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Reflective AI-Partnerships: How Middle Schoolers Balance Creativity and AI Collaboration

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Abstract: This study explores how middle school students navigate collaboration with generative AI in storytelling, focusing on their ability to balance AI contributions with their creative agency. Conducted during a workshop with Story AI, an interactive narrative-writing platform, this research involved participants aged 6 to 12 years from a predominantly Latinx community. Data from surveys, interviews, and writing outputs reveal that students engaged in reflective practices and demonstrated an emerging ability to critically modulate AI contributions. These findings engage with recent CSCL studies, including Cress and Kimmerle's (2023) insights into knowledge transformation and Borge et al.'s (2024) exploration of metacognitive reflection, by situating co-writing as a dynamic context for fostering collaboration and agency. Implications include designing learning environments that explicitly scaffold student reflection on AI collaboration as an essential skill for navigating human-AI partnerships. This research highlights co-writing as a valuable avenue for advancing reflective and creative thinking in educational settings.

Introduction

With the recent rise of studies of Artificial Intelligence (AI) in education, and with youth interacting with AI both in educational settings and their daily lives, research on the affordances of AI for learning has also risen. Nevertheless, the interactions between learners and AI can be very nuanced, and interpretations of the role that AI can have in learning can go beyond thinking of AI as a learning assistant, as intelligent agents could be perceived as co-creators or knowledge or even as a mean to learn about learning (Rismanchian & Doroudi, 2023; Doroudi, 2023). Co-writing with AI tools provides a compelling context for examining these dynamics (Jacob et al., 2024), as it combines individual cognitive processes with interactive, tool-mediated collaboration to support both shared and independent sensemaking.

Scholars have increasingly examined how generative AI tools reshape learning processes by fostering both collaboration and individual reflection. Cress and Kimmerle (2023) demonstrate how these tools enable "knowledge transformation," turning storytelling into a co-creative process that intertwines human agency with technological mediation. Borge et al. (2024) delve further into the reflective practices AI supports, showing how learners critically evaluate AI outputs to refine their strategies and preserve their creative autonomy. Similarly, Järvelä and Rosé (2023) argue that AI's dual role as collaborator and mediator necessitates the development of skills to balance its contributions with personal creativity. However, these studies leave open important questions about how learners, particularly younger ones, experience and navigate these dynamics in creative contexts like storytelling.

Conducted at a non-profit community center serving predominantly Latinx communities, the workshop involved 30 participants aged 6 to 12 years. Over four days, students participated in activities introducing basic AI concepts and exploring the Story-AI platform for narrative writing. Each session included writing tasks followed by semi-structured interviews. Video observations, screen recordings, and student writing outputs, were analyzed using thematic analysis to identify patterns in students' reflections on their collaboration with AI. This research addresses the question: *How do middle school students navigate collaboration with AI in co-writing contexts, particularly in balancing AI contributions with their own creative agency?*

Background

Recent research in CSCL has advanced conceptualizations of AI-human collaborations. For example, Cress and Kimmerle (2023) describe the potential of generative AI to enable "knowledge transformation," a process where iterative interactions between users and AI reshape storytelling into a collaborative act of deeper meaning-making. This underscores a shift from merely using AI as a tool to integrating it as a co-participant in learning, revealing the interplay between agency and technological mediation. Paralelly, Borge et al. (2024) explore how generative

AI tools foster metacognitive practices within individual learning settings. Their research identifies metacognitive reflection as a critical process where learners independently evaluate and regulate their cognitive engagement, including assessing when AI contributions enhance or impede learning. In the context of AI-supported storytelling, this framework helps illuminate how students individually reflect on their roles, critically evaluate AI outputs, and recalibrate their strategies to align with creative goals (Ojeda-Ramirez et al., 2024). These individual reflections highlight learners' growing ability to discern the limits of AI support while maintaining agency over their work, showcasing how generative AI can serve as a tool to scaffold deeper metacognitive awareness and adaptive thinking.

Furthermore, Järvelä and Rosé (2023) argue that the integration of AI in CSCL environments redefines traditional notions of collaboration. They emphasize the need for learners to develop skills to navigate AI's dual role as both collaborator and mediator. In the case of Story AI, students' reflections often align with these insights, as they highlight the necessity of modulating AI's contributions to maintain their creative agency. In this study, we aim to contribute to the discourse on CSCL by examining how middle school students engage with generative AI in a storytelling workshop. Specifically, we build on the concept of AI as a metacognitive tool (Ojeda-Ramirez et al., 2023), positioning Story AI as not only a facilitator of narrative construction but also as a medium for developing critical reflection on collaboration and authorship. Moreover, while research has advanced our understanding of youth perceptions of AI's intelligence (Druga & Ko, 2021; Morales-Navarro et al., 2024), much remains to be understood about youth perceptions of their collaboration with AI. By investigating students' interactions, we explore how their experiences reflect broader themes of agency, creativity, and the nuanced role of AI in collaborative learning.

Methods

Participants and workshop design

The workshop was conducted at a non-profit community center in Southern California during the spring of 2024. This center predominantly serves Latinx communities and works closely with local school districts. Thirty participants, aged 6 to 12 years (mean age = 9.73, SD = 2.26), took part in the study. The group included 16 females and 14 males, all identifying as Hispanic or Latinx. The workshop was structured over four consecutive days, with participants divided into three age-specific groups. Each group attended one-hour sessions daily. The first day began with rapport-building activities, including introductions and sharing likes and dislikes, followed by a pre-survey. This was succeeded by a lesson introducing basic AI concepts, such as defining AI and providing examples. On the second day, students engaged with the Story-AI platform for narrative writing, guided solely by the tool. Each session consisted of a 35-minute writing activity, followed by individual semi-structured interviews conducted by two researchers. The third day followed the same structure. On the fourth day, students completed a post-survey and participated in a discussion about their experiences with Story-AI, providing feedback and drawing representations of their vision of the platform.

Context of the study

Story-AI is an interactive platform designed to guide learners through narrative writing by combining a conversational chatbot with a visual creation canvas (Han, 2024 ; Han & Han, 2024). The chatbot prompts users to select a genre, such as a fairy tale, and brainstorm story elements like characters, settings, and themes. For instance, a student might choose a lost princess in an enchanted forest, with the AI suggesting refinements to these ideas and providing supportive prompts like, "What is the major problem in this story?" Students can also generate visuals, such as scenes of the princess in the forest, using text-to-image features. The platform leverages services like Large Language Models (LLMs), text-comparison, and calculation tools to enable seamless interaction. Story-AI also provides tailored feedback, suggesting richer descriptions or stronger hooks, helping students progress through planning, drafting, and revising while retaining creative control of their work.

Data collection and analysis

Data sources included pre- and post-surveys from 19 participants, focusing on writing motivation (planning, translating, revising), AI literacy (Long & Magerko, 2020) (perception, confidence, motivation to use AI), and writing fluency and flexibility. Surveys also explored students' general writing efficacy and prior AI experience. The post-survey included usability evaluation questions about students' ownership of their writing, enjoyment, ease of use, collaboration, and satisfaction with Story-AI. Additional data consisted of video observations, screen recordings of students' writing processes, collected text outputs, and AI-child interaction dialogues. Semi-structured interviews with each participant explored their experiences with Story-AI, perceptions of ownership,

and suggestions for improvement. This paper draws on findings from a thematic analysis of the interviews (Nowell et al., 2017), complemented by field notes and video recordings. An initial inductive coding phase generated preliminary themes, followed by a review of these themes in light of existing literature, including Cress and Kimmerle's (2023), Järvelä and Rosé (2023) and Borge et al. (2024). This iterative process enabled the definition and naming of themes related to students' reflections on authorship and AI assistance. Researcher triangulation, involving multiple researchers who participated in data collection and field observations, ensured reliability and depth of the analysis.

Results

Nuances in human-AI collaboration in storytelling

The self-perceived contributions of AI and students in story co-authorship reveal diverse patterns of engagement, as shown in Table 1. Each of the eight middle school students interviewed estimated the percentage of authorship they attributed to the AI tool versus their own input. The results range from students who viewed AI as an equal partner (e.g., Elena and Luis, each reporting a 50-50 split) to those who saw AI as either the primary contributor (e.g., Isa, attributing 100% authorship to AI) or a minimal assistant (e.g., Ben, with only 10% attributed to AI). On average, students reported that AI contributed 43% to the final product, while they attributed 57% to their own creative efforts. This distribution highlights the variety of ways students engage with AI in storytelling, from full dependence on AI-generated content to strong personal ownership.

Table 1

Perceived Contribution of AI and Students in Story Creation.

Student	Perceived AI/Student Contribution Ratio
Elena	50/50
Isa	100/0
Sofía	60/40
Luis	50/50
Jane	0/100
José	30/70
Ben	10/90
Average	***43/57***

Balancing creative control and AI support

Students demonstrated a nuanced interplay between relying on AI for inspiration and asserting their agency to craft original narratives. Katherine noted, "It helps you take the first step," suggesting that AI was particularly helpful in overcoming creative barriers. This observation aligns with Cress and Kimmerle's (2023) framework of "knowledge transformation," where users actively refine AI contributions to construct meaningful outputs. Katherine's comment reflects how students transitioned from "knowledge telling"—simply utilizing AI suggestions—to engaging in "knowledge transforming," wherein AI outputs were reshaped to align with their creative goals.This co-construction process became evident as students reflected on their interactions with Story AI. Valerie shared, "I realized that sometimes it doesn't get exactly what I mean, so I have to change it a lot." Her active engagement with AI to refine its suggestions illustrates her awareness of the collaborative nature of the process. While Story AI provided initial prompts and ideas, Valerie's efforts to adjust and personalize the outputs indicate a deeper interaction where the student-AI partnership moved beyond passive reliance.

Jane echoed this sentiment, noting, "It gave me ideas, but sometimes they don't really fit, so I end up taking bits and making my own thing." Her selective integration of AI outputs highlights her ability to maintain creative control, a process Cress and Kimmerle (2023) describe as essential for achieving dialogic collaboration. By consciously curating AI-generated content, Jane demonstrated an understanding of her role in the co-construction of narratives, emphasizing her active participation in transforming AI inputs into personally meaningful outputs. This ability to balance agency and AI support is particularly significant for middle school students, who are developing both their creative confidence and their capacity for metacognitive reflection. As Borge et al. (2024) suggest, such reflective practices are critical for fostering higher-order thinking skills. The students' interactions with Story AI illustrate how they navigated the tension between leveraging AI's strengths—its ability to scaffold and inspire—and asserting their ownership over the final narrative.

Negotiating ownership and collaboration

One of the central themes emerging from students' reflections was the negotiation of ownership in their stories, particularly in light of how they perceived collaboration with AI. Isa, attributing 100% authorship to the AI, described her process as collaborative but needing personal intervention: "It's helpful, but I still need to make it my own, or it doesn't feel like my story." This tension reflects the reshaping of traditional collaboration described by Järvelä and Rosé (2023), as Isa balances external assistance with her creative agency. Similarly, José emphasized his active role, stating, "It was a collaboration because I also had to put my ideas." This aligns with Borge et al.'s (2024) insights into individual metacognitive reflection, wherein learners critically evaluate AI's contributions and ensure their creative input remains central. José's reflections illustrate how AI can support idea refinement without overshadowing the user's intent.

Valerie and Jane offered further nuances. Valerie shared, "It was like 50/50. I put the ideas, and it gave me suggestions," reflecting an equitable creative partnership. Jane added, "I wouldn't have thought of some of those ideas, but I made the story my way," highlighting her ability to integrate AI inputs while maintaining authorship. Both cases reveal the metacognitive skill of modulating external support to align with personal goals. Students' reflections underscored their growing awareness of AI's limitations and the need to regulate its influence. This resonates with Borge et al.'s (2024) findings that generative AI fosters metacognitive reflection by prompting learners to assess its utility critically and recalibrate their strategies. While students did not explicitly simulate dialogue with AI, as in Borge's study, their reflections reveal an emergent ability to mediate AI's contributions in creative processes. These interactions highlight a critical developmental moment for middle school learners, who, through engagement with Story AI, practiced essential skills of regulating and negotiating creative contributions. By actively balancing collaboration with personal agency, students demonstrated the potential of AI tools to scaffold metacognitive growth and adaptive thinking in educational storytelling contexts.

Developing critical awareness of AI contributions

As students became more familiar with Story AI, many expressed critical awareness of its limitations, showing that even younger learners engage in evaluative thinking about AI's role in their work. For instance, Sofia shared, "Don't count on it every time, especially for tests when you can't use AI." Her comment reflects an individual metacognitive reflection, as she recognizes that excessive reliance on AI could hinder her independent learning. This aligns with Borge et al.'s (2024) findings, which highlight the importance of metacognitive processes in human-AI interaction, such as evaluating when external supports like AI enhance or impede personal learning goals. Similarly, Ben reflected on his evolving relationship with AI, stating, "It gave me ideas about how to do it," but later acknowledging, "You kind of rely on AI? You can't really rely." His comments suggest a developmental shift from uncritical acceptance of AI-generated outputs to a more nuanced understanding of its limits. This critical stance aligns with Järvelä and Rosé's (2023) argument that human-AI collaboration requires learners to develop the ability to discern when AI contributions align with their goals and when they need to assert greater control over the process. Students' critiques also extended to specific features of Story AI, as evidenced by Iyari's frustration with the image generation tool: "It only gave me two options, and I couldn't regenerate." Her feedback highlights an expectation for customization and control, even at younger ages, reflecting a growing awareness of the tool's constraints. This finding underscores Borge et al.'s (2024) emphasis on metacognitive reflection, as students adapted their strategies to navigate the limitations of the tool, adjusting their engagement to ensure it supported their creative intentions.

Discussion

This study explored how middle school students navigate collaboration with AI in storytelling, focusing on balancing AI contributions with creative agency. Our findings demonstrate that students engage in reflective practices implicitly when discussing their experiences with Story AI, critically assessing its role in their narratives. This extends the work of Borge et al. (2024), who emphasize metacognitive reflection in human-AI interactions, by showing that such reflection can occur without explicitly framed dialogues, particularly in co-writing contexts. We also build on insights from Cress and Kimmerle (2023) and Järvelä and Rosé (2023), illustrating how generative AI supports knowledge transformation and reshapes collaboration. Students' ability to modulate AI's contributions—refining outputs, integrating suggestions, or asserting ownership—highlights the potential of co-writing as a space for fostering critical awareness, agency, and adaptive thinking. These findings have implications for CSCL and the design of learning environments. By scaffolding explicit reflection on AI collaboration—through activities like simulated chatbot dialogues or structured prompts—educators can better support students in evaluating and modulating AI's contributions. Such designs can foster creativity and metacognitive skills essential for navigating future human-AI collaborations. This study reinforces co-writing with AI as a valuable context for advancing collaborative and individual sensemaking in educational settings.

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