Using Generative AI to Reframe Mathematical Tasks for Personalized Learning

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Abstract

The authors explore how generative AI can reframe mathematical tasks for personalized learning. Building on prior work showing that interest-based tasks (e.g., sports, movies, video games) boost student engagement, this study examines teachers' use of the MagicSchool tool for K–9 students. It reports on teachers' positive and negative experiences, discusses AI's affordances and limitations for personalization, and evaluates the readability of AI-generated problems.

Keywords: Generative Artificial Intelligence, Personalized Mathematics Tasks, Teacher Practice

1 Introduction

Generative AI has gained attention in education for its potential to promote personalized learning of mathematical tasks, and teachers are starting to use it to enhance student engagement and understanding. Tools within software suites like *MagicSchool* offer an innovative, customized approach by modifying problem contexts to align with students' interests. Using references to popular culture, hobbies, and other real-world contexts as prompts to the AI, educators can develop tasks that allow for a deeper connection between students and math concepts. This paper explores how mathematics teachers utilized *MagicSchool* to personalize word problems and activities for their students, highlighting both the opportunities and challenges of AI-driven personalization.

Walkington (2013) and Bernacki and Walkington (2018) found that when mathematical problems incorporate students' interests in areas like sports or video games, engagement increases, leading to better learning. Recent meta-analyses (Lin et al., 2024) further support the positive effects of personalized learning, demonstrating its potential to improve students' knowledge retention and problem-solving abilities.

This study investigates two key aspects of AI-assisted personalization in mathematics education. First, we examine teachers' reflections on using *MagicSchool* to modify problem contexts, using screenshots of *MagicSchool* and transcription of teacher conversations, identifying their strategies for ensuring relevance and accessibility. Second, we analyze real examples of AI-generated personalized problems, comparing them with their original versions and looking at the manner in which AI reformulated these problems.

2 Summary of Related Literature

Research shows that tying mathematics to students' interests highlights its real-world relevance and deepens understanding (Sawyer, 2024; Bernacki & Walkington, 2018). Teachers using generative AI report that customized, interest-based problems help learners make sense of tasks, offer meaningful choices, and boost motivation while reducing math anxiety (Aga et al., 2024; Biton & Segal, 2025; Beauchamp & Walkington, 2024). These benefits hold true at all levels of mathematical study (Kaplan, 2024). In addition, some studies suggest that strengthening pre-service and in-service teachers' understanding of generative AI in mathematics will allow them to critically review what is generated and create more engaging environments in the classroom for students (Aga et al., 2024; Sawyer, & Wolfe, 2024; Li, 2024; Wardat et al., 2024). Broutin et al. (2024) suggest that teachers can use generative AI platforms to innovate and individualize learning, which is critical to the teaching profession as technology progresses rapidly. Understanding complex math concepts can be easier if personalization is used to draw upon students' interests (Walkington, 2013). However, more research is needed to understand how teachers engage with context personalization with generative AI as a lesson-planning partner. This study investigates two key aspects of AI-assisted personalization in mathematics education. For clarity, we refer to our research questions as **Q1** and **Q2**:

Q1. What themes arise as teachers explore and discuss the benefits and drawbacks of generative AI for personalizing mathematics tasks to students' interests?
Q2. How does teacher personalization through generative AI tend to change the readability of mathematics tasks?

3 Methodology

This study examines 12 teachers enrolled in a university-level elementary mathematics methods course, including 3 preservice and 9 in-service teachers. The teachers were diverse in background and experience. Participants identified as Asian (2), Chinese (1), Black (2), Hispanic or Latino (2), Spanish (1), and White (5). The in-service teachers held a range of teaching assignments, including Kindergarten, Second Grade, Fourth Grade, Fifth Grade (2), Sixth Grade (2), Seventh Grade, and Algebra 1.

MagicSchool is an online platform that includes over 60 generative AI tools for teachers. Teachers used three generative AI tools from *MagicSchool* designed to adapt and write instructional tasks, namely *Math Word Problem Maker*, *Make it Relevant*, and *Rewrite It*. *Math Word Problem Maker* generates custom math word problems aligned to specific grade levels and learning objectives, which teachers can tailor for difficulty, context, and problem type. *Make it Relevant* adapts instructional content to better reflect students' interests, cultures, or real-life experiences. *Rewrite It* enables teachers to modify existing text in mathematical tasks for different reading levels and contexts. These AI tools personalize learning by making content more accessible to the needs of individual students and entire classes. Teachers used math tasks from standardized tests or from their curricula and explored AI-based revisions incrementally.

For **Q1**, we analyze teacher interviews and screen recordings with verbal discussions to understand different approaches to personalizing mathematical tasks using *MagicSchool*. For **Q2**, we analyze original and AI-revised problem tasks that teachers produced, as well as the new problems generated by *MagicSchool*. Table 1 shows several examples. For most word problems, teachers chose to keep the number set from the original problem the same, changing numbers only when the originals didn't make sense contextually or pedagogically.

Table 1. *Examples of original problems and their personalized counterparts.*

Original Problem	**Personalized Problem with *MagicSchool***
A kid goes to the ice cream shop and gets three scoops of ice cream. He drops one scoop on the floor on his way out. How many scoops does he have now?	A student named Evangeline goes to the pizza parlor and gets three slices of pizza. She drops one slice on the floor on her way out. How many slices does she have now?
A group of people bought tickets for a roller-coaster ride. The group spent $4 for each ticket. Altogether, the group spent $48 on tickets. Each person in the group got two tickets. How many people were in the group?	*Students' School Trip to Six Flags:* A group of students in blue shirts went on a school trip to Six Flags. They bought tickets for a roller-coaster ride. The group spent $4 for each ticket. Altogether, the group spent $48 on tickets. Each student in the group got two tickets. How many students were in the group?
Two customers spent the same total amount of money at a restaurant. The first customer bought 8 hot wings and left a $4 tip. The second customer bought 10 hot wings and left a $2.80 tip.	*Solving a Mystery at the Spooky Restaurant!* Two customers visited a restaurant and had a puzzling experience. *Customer 1* ordered eight hot wings and tipped $4. *Customer 2* ordered 10 hot wings and tipped $2.80. Both customers paid the same price per hot wing.
Both customers paid the same amount per hot wing. How much does one hot wing cost in dollars and cents at this restaurant?	Can you help Scooby Doo figure out the cost of one hot wing in this Scooby Snack-loving restaurant?

This study draws on multiple data sources to understand how teachers interact with generative AI tools from *MagicSchool*. To answer **Q1**, open coding was applied to responses from a whole-class discussion and post-survey. We expanded the analysis by incorporating additional data, including transcriptions and screen recordings (with audio speech from teacher discussions) using each of the three AI tools. The screen recordings (which we illustrate through selected screenshots) document real-time interactions, decision-making processes, and collaborative discussions, offering deeper insight into how teachers leveraged AI to personalize instruction. For **Q2**, webfx.com was used to review the readability scores of the original and revised AI-generated word problems. The readability review was used for teachers' interactions with *MagicSchool*'s *Rewrite It* and *Math Word Problem Creator* tools. By triangulating participants' reflections, recorded collaboration, and AI-generated outputs, we've strengthened the depth and reliability of the analysis.

4 Findings

4.1 Research Question 1 (Q1)

To address **Q1** (*What themes arise as teachers discuss the benefits and drawbacks of generative AI for personalizing mathematics tasks to students' interests?*), 21 distinct codes were identified from the data on teachers' perceptions of the affordances and constraints of using *MagicSchool*'s three tools to personalize instruction. In a second round of coding, these codes were grouped into six overarching themes (Table 2) by categorizing similar codes.

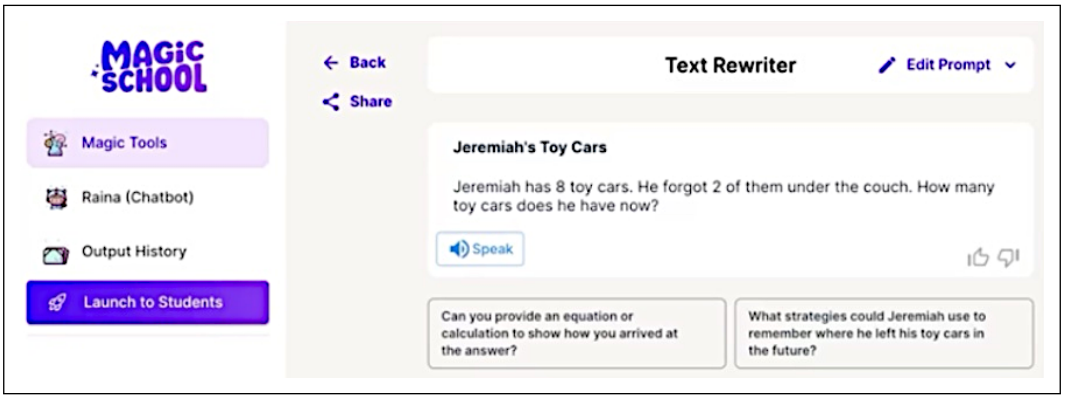
Theme 1: AI and Math Pedagogy

Figure 1 illustrates how a teacher leveraged *MagicSchool*'s *Text Rewriter* tool to enrich a word problem with prompts that fostered critical thinking (one of our codes). This gave the kindergarten teacher concrete ideas for follow-up questions to deepen student understanding. It also exemplifies our third theme, *AI as a Planning Partner*, as the AI provided ready-to-use, next-step suggestions. This theme is explored in more depth below.

Table 2. *Personalization with AI: Teacher Themes and Codes*

Theme	Codes	Freq.
AI and Math Pedagogy (n=86)	Ability of AI to show pedagogical math reasoning	10
	Inability of AI to show pedagogical math reasoning	12
	AI and critical thinking	17
	AI and student motivation	18
	Navigating district policy and autonomy in AI integration	26
	AI and lesson differentiation	3
Building Relationships (n=69)	Integrating students' background and interest	43
	Prompts reflect student voice or identity	26
AI as a Planning Partner (n=92)	Accessible PD for teachers anytime/anywhere	2
	Ease of prompt engineering	42
	Teacher empowerment to craft ideas	48
AI Tools Customization (n=110)	Text focuses on specific situation or audience	23
	Re-prompting vs. iterative prompting	41
	AI Tools Not Efficient	10
	AI Tools Efficient	14
	AI Tools Enhance Creativity	12
	Prompt copying	10
Accuracy and Authenticity (n=57)	Positive factual accuracy of AI	10
	Negative factual accuracy of AI	14
	Positive authenticity of AI	12
	Negative authenticity of AI	21

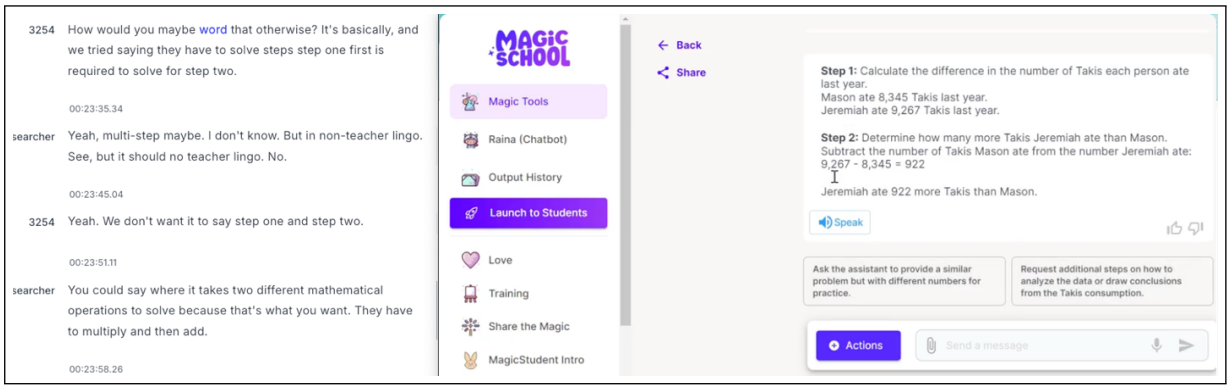
Figure 1
Improving Opportunities for Student Critical Thinking



Note: *The screenshot illustrates the MagicSchool Text Rewriter tool suggesting follow-up prompts to deepen student reasoning.*

Also, under the first theme of *AI and Math Pedagogy*, Figure 2 shows another teacher's struggle with using the *Text Rewriter* tool. The third-grade teacher considered changing the wording (taking out teacher lingo of "multi-step problem") to have it generate a two-step problem. However, the LLM could not understand the direction or produce the desired output, demonstrating one of our codes, *Inability to Engage in Appropriate Pedagogical Math Reasoning*.

Figure 2
Inability of AI to Show Pedagogical Math Reasoning



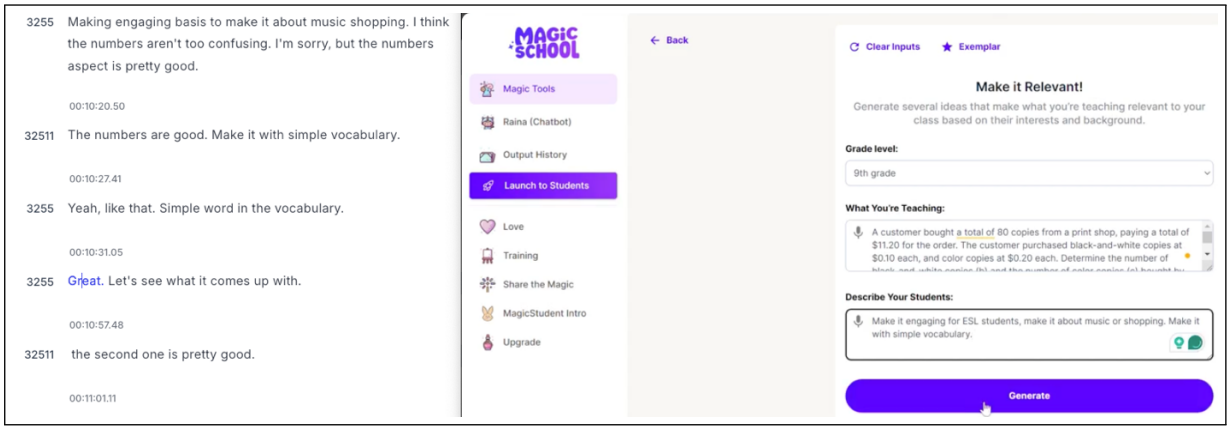
Note: *The screenshot shows a teacher prompting MagicSchool's Text Rewriter to generate a clear two-step problem, illustrating limitations in the AI's pedagogical reasoning.*

There were ten instances (n = 10) where AI effectively supported students' mathematical reasoning, such as by suggesting deeper questions for students to consider. In eighteen instances (n = 18), AI was used to adapt content to students' interests to boost motivation. In twenty-six cases (n = 26), teachers described challenges related to district policy or autonomy when integrating AI—stemming from administrative rules or their own instructional choices. Finally, only three instances (n = 3) highlighted AI's potential to support lesson differentiation, suggesting that this area remains underexplored by teachers.

Theme 2: Building Relationships

In the transcript excerpt (Figure 3, left), the preservice teacher asked *MagicSchool* to simplify vocabulary and connect the task to students' interests in music and shopping. This aligns with our code, *Integrating Students' Backgrounds and Interests*, since teacher intentionally adapted content to reflect students' lived experiences to boost engagement.

Figure 3
Integrating Students' Background and Interests



Note: *This screenshot shows a teacher using MagicSchool's Make It Relevant tool to tailor word-problem contexts—here asking for simple vocabulary and familiar topics.*

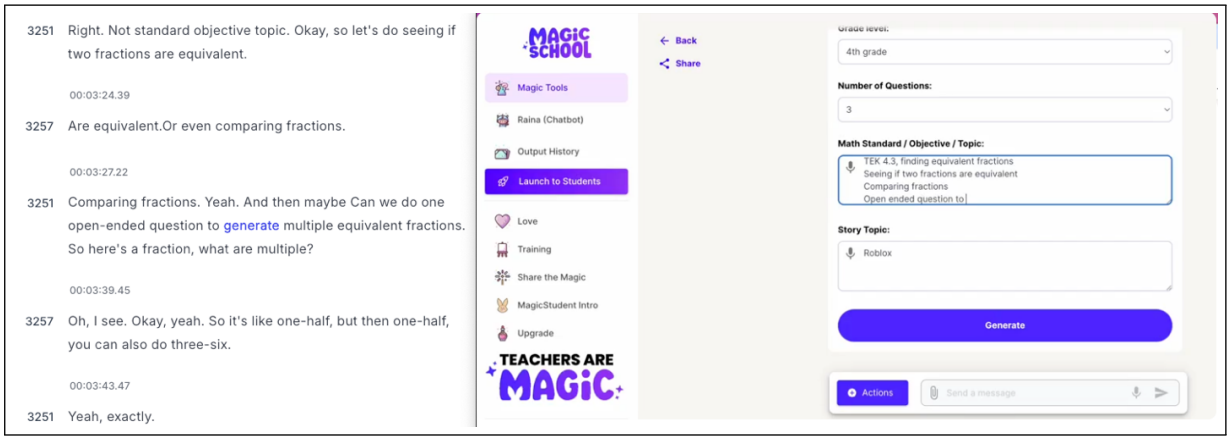
In addition to integrating students' backgrounds and interests, the theme *Building Relationships* included 26 instances (n = 26) where prompts were personalized to reflect

student voice or identity. These examples described efforts to tailor language, cultural references, or content in AI-generated materials to affirm students' individuality.

Theme 3: AI as a Planning Partner

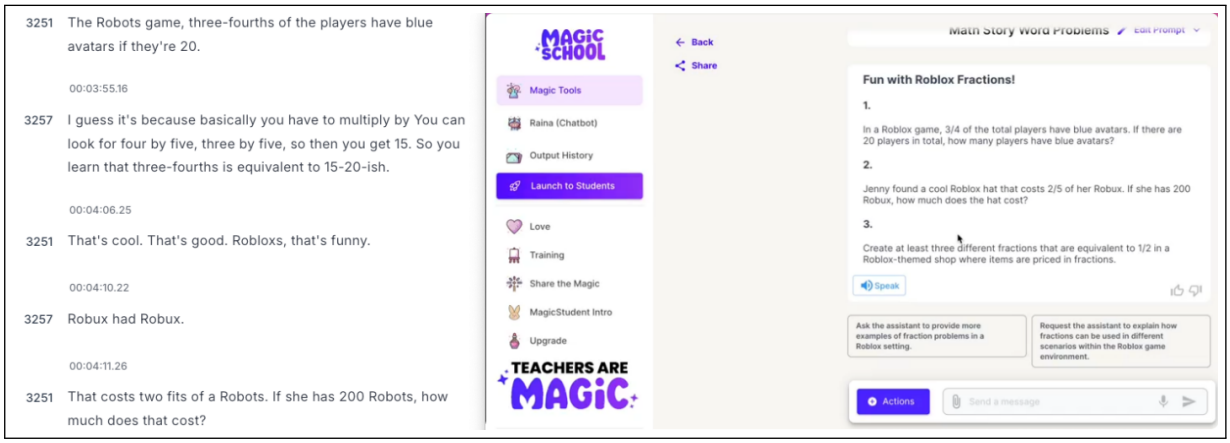
Figure 4 illustrates our third theme, *AI as a Planning Partner.* Figures 4 and 5 show how one teacher designed open-ended problems tailored for their classroom using *MagicSchool*'s AI tools. In the transcript, fourth and sixth-grade teachers used the *Math Story Word Problem* tool to create fraction comparison problems, using standards to guide their work. The tool enabled teachers to plan problem types and craft new ideas for their classrooms, one of our codes under this theme.

Figure 4
Teacher empowerment to craft ideas for classroom



Note: *In this screenshot a teacher uses the Math Story Word Problem tool to generate multi-step fraction tasks tied to student interests, illustrating how AI can support open-ended lesson planning.*

Figure 5
Teacher empowerment to craft ideas for classroom



Note: *This screenshot shows a teacher using MagicSchool's Math Story Word Problem tool to generate multiple Roblox-themed fraction tasks, illustrating how AI empowers teachers to quickly craft context-adapted problem ideas.*

The theme *AI as a Planning Partner* also included (n = 42) instances of ease of prompt engineering. Teachers described how they quickly learned to adjust structure or language to

get a more targeted and useful response from AI. Less frequent were (*n* = 2) instances where teachers discussed the accessible professional development (PD) opportunities, drawing attention to the need for more generative AI professional development in mathematics.

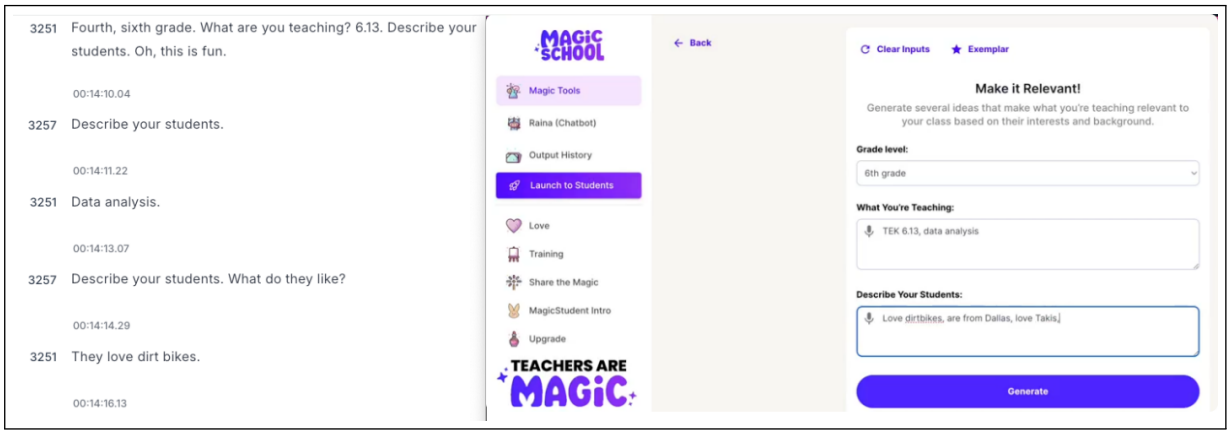
Theme 4: AI Tools Customization

Figures 6 and 7 illustrate our fourth theme, *AI Tools Customization*. In Figure 6, the sixth-grade teacher used the *Make It Relevant* tool to customize the activities to the interests of their students. The teacher said, "They love dirt bikes" and "are from Dallas," to further personalize the activities. Figure 7 shows three possible activities generated by *MagicSchool*. The teacher noted, "That one is interesting because I'm sure they [the AI] already know what they [my students] would want to analyze." This demonstrates how the *Make It Relevant* tool facilitates customization by prompting teachers to "describe your students." Here, teachers can list things their students enjoy. While the teachers ultimately decided that the "dirt bike" activity might not work for their class, they did not elaborate on the reason. Nevertheless, the process generated reflection and discussion about their students' interests, illustrating how generative AI can support more student-centered planning, even when initial outputs are refined or changed.

This exchange illustrates the code, *AI Tools Efficient*, since the teacher was able to generate multiple relevant activity options by inputting a handful of student interests. The teacher was then able to review them and choose what would work best for their students. The interaction also illustrates the code, *Text Focuses on Specific Situation or Audience*, because the content that the AI generated reflected the teacher's specific input about their students—namely, interest in dirt bikes and their local context. This personalization made the content more relevant for students. Additionally, in the post-interviews, one preservice teacher described how, "I liked that you could add as much detail as possible to get what you want. The more you know the student, the better descriptions you can give. I believe this AI tool can be improved by connecting the mathematical concepts to the student's description and not only gathering surface-level ideas and putting them together."

Figure 6

AI Tools Are Efficient and Text Focuses on Specific Situation or Audience



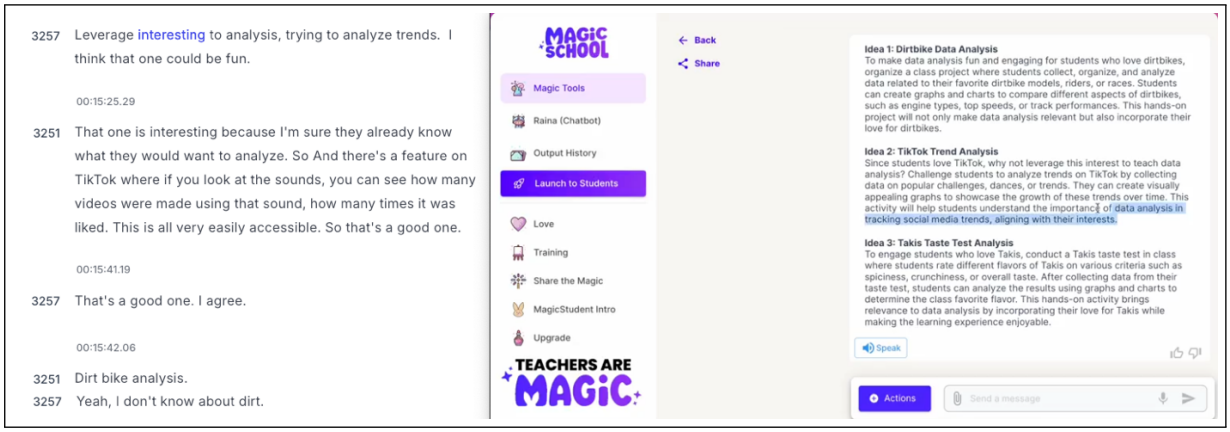
Note: *This screenshot shows a teacher using MagicSchool's Make It Relevant tool to tailor a data-analysis task by specifying students' interests (dirt bikes, Dallas, Takis), illustrating how audience-driven prompts guide AI to generate contextually relevant problem ideas.*

Four additional *AI Tools Customization* codes emerged. *Re-prompting vs. Iterative Prompting* (n = 41) described teachers' trial-and-error in refining or re-submitting prompts for better outputs. *AI Tools Not Efficient* (*n* = 10) captured frustrations when the tools produced

off-target results. *AI Tools Enhance Creativity* (*n* = 12) surfaced when teachers praised imaginative AI suggestions that expanded their instructional ideas. Finally, *Prompt Copying* (*n* = 10) noted instances where teachers reused proven prompts as an efficiency tactic.

Figure 7

Negative Factual Accuracy



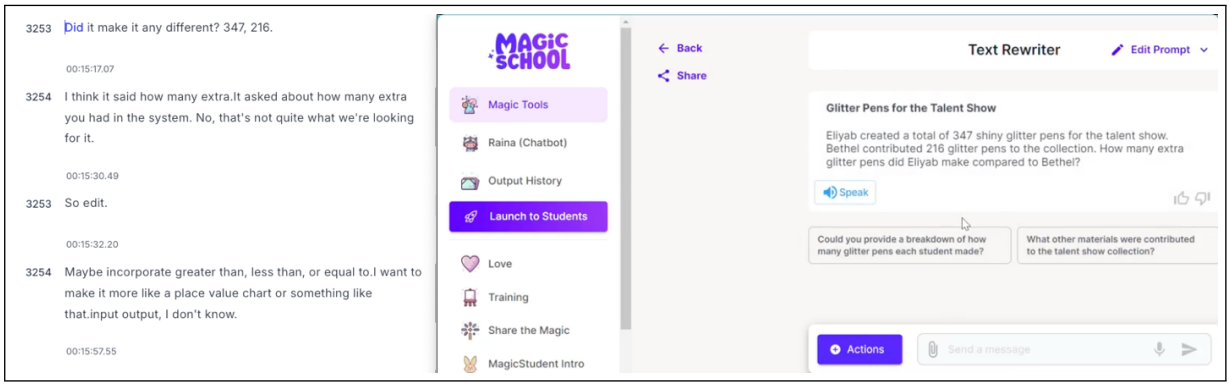
Note: *This screenshot shows MagicSchool's Make It Relevant tool generating multiple context-adapted project ideas (e.g., dirtbike data analysis, TikTok trend tracking, Takis taste tests) in response to a teacher's prompt, illustrating how AI can spark creative, student-centered lesson possibilities.*

Theme 5: Accuracy and Authenticity

Figures 8 and 9 demonstrate our fifth theme, *Accuracy and Authenticity*. In Figure 8, the third-grade math teacher emphasized the need to add key terms to the problem for the *MagicSchool* output to be factually accurate to give the students enough information to solve the problem. The language of "extra" glitter pens is confusing and ambiguous. The teacher wanted *Text Rewriter* to add language like *greater than*, *less than*, or *equal to*, in order to clarify the mathematics while maintaining the context. As such, this passage demonstrates the *Negative Factual Accuracy* code.

Figure 8

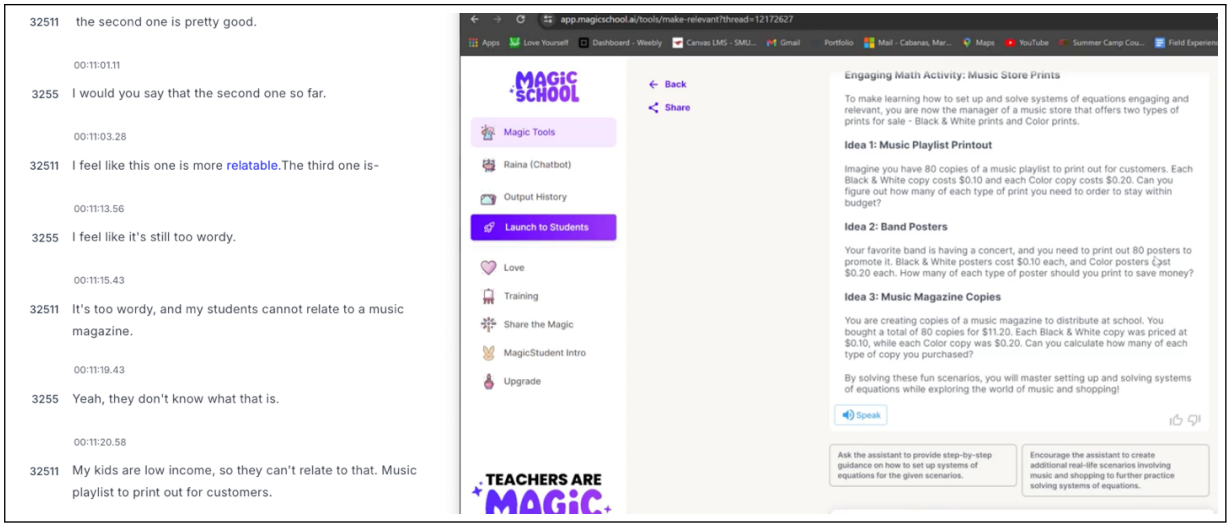
Negative Accuracy and Authenticity



Note: *This screenshot captures a teacher iteratively refining a Text Rewriter prompt—asking the AI to incorporate comparative language (e.g., "greater than," "less than," "equal to") and a chart-style output (right side of screenshot)—demonstrating how prompt engineering customizes AI outputs to meet specific pedagogical goals.*

Figure 9 further demonstrates that although the *Make it Relevant* tool gives ideas that students may be interested in, it sometimes brings in ideas that only partially fit students' interests. For example, the ninth-grade teacher wanted to discuss topics like music or shopping, but *MagicSchool*'s tool brought in music magazines, which the teachers noted that their students may be unable to afford; therefore, the topic is not relatable. This demonstrates the code *Negative Accuracy and Authenticity* because the AI-generated content, attempted to align with the input music and shopping, overlooked students' socioeconomic realities, making the output feel inauthentic and disconnected.

Figure 9
Negative Accuracy and Authenticity



Note: *This screenshot shows MagicSchool's Make It Relevant tool generating several music-themed systems-of-equations problems and accompanying follow-up prompts; it illustrates how teacher feedback on wording and student background (e.g., income level, familiarity with music magazines) guides iterative refinement toward more accessible, engaging tasks.*

The theme of Accuracy and Authenticity had (n = 10) instances where AI-generated content was factually correct and aligned with teacher expectations. In addition, there were (n=12) instances describing positive authenticity, where the AI outputs were what the teachers would use in their classroom or for a particular student. The differences in accuracy and authenticity highlights the importance of teacher inspection of AI-generated materials for their students.

4.2 Research Question 2 (Q2)

Each group used the *Rewrite It* tool to personalize existing mathematics word problems, and here, we examine the readability of the original and revised problems. The readability score (Table 3) is calculated using the Flesch-Kincaid measure, which estimates readability in terms of grade level and month (e.g., 2.3 would be second-grade third month). On average, *Rewrite It* increased the Flesch-Kincaid readability by about 1.12 grade levels for the first problem teachers posed and 0.78 grade levels for the second problem teachers posed. This suggests that the tool tended to make problems more complex or wordier. Interestingly, for the 9th-grade problems, the tool simplified the readability of the first problem (-.06 reduction in grade level) and the second problem (-1.1 reduction in grade level), showing it can also reduce complexity. The increase in readability was most pronounced in the lower grade levels, potentially making the word problem less accessible and developmentally inappropriate.

Each group also used the *Math Word Problem Creator* tool to create brand new personalized word problems based on inputted topics, grade levels, and state standards (Table 4). The three iterations revealed readability values that ranged from grades 2-10, which indicated that outputted problems often used more complex language from 6th grade through 10th grade, demonstrating a lack of consistent AI output. This is especially problematic given that the *Math Word Problem Creator* tool asks teachers to input grade levels and standards, yet the readability level rarely matched these values. For example, the 9th grade problems fluctuated readability grade levels from 3.6, 3, 10.7, to 9.6; thus, only one was aligned with the expected reading level for 9th grade. These fluctuations suggest that while AI can generate word problems at various grade levels, it demonstrates a lack of consistency in readability for grade levels, even when the teacher has chosen them in advance.

Table 3. *Readability Using MagicSchool's Rewrite It*

Problem Grade Level	Orig. #1	AI Revised #1	Orig. #2	AI Revised #2
		Flesch-Kincaid Grade Level		
Kindergarten	0.90	3.80	0.50	1.80
3rd	3.00	2.50	5.70	6.70
8th (a)	3.70	5.30	5.00	5.20
8th (b)	3.30	5.50	3.30	5.80
9th	3.60	3.00	10.70	9.60
Average	2.90	4.02	5.04	5.82

Table 4. *Readability Using Math Word Problem Creator*

Problem Grade Level	First AI-Written	Second AI-Written	Third AI-Written
		Flesch-Kincaid Grade Level	
Kindergarten	3.90	2.30	4.30
3rd	2.40	3.30	6.90
4th	5.20	4.60	2.60
4-6	6.26	10.73	8.70
7-10	6.60	5.50	6.70
9th	4.45	5.20	4.10
Average	4.14	5.35	5.22

5 Discussion

5.1 Research Question 1 (Q1)

Several key themes were identified that address **Q1** (*What themes arise as teachers discuss the benefits and drawbacks of generative AI for personalizing mathematics tasks to students' interests?*). First, teachers used AI tools in *Magic School* to deepen students' critical thinking, as demonstrated by a kindergarten teacher using the *Text Rewriter* tool to ask challenging questions. However, some teachers faced challenges when *Text Rewriter* could not generate a pedagogically sound problem. This aligned with Broutin et al. (2024), who cautioned against over-reliance on generative AI for lesson planning without teacher expertise.

Second, teachers used AI to personalize tasks based on students' interests, such as music, food, or shopping. Some teachers had topics, like music magazines, that they felt did not align with students' real-life experiences, highlighting AI's limitations in creating relevant contexts (Biton & Segal, 2025).

Third, *MagicSchool*'s AI tools also helped teachers design tasks quickly and efficiently. Teachers found this feature helpful, especially when the problems related to their students, supporting previous findings on AI's potential to create mathematics lessons efficiently (Broutin et al., 2024). However, there were instances (n = 10) where AI tools were not efficient. The teachers described needing to take time in rewording prompts and adjusting content that did not align with students. This aligned with Wardat et al. (2024), who emphasized the importance of equipping teachers with the necessary skills and supporting the challenges they may face in using AI tools effectively.

Fourth, teachers discussed how AI-generated tasks were best when the text focused on specific situation or audience but still required multiple phrasings or inputs to refine the output. Broutin et al. (2024) suggest that teachers can use generative AI to innovate and individualize learning which is an increasingly critical skill as technology continues to evolve.

In our fifth theme, generative AI tools were looked at as a planning partner. Teachers described how the accessibility of tools like Magic School can support teacher learning, develop strategies for task design and provide professional growth (Sawyer Wolfe, 2024; Wardat et al., 2024). It also empowered teachers to generate ideas quickly and foster creativity (Broutin et al. 2024). The teachers in the study created tasks to connect to students' interest and lived experiences which can strengthen student engagement (Walkington, 2013; Kaplan, 2024). By connecting students' experiences to the mathematical tasks teachers can enhance motivation and reduce negative attitudes toward mathematics (Biton & Segal, 2025; Aga et al., 2024).

5.2 Research Question 2 (Q2)

We next discuss results from **Q2** (*How does teacher personalization through generative AI tend to change the readability of mathematics tasks?*). Teachers' use of generative AI tools in *MagicSchool* impacted the readability of math tasks in a variety of ways. The *Rewrite It* tool often increased the linguistic complexity of tasks, making them potentially difficult for younger students. The Flesch-Kincaid readability score increased by about 1.12 grade levels on average, which could mean the newly created problems were developmentally inappropriate. On the other hand, higher-grade task readability was sometimes simplified. The inconsistency across grade levels was concerning, as AI struggled to get math tasks to the intended grade level.

Teachers also noticed that AI sometimes used ambiguous language (e.g., "extra glitter pens"), causing problems to be difficult to understand. A preservice teacher noted, "I think it definitely has its uses, but I think this tool in particular had a lot of biases, especially when we tried to ask the AI tool to make it relevant to an ESL student with limited English vocab, it actually made the word choice harder to understand not easier." This highlights the need for continued teacher revision in order to meet pedagogical standards (Aga et al., 2024; Sawyer, & Wolfe, 2024).

The *Math Word Problem Creator* tool generated problems with varied readability levels that did not align with the correct grade levels, even with specific prompting. This presents challenges in ensuring tasks are readable and aligned with grade-level standards. Teachers must review AI outputs to ensure accuracy, accessibility, and readability (Sawyer & Wolfe, 2024).

6 Conclusion

Personalizing word problems and activities using generative AI tools such as *Magic School* AI offers incredible flexibility not only with personalizing to student interests but also with the ability of AI to make countless iterations of problems and activities quickly. This allows teachers time to personalize the word problems in ways that they may not have had time to do without using generative AI tools. An increased prevalence of personalized math content in classrooms would likely improve student learning outcomes, according to prior research (Walkington, 2013). A promising direction for educational interventions could be training teachers to effectively incorporate AI tools into their workflow.

Limitations of the use of generative AI include the inconsistency in generating word problems at correct readability levels and with appropriate accuracy, pedagogical focus, and authenticity, as well as some issues in some cases with the efficiency of this approach. More research should be done on training LLMs to generate personalized word problems to specific readability levels while keeping the concepts and numbers appropriate for the standards being taught.

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