

# Design implications of Generative AI tools for School aged Children for Narrative Writing

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Writing proficiency is fundamental to effective communication across various contexts, including interactions with teachers, peers, colleagues, and the broader community (Gilbert & Graham, 2010). Strong writing skills are essential not only for managing daily tasks but also for academic growth and advancement. Despite its significance, writing instruction remains a complex and challenging endeavor. Developing writing competence is a long-term process that requires years of practice, guidance, and refinement. These interconnected difficulties highlight the broader complexity of writing education and underscore the pressing need for enhanced resources and instructional strategies to support both students and teachers in fostering strong writing skills (Graham et al., 2012).

The rise of Generative Artificial Intelligence (GenAI) models, such as Large Language Models (LLMs) and Text-to-Image (TTI) systems, has transformed content creation and enabled more natural, human-like interactions (Han & Cai, 2023; Verhelst et al., 2024). These innovations have led to the development of GenAI-powered story-authoring platforms, offering teachers new opportunities to integrate AI seamlessly into their instructional practices (Jeon & Lee, 2024; Han et al., 2024a).

This proposal outlines the design process and its implications for developing a GenAI-powered story-authoring platform, StoryAI, aimed at enhancing students' writing and literacy development. It includes a formative study with teachers, the iterative design and development of StoryAI, and a pilot study examining its applicability in writing education (Han et al., 2024) (see Figure 1).

## Teacher Insights on Personalized Writing Instruction

Before designing the platform, we sought to gain a deeper understanding of the motivations and needs of teachers and parents in supporting children's literacy development. To achieve this, we recruited 35 teachers and 36 parents from across the United States. Teachers were required to have experience in primary school settings.

From our analysis of teacher interviews, we found that a primary challenge in teaching writing is providing individualized support to meet each student's unique needs. Due to class size constraints, it is difficult for teachers to address every student's varying academic levels, interests, strengths, and weaknesses. While teachers aim to foster engagement by aligning instruction with students' interests, they struggle to create personalized materials that accommodate both students' strengths and areas for improvement. This lack of individualized support can hinder students' progress, particularly those who need additional guidance in developing their writing skills. Therefore, teachers expressed a strong desire for tools that support the creation of scaffolded, cross-disciplinary lesson plans and foster child-centered, interest-driven projects by allowing students to choose what they read and write about (Nordlof, 2014). Teachers emphasized the need for a platform that delivers individualized feedback, streamlines lesson planning, and ultimately saves time while enhancing instructional effectiveness.

## Design Strategies of StoryAI

Through formative interviews with teachers, we identified key priorities, including *genre-specific writing support*, *comprehensive guidance throughout the writing process*, *interactive activities to enhance motivation*, *opportunities to practice spelling and sentence structure*, and *AI-assisted writing to enhance comprehension*. StoryAI serves as a sandbox for experimenting with GenAI-driven literacy activities, where we are actively developing and refining several modules to enhance the writing experience.

Our primary goal was to develop a student-centered application that empowers learners to take ownership of their writing process. Instead of following a rigid, predetermined structure, students can choose a genre, select a topic, and shape their own storylines. In reviewing standardized K-12 writing curricula in the United States, we identified three core writing themes: narrative, opinion, and informative writing. For our initial trial module, we focused on narrative writing, integrating AI to support students in brainstorming story ideas and structuring their

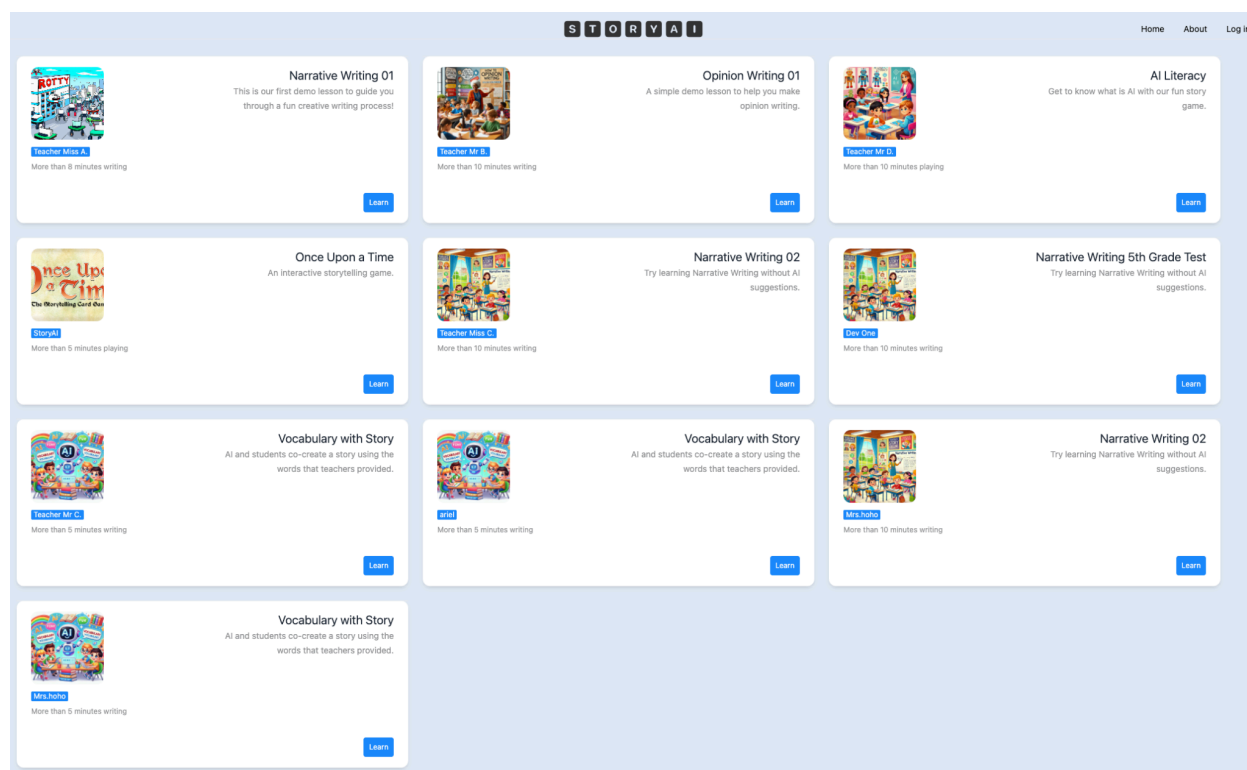
narratives from beginning to end. The AI provides targeted prompts and guidance to encourage students to progress in their writing (Kuhail et al., 2023).

## Narrative Writing Module

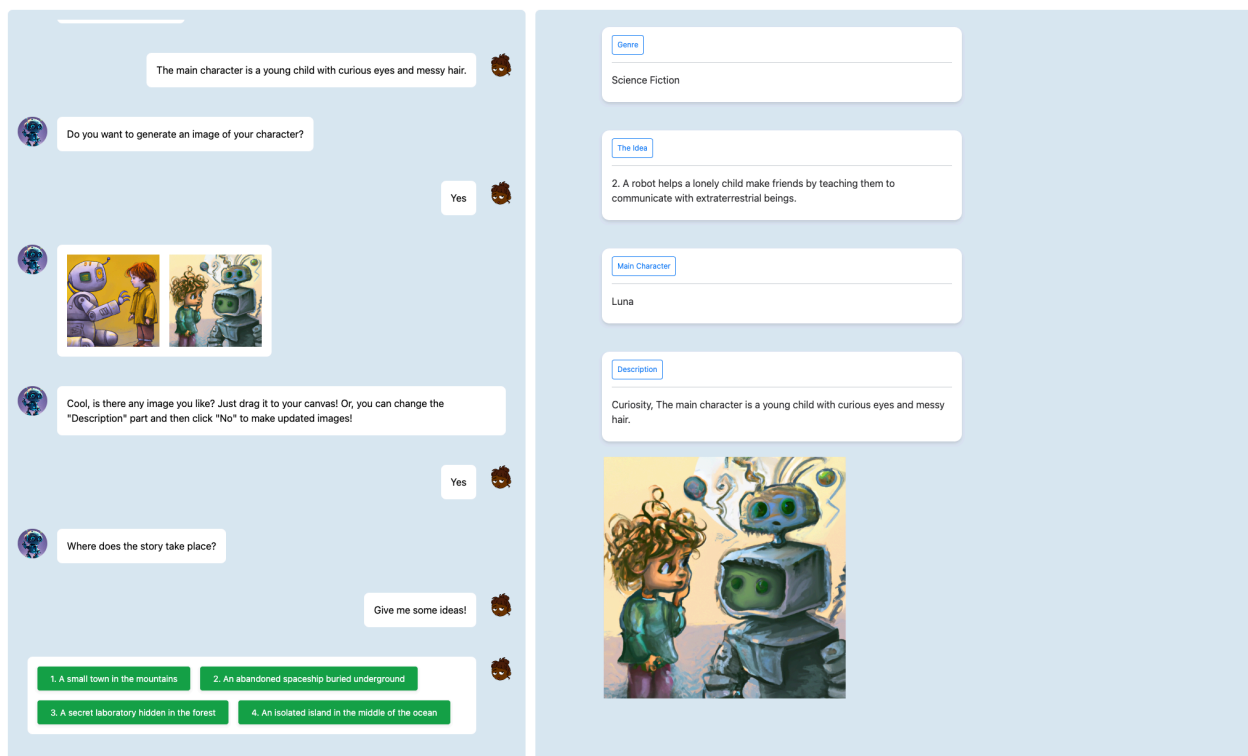
We began by designing a narrative writing module where students select a genre and topic, then collaborate with an AI bot to brainstorm their story's structure. The bot guides students through the writing process with prompts to help them develop their narratives (see Figure 2). Upon entering the module, students are greeted by the AI bot, which introduces itself: "Hi, my name is StoryBot! Do you want to write a story with me?" To support their learning, students have access to multimedia resources, including instructional videos. One such video, "What is Narrative Writing?", introduces key storytelling concepts to help students get started.

Next, students choose a genre for their story within the narrative writing module. They can select from options such as science fiction, fairy tale, diary, or personal stories. Once a genre is selected, the AI bot provides a short video lesson explaining its characteristics and guides students in brainstorming an overarching theme. The bot then prompts students to begin developing their story, starting with character creation. It asks, "Who is the main character of your story?" After students provide a response, the AI offers positive reinforcement, saying, "Oh, that's great!", before encouraging them to elaborate: "Can you describe your character in more detail? For example, how old are they? What is their gender? Do they have any unique traits?"

As students refine their ideas, the AI provides an option to generate an image that visually represents their story, further enriching their creative process. They then engage in story mapping pre-writing activities for setting and background before beginning the writing process. Starting with the exposition and progressing through the rising action, climax, falling action, and resolution, the AI bot encourages students to add more descriptive details at each stage. Additionally, it offers personalized feedback on sentiment, grammar, word choice, and sentence structure, helping students improve their writing while maintaining their unique storytelling voice. At the conclusion of the story-writing process, the AI prompts students to save their stories. Additionally, for research purposes, we were able to locally store their writing outputs along with their interactions with the AI.



**Figure 1.** The StoryAI homepage showcasing various modules, including narrative writing, opinion writing, and vocabulary lessons.



**Figure 2. A snapshot of the StoryAI narrative writing module activity, showing a text-based conversational agent interaction on the left side of the screen and a canvas for students to organize, review, and revise their writing on the right.**

## Pilot Evaluation of StoryAI

With a functional prototype in place, we launched an exploratory study involving students aged 8 to 12 to examine their experiences and perspectives on StoryAI. 30 students participated in a week-long StoryAI writing workshop during the spring 2024 camp. The workshop was held at a community center serving marginalized communities on the West Coast of the United States. We conducted semi-structured interviews with the students both during and after the writing workshop to explore their perceptions and experiences using StoryAI in their writing. An inductive approach was then employed to analyze the interview data.

Our analysis revealed that students highlighted StoryAI's strength in personalization, noting that they felt more engaged with the AI agent due to its sentiment-based greetings and feedback. However, they also identified areas for improvement in the conversational experience. Students highlighted that engaging with AI helped them generate new ideas they wouldn't have thought of on their own and refine their writing, as the AI provided grammar suggestions, word choices, and improved syntax. However, we observed distinct differences in how fluent and struggling writers perceived their experience with StoryAI.

Although, fluent writers tended to prefer minimal AI intervention, noting that AI suggestions disrupted their writing flow. As a result, many expressed a preference for writing in Google Docs, where they could maintain uninterrupted creativity. In contrast, struggling and emergent writers valued StoryAI, describing it as a supportive tool that made writing feel less intimidating. They reported feeling more engaged and motivated, as the AI provided personalized feedback akin to having an individual writing tutor.

These findings suggest that a student's writing proficiency level significantly influences their experience and learning process with AI-assisted writing tools. Our initial assumption from this exploratory study is that StoryAI has been particularly beneficial for emergent writers, offering them a greater sense of confidence and engagement in the writing process. Further research is needed to examine how AI-driven writing support can be tailored to different proficiency levels for optimal learning outcomes.

Since our pilot study did not include a detailed analysis of students' writing outputs and interactions, further research is needed to assess their writing quality over time. Future studies should explore aspects such as lexical diversity, syntactic complexity, coherence (McNamara et al., 2010), and how students engage with and interact with AI. Examining child-AI conversations in greater depth will provide valuable insights into the impact of AI-assisted writing on student learning and development.

Our goal is to continue investigating the design implications of such systems through empirical studies. We aim to understand the experiences and perceptions of educational stakeholders—including students, teachers, and parents—and explore how they interact and collaborate with the system. These insights will inform design decisions, ensuring that the tool becomes more accessible, inclusive, and effective within educational settings.

## Reference

- Gilbert, J., & Graham, S. (2010). Teaching writing to elementary students in grades 4–6: A national survey. *The Elementary School Journal*, 110(4), 494–518. <https://doi.org/10.1086/651193>
- Graham, S., Bollinger, A., Olson, C. B., D'Aoust, C., MacArthur, C., McCutchen, D., & Olinghouse, N. (2012). Teaching Elementary School Students to Be Effective Writers: A Practice Guide. NCEE 2012-4058.
- Han, A., & Cai, Z. (2023). Design implications of generative AI systems for visual storytelling for young learners. In *Proceedings of the 22nd Annual ACM Interaction Design and Children Conference (IDC '23)*. Association for Computing Machinery, New York, NY, USA, 470–474. <https://doi.org/10.1145/3585088.3593867>
- Han, A., Corrigan, S., Han, S., & Pepler, K. (2024, June). Co-Design a Logic Model for Inclusive AI-Powered Learning Application with Primary School Teachers. In *17th International Conference on Computer-Supported Collaborative Learning (CSCL) 2024-CSCL Proceedings* (Vol. 2024).
- Han, A., Zhou, X., Cai, Z., Han, S., Ko, R., Corrigan, S., & Pepler, K. (2024a). Teachers, Parents, and Students' Perspectives on Integrating Generative AI into Elementary Literacy Education. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '24, May 11–16, 2024, Honolulu, HI, USA: Association for Computing Machinery. <https://doi.org/10.1145/3613904.3642438>
- Jeon, J., Lee, S. Can learners benefit from chatbots instead of humans? A systematic review of human-chatbot comparison research in language education. *Educ Inf Technol* (2024). <https://doi.org/10.1007/s10639-024-12725-9>
- Kuhail, M.A., Alturki, N., Alramlawi, S. *et al.* Interacting with educational chatbots: A systematic review. *Educ Inf Technol* 28, 973–1018 (2023). <https://doi.org/10.1007/s10639-022-11177-3>
- McNamara, D. S., Crossley, S. A., & McCarthy, P. M. (2010). Linguistic features of writing quality. *Written Communication*, 27(1), 57–86. <https://doi.org/10.1177/0741088309351547>
- Nordlof, J. (2014). Vygotsky, Scaffolding, and the Role of Theory in Writing Center Work. *The Writing Center Journal*, 34(1), 45–64. <http://www.jstor.org/stable/43444147>
- Verhelst, E., Janssens, R., Demeester, T., & Belpaeme, T. (2024). Adaptive Second language tutoring using generative AI and a Social Robot. *Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction*, 1080–1084. <https://doi.org/10.1145/3610978.3640559>