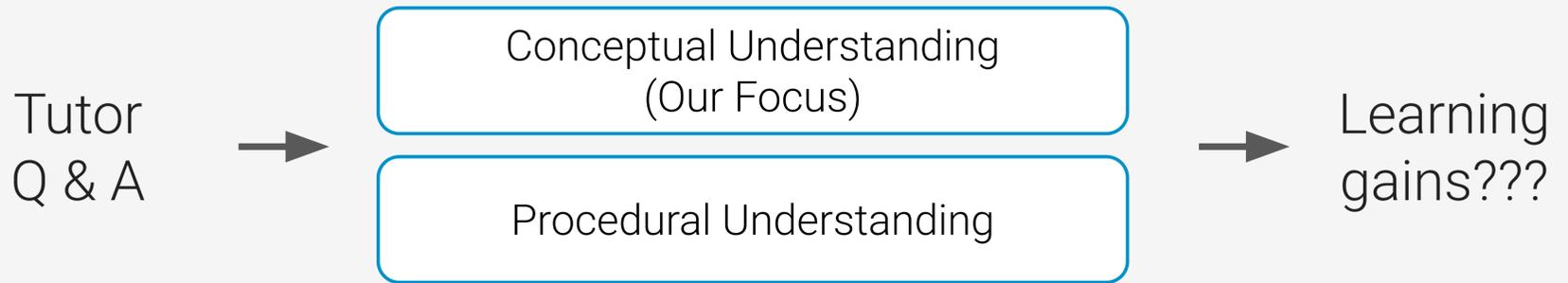


Retrieval-augmented Generation to Improve Math Question-Answering

Trade-offs Between Groundedness and Human Preference

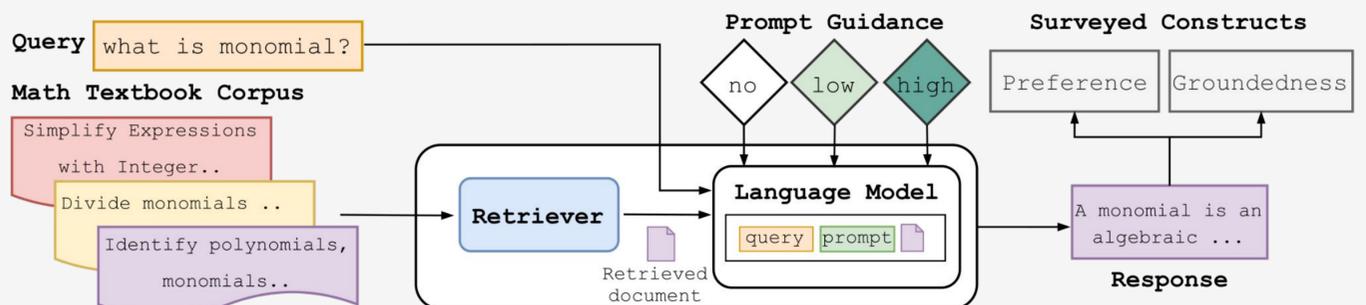
Zachary Levonian, Chenglu Li, Wangda Zhu, Anoushka Gade, Owen Henkel, Millie-Ellen Postle, Wanli Xing
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Large Language Models for Math Question-Answering



Retrieval-augmented Generation for Correctness & Groundedness

- Implemented a RAG system
- Asked GPT-3.5 student questions from Math Nation
- Retrieved textbook sections from OpenStax (prealgebra)
- Evaluated via survey
- Code & data available!

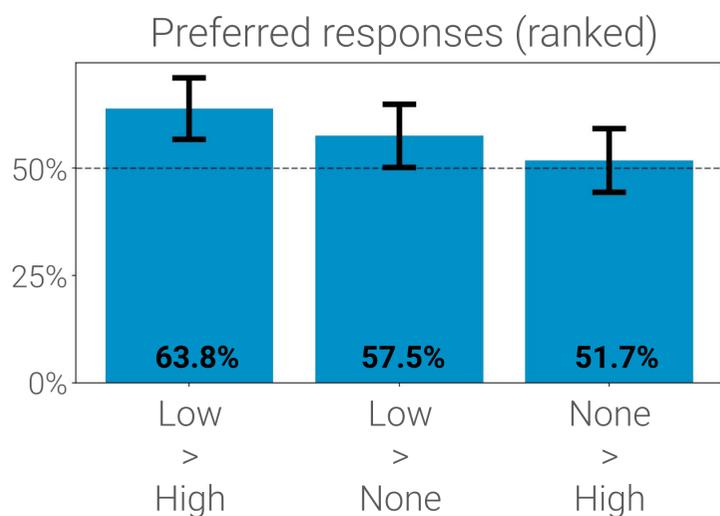


github.com/DigitalHarborFoundation/rag-for-math-qa

What we found: Humans prefer LLM responses to students' conceptual math questions when created with retrieval-augmented generation and "just the right amount" of prompting guidance.

Survey Results

- Prompt guidance affects groundedness
- Raters preferred low guidance ($n=144$)
- Too much guidance is possible!



Rori: a chatbot math tutor

- Accessed via WhatsApp
- Used in classrooms and at home
- Mostly in West Africa, esp. Ghana



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