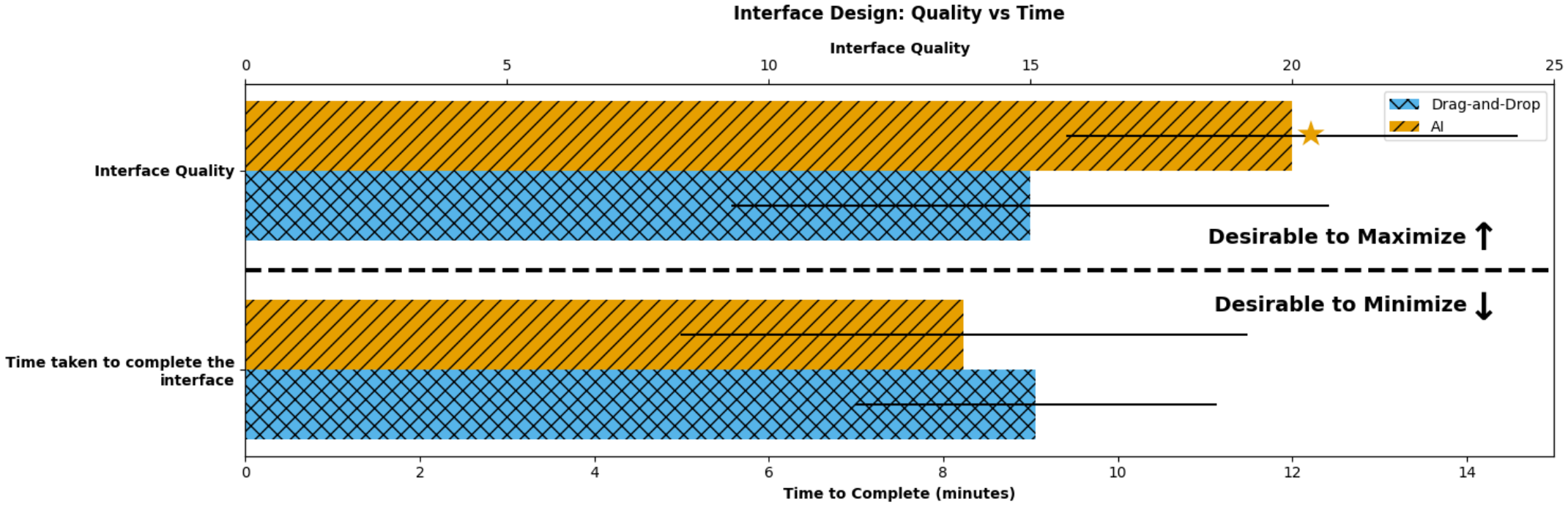
Express Preferences on the Designs

5



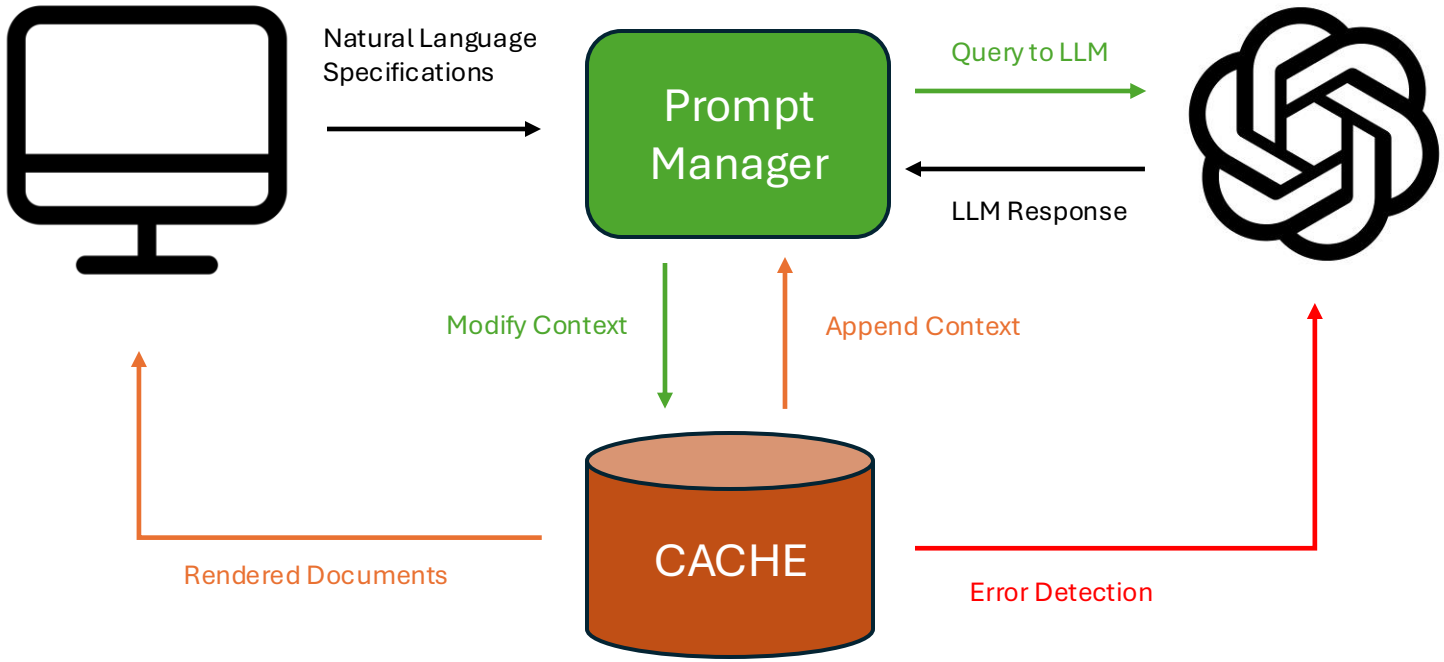
Manually Refine the Final Interface

An Educator-Centered Framework



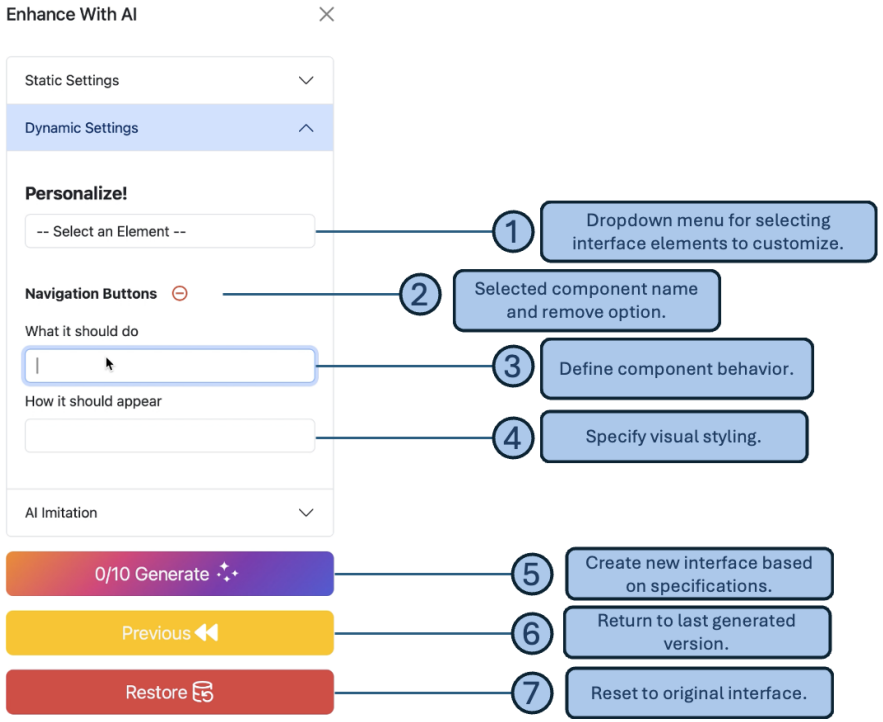
Significant enhancement of final interface quality.

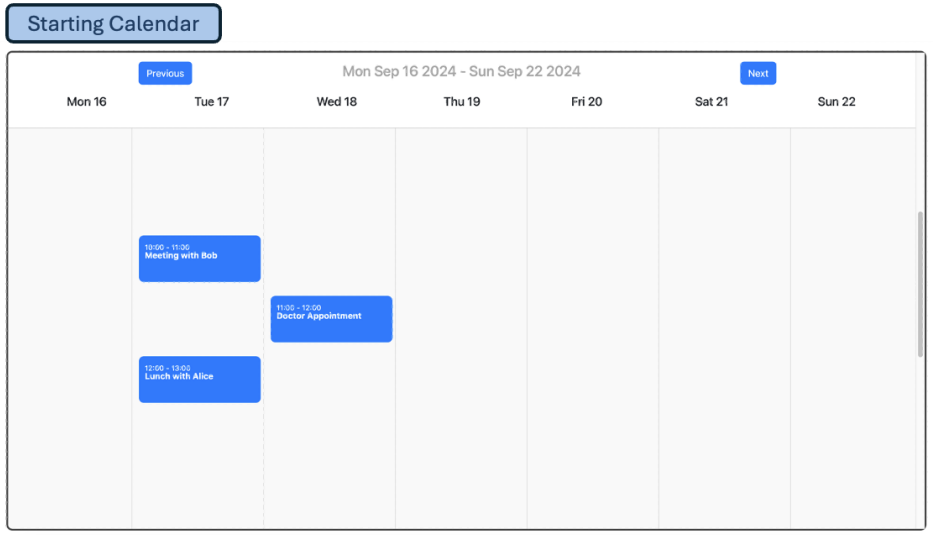
End User Development of Graphical Interfaces

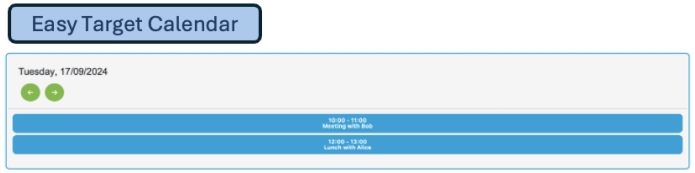


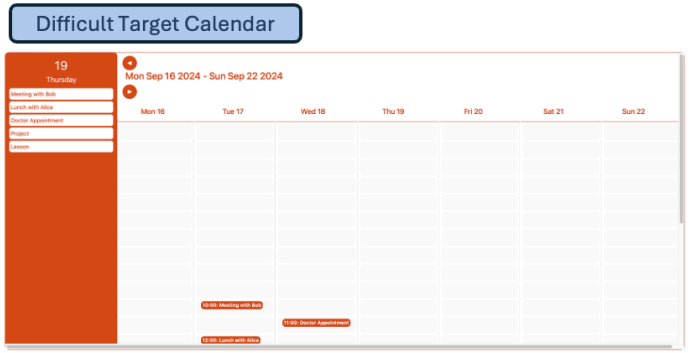
We introduce a framework to allow end users to generate and refine websites without concerning with the underlying code.

End User Personalization of Graphical Interfaces



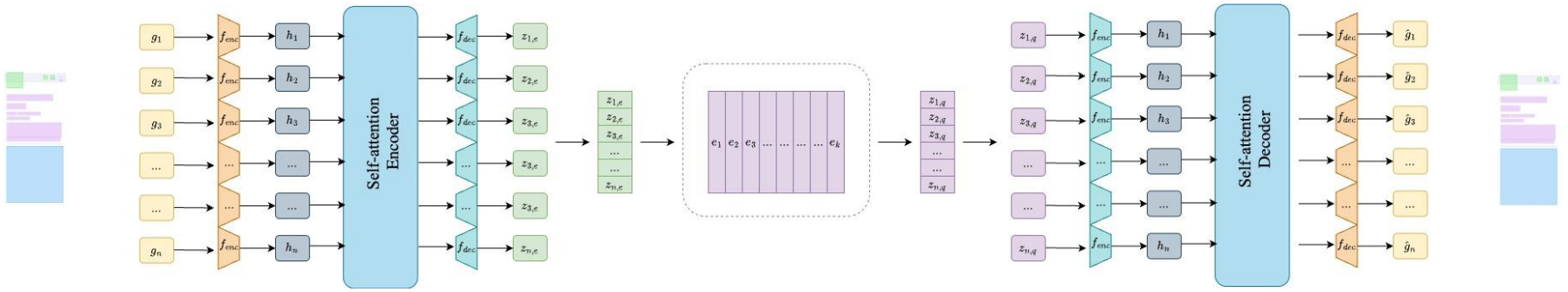






We introduce MorphGUI, a framework that leverages Large Language Models to enable free-form interface customization through natural language interaction.

Deep Learning Based Approaches



We introduce a specialized multimodal VQ-VAE for modelling Figma GUIs.

Model	mIoU ↑	Acc ↑	PosErr ↓	AreaErr ↓	Acc_{col} ↑	Cos_{txt} ↑	Cos_{img} ↑
VQ-VAE512	0.10 ± 0.05	98.63 ± 2.81	0.08 ± 0.03	0.51 ± 0.11	$\mathbf{99.63 \pm 2.61}$	0.84 ± 0.06	0.81 ± 0.09
VQ-VAE768	$\mathbf{0.11 \pm 0.05}$	$\mathbf{98.90 \pm 2.59}$	$\mathbf{0.07 \pm 0.03}$	0.51 ± 0.11	99.59 ± 2.26	0.84 ± 0.06	0.81 ± 0.09

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