A New Muse: How Guided AI Use Impacts Creativity in Online Creative Writing Courses

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Abstract

Creative writing students are being flooded with online advice for how to use generative artificial intelligence (AI) to improve their fiction. However, the effects of AI on the creative process are not well understood, especially in the context of online creative writing courses. Using a within-subjects design, this study investigated how ChatGPT impacted the creativity of students enrolled in online creative writing courses, and whether additional support from the instructor altered the impact. Students from two introductory courses (N = 31) performed the same creative exercise in three experimental conditions: (1) no ChatGPT assistance (baseline control condition), (2) with ChatGPT but no instructor support, and (3) with both ChatGPT and instructor support on its usage. All three writing assignments produced by students were then coded by expert judges for creativity using Amabile's Consensual Assessment Technique (CAT). The resulting creativity scores were similar for conditions 1 and 2, indicating that ChatGPT on its own did not impact overall creativity from original student writing. Creativity scores were significantly higher in condition 3 compared to conditions 1 and 2, indicating an increase in creativity when ChatGPT use was combined with instructor support. However, this was primarily driven by students with low baseline creativity scores (condition 1). Students who received moderate or high creativity scores at baseline experienced no added benefits in using ChatGPT, even with instructor support. Overall, these findings suggest that providing good instruction about when and how to employ ChatGPT can improve student outcomes in creative writing courses, especially among the students who exhibit low creativity on their own.

Introduction

Creative writing is a valuable skill that can enhance students' academic, personal, and professional development, but it has been complicated by the release of generative AI tools, such as ChatGPT – especially in an online setting where instructors have less direct contact with students. Experts have recently been urging writing instructors to "assume that 100 percent of their students are using ChatGPT" (Roose, 2023) and, therefore, overhaul their curricula (Grobe, 2023; Scott, 2023; Heaven, 2023; Ceres, 2023). Recent surveys confirm significant levels of AI use among students, with the Pew Research Center showing that AI use among teens doubled in just one year, from 13% in 2023 to 26% in 2024, and the highest rates, 31%, at the 11th and 12th grade levels (Sidoti, 2025). A survey of online students at Oregon State University found that 38% indicated they used generative AI for coursework (Dello Stritto, Underhill, & Aguiar, 2024), and another survey across multiple institutions and educational contexts placed the number at 56% (Nam, 2023). OSU instructors themselves have reported in interviews that they've seen more instances of generative AI use in online courses than on-campus courses, with both numbers continuing to rise (Delf, 2024), even in writing assignments designed to discourage AI assistance (McMurtrie, 2024). As a result, many have begun shifting away from prohibition-based approaches (Singer, 2023), instead allowing AI or integrating it into their curricula (Robinson, 2024), a transition that remains challenging both for faculty and for students (Oregon State Ecampus). In fact, the survey of OSU online students found that 66% expressed some level of interest in receiving instructor guidance for using AI in their coursework (Dello Stritto et al., 2024).

Instructor guidance might be a sensible idea. Researchers have demonstrated that collaborative creative writing involving two or more students enhances focus and inspires creativity (Hodges, 2017). This appears to hold true even when the collaborator is nonhuman. One study, published half a year before the debut of ChatGPT, examined student creativity in collaborative short stories with an AI system called Text Generator, which predicted and generated text based on user input, providing output at different lengths (word, sentence, paragraph) to inspire writing ideas. The results demonstrated that Text Generator

significantly enhanced students' creativity, fostering originality in their writing, along with the flexibility and elaboration that can lead to greater effectiveness (Woo & Guo, 2023). Less than a year earlier, researchers found that secondary students who used AI systems to develop and analyze Mars rover designs believed that AI helped them develop their creativity (although they said it would never match human ingenuity). Students who had more exposure also reported more positive thoughts about AI, and students with less exposure tended to be fearful of it (Marrone et. al., 2022). Similarly, there is evidence indicating that access to computer chess programs, such as the one that beat grandmaster Gary Kasparov in 1997, not only helps human players improve their play but also enhances their creativity (Piezunka, 2021).

However, it was not well known how these findings applied specifically to online pedagogy or creative writing instruction, or how they were affected by the transformational release of ChatGPT or by the later versions and competitors that have followed. The current study was designed to fill these gaps. This study examined asynchronous online creative writing courses, measuring: (1) whether using ChatGPT enhanced students' creative output and (2) whether instruction about how to use ChatGPT enhanced students' creative output.

Background Literature on Creativity

Defining Creativity
The widely adopted definition of creativity typically hinges on two essential attributes: originality and effectiveness (Runco & Jaeger, 2012). Though originality alone, or the novelty of an idea, is often conflated with creativity, it can be achieved by producing bizarre alternatives that might remain unique for a reason: they're not necessarily useful (Taylor et. al., 2018). Effectiveness is a corollary attribute of creativity that is defined by the value of an idea in addressing a particular problem or objective.

Cognitive Processes in Creativity
The process of generating creative ideas includes multiple phases. The initial phase, often referred to as "problem finding," involves seeking opportunities for innovation or enhancement, identifying where they exist, and defining the kind of creativity they warrant (Reiter-Palmon & Robinson, 2009). Naturally, this requires a certain level of expertise. A novice writer might not look for, let alone recognize, the opportunity to establish a literary setting through sensory details. An intermediate writer might establish the sensory details of a setting, but only in conventional ways for conventional settings. A more advanced writer might do all of this, but recognize the opportunity to use a novel setting and/or to convey unconventional details about it.

The next phase in the creative process is "divergent thinking." In this stage, the focus shifts to the generation of new ideas from the existing knowledge base, with a particular emphasis on producing a wide array of possibilities (Weir, 2022). In psychological research, a classic example might involve assessing the number of distinct uses a participant can envision for an ordinary object like a brick (Christensen, 1957). In creative writing, the equivalent would be the writer's capacity to conjure up a multitude of settings or a great variety of sensory details within a setting.

After this phase of expanding possibilities comes a phase of selectivity, requiring the application of self-regulation to determine the best or most creative solution from the array of alternatives, which must then be adapted to the specific context through loops of feedback and revision (Zielińska, 2023). Choosing to set a scene at a landfill, for example, might require adjustments to character circumstance or motivation, which might then also require further adjustments to the setting.

Finally, this gives way to "convergent thinking." Here, the focus is on identifying commonalities among seemingly disparate phenomena. It

involves the act of merging and uniting distinct ideas to yield additional richness or insight (Drago & Heilman, 2012), like when a writer discovers and then emphasizes resonance between ostensibly unrelated aspects of a setting and a character, such as the asbestos disposal site at the landfill and the character's mood after a quarrel.

The entirety of this process demands an unusual level of coordination between two distinct (and even antagonistic) neural networks: the cognitive control network, responsible for executive functions like planning and problem-solving, and the default mode network, typically active during moments of mind-wandering or daydreaming. Ordinarily, these two networks are at odds, undermining each other, but creativity appears to generate a unique scenario where they collaborate (Beaty et. al, 2021). This unusual alliance might explain why a creative state can be so difficult to achieve.

The Role of AI in Enhancing Creativity

Creativity experts theorize that AI can help enhance this coordination, but only if used in specific ways at specific junctures (Florent, 2023). These programs are excellent at the second phase of creativity, divergent thinking, capable of generating dozens of ideas in seconds, and at analysis of existing content, with the ability to generate detailed feedback. However, they need significant human judgment both to initiate these phases with "problem-finding" and to make good use of them afterward through selectivity, adaptation, and convergent thinking. That is the human element of the collaboration, in which writers, whether student or professional, are able to exercise the creativity that comes from their interests, experiences, intuitions, and good judgment.

Large language models like ChatGPT are trained to produce text by anticipating the most likely sequence of words (Gent, 2023) – and therefore the most common or conventional. Without this human element of collaboration, then, it is a system designed to produce clichés. The greater the expertise of the users, however, the more likely they are to be able to intervene at critical junctures in productive ways. It seems reasonable that such expertise could be delivered to Ecampus students, not only through instruction on creative writing but also about when and how to incorporate AI's considerable aptitude for divergent thinking and analysis.

Nobody needs this support more than online students, who might be the earliest adopters of ChatGPT (Delf, 2024) and who cannot be steered away from it with the analogue classroom activities suggested by experts (Grobe, 2023; Scott, 2023; Heaven, 2023; Ceres, 2023). Our research advances our ability to provide such supports by examining how student creativity is affected by both the new technology and the pedagogical intervention.

Method

This study investigated the impact of generative AI, specifically GPT-4o, on the creative writing process, both with and without pedagogical intervention. It was conducted in May 2024, using a within-subjects design. The study was approved by the Institutional Review Board of Oregon State University (Study HE-2024-811; date of approval 23 February 2024). Informed consent was obtained from all subjects involved in the study.

Participant Recruitment

Participants for this research were drawn from students enrolled in two online sections of WR 224 (Introduction to Fiction Writing), one taught by each principal investigator in Spring 2024. The two sections enrolled 22 and 24 students, creating a pool of 46 possible participants available for recruitment. Because the course fulfilled a baccalaureate core requirement, these students represented a wide variety of majors, interest levels, and abilities. They were directed to a consent form on Qualtrics at the start of the term that asked for permission to use their writing samples for coding, but they were not provided

with any extrinsic incentive to provide it. While 40 students consented, a rate of approximately 87%, nine did not submit a writing sample in at least one condition. Because of the study's within-subjects design, these students were removed, creating a final pool of 31 participants and 93 writing samples. No demographic information about participants was collected.

We embedded the study within a pedagogical framework that benefited all students regardless of whether or not they chose to release their creative output for our research. This ensured that the research did not disrupt the students' learning experience, nor create any additional burdens or opportunities for either group. Whether students consented to having their work included in the study or not, they engaged in identical coursework with the same academic stakes in the class. Because a graduate assistant compiled and de-identified writing samples from consented students, then distributed them to the judges, student participation was anonymous even to the principal investigators who were the instructors in these courses. That is, the instructors saw each student's assignments, but did not know which

samples were being used in the study, ensuring fair treatment for students regardless of their consent status. Creativity scores were used only in the context of our research; students were not notified of the creativity score that coders assigned to their work.

Data Collection
Each participant produced three fiction writing exercises in response to the same basic prompt. This enabled the study to utilize a within-subjects design, in which students participated in all three experimental conditions: (1) a baseline control condition in which students were asked to produce a creative writing product without the use of ChatGPT; (2) an experimental condition in which students were asked to use ChatGPT, but without any scaffolding from the instructor; and (3) an experimental condition in which students were asked to use ChatGPT with techniques explained and modeled by the instructor. This design has the advantage of controlling for individual differences among students that might affect their baseline creative writing skills. Table 1 illustrates this design.

Table 1. Experimental Design

Condition 1 (baseline control condition)	Condition 2 (first experimental condition)	Condition 3 (second experimental condition)
Writing product without ChatGPT (n = 31)	Writing product with ChatGPT but no instructor scaffolding (n = 31)	Writing product with ChatGPT after instructor scaffolding (n = 31)

The writing samples were collected and de-identified by a graduate assistant. This ensured participant anonymity from both the judges who evaluated the samples and from the principal investigators, who were instructors in the courses from which the samples were culled. The graduate student ordered the samples randomly to prevent potential bias. This ensured judges could not make

inferences about the student or the condition based on the order of samples, which might have influenced their evaluations (e.g., had they reviewed all three samples from each student consecutively).

In addition to producing the writing samples, each student was required to complete a reflection

about their experiences moving through the three conditions, especially in comparison to each other. These reflections, completed within two days of the last writing sample, were not designed to be formally analyzed using qualitative methods, but to provide further context about how the students viewed their output and their satisfaction with the writing process across the three conditions. At the end of the term, participants who had consented to participate in the study were also asked to complete an optional post-exercise survey to informally quantify some of the attitudes expressed in their reflections. This Qualtrics survey was delivered by our graduate assistant to ensure participant anonymity. See Appendix 2 for the reflection assignment and Appendix 3 for the end-of-term survey.

Pedagogical Approaches to Instructor Scaffolding

This study took place in Weeks 7 and 8 of a 10-week term, after students had already studied and practiced fundamental fiction writing strategies dealing with subject matter, descriptive detail, direct characterization, character complexity, conflict and escalation, point of view, and narrative time, among others.

Condition 1: Original Student Writing (Baseline Control)
The exercise in the first condition occurred in Week 7 and was introduced as a way to convert granular lessons into a more cohesive project. The results of this exercise might (or might not) serve as the basis for the complete short story students would submit at the end of the week. Because of this, we chose a prompt that would help students root their narratives in personal or vicarious experiences, which often has salubrious effects on their fiction:

> Choose a job you know well, either from firsthand experience or from what you've heard about it from family and friends, no matter how mundane. Then write a scene about a character at work on the day an unusual incident happens. Feel free to

fictionalize some aspect of the character (or not), and to invent a fictional incident (or not).

Condition 2: ChatGPT Use without Instructor Support
The exercise in the second condition occurred in Week 8, after students had submitted their complete short stories and entered a module about incorporating AI into fiction writing. The first portion of this module was an exercise that allowed students to "play around, experiment, and have an authentic experience unencumbered by the ideas or expectations of [their] instructor," as the assignment description phrased it. Students then responded to the same prompt they did in condition 1:

> After creating an account, use ChatGPT to help you fulfill the following prompt, aiming to produce the best fiction you can, based on everything you've learned in this class. Like you did in Week 7, write another scene about a character at work on the day an unusual incident happens, but this time use ChatGPT for help. The job and the incident can be different from the other exercise, or not. Play around! Anything goes!

Condition 3: ChatGPT Use with Instructor Support
The exercise in the second experimental condition came after three video lessons and a quiz. The first video lesson (3:11 run time) described the creative process and the best ways to incorporate ChatGPT into that process. It encouraged students to harness ChatGPT's capabilities in the first two phases, "finding opportunities" for creativity and "brainstorming possibilities" to meet those opportunities. These correspond to the "problem finding" and "divergent thinking" labels that are typical in more formal descriptions of creative psychology. The video further encouraged them to prioritize their own human judgment in the last two phases, "selectivity" and "integration" (or "convergent thinking"), especially because these

phases rely on personal factors from the writer, such as what they find interesting, moving, inspiring, or resonant with their life experiences. The final advice was to claim an authoritative role in any collaboration with AI; that is, rather than passively accepting its output, students should be the ones making the choices and then executing them in the writing, enlisting ChatGPT only as an assistant.

The other two video lessons (7:47 and 7:42 run times) modeled the brainstorming and opportunity-finding strategies. They showed the ChatGPT interface while the instructor narrated his experience using it, explained his decisions, and performed his own writing. In this manner, he used ChatGPT first to brainstorm narrative options before starting the exercise and then to find opportunities in a finished product where the creativity could be improved.

More specifically, in the second video, the instructor broke down the prompt, "write a scene in which a character discovers something tangible or intangible," into its constituent elements: the character, the discovery. He then used ChatGPT to brainstorm possibilities for these two elements, first asking it to list ten options for "interesting, distinctive, realistic characters," then doing the same for the discovery. He emphasized the collaborative and iterative nature of the process by rejecting ChatGPT's ideas, requesting modifications, and leaping at times from an AI suggestion to a related idea from his own experience.

In the third video, when modeling how to use AI to find opportunities for improved creativity, the instructor pasted in a passage of student fiction and prompted ChatGPT to "identify just one specific place that is bland, unoriginal, or cliche, then give me ten specific suggestions for how to make it more original, distinctive, or creative." He then repeated the same iterative, collaborative negotiations as in the previous video. Access to the instructional videos can be found here.

After viewing the three video lessons, students were required to demonstrate their comprehension by taking a 10-question quiz. This ensured their exposure to these interventions before they moved onto the exercise in the third condition, which prompted them to use ChatGPT in the ways described in the video lessons:

> Like you did in the last exercise, write another new scene about a character at work on the day an unusual incident happens. Use the strategies you've learned to produce a more fruitful collaboration with ChatGPT, taking its suggestions but not its writing.
>
> *Remember!* That means you need to break down the prompt into its individual elements: (1) What is the job? (2) Who is the character working it? (3) What is the unusual incident? Consult ChatGPT to help brainstorm possibilities before you begin, then write about them on your own.
>
> *Also remember!* After you're finished, you need to ask ChatGPT to help identify places to improve. Here are some prompts you could try out.

We then offered 10 potential prompts that could help ChatGPT identify blandness in the narrative's specificity, description, theme, dialogue, and voice.

Evaluation Criteria
The research methodology incorporated Teresa Amabile's Consensual Assessment Technique (CAT) to code and evaluate the creativity of the students' written outputs. This technique involves experts evaluating creative output by providing numerical ratings based on creativity. The experts in this study were both seasoned instructors of college-level creative writing who have advanced degrees in the field of fiction writing and numerous publications. The expert judges were not the instructors of courses involved in the study. They did not know who wrote each writing

product nor what condition the writing product was produced from.

The judges first rated each sample on creativity individually, using a 1 - 7 Likert Scale, where "1" is not creative at all and "7" is highly creative. After independent evaluations, the two judges convened to discuss their assessments and reach a consensus, aligning their ratings to collectively determine the creative quality of the output. This consensus approach is known to be more accurate than individual or even composite ratings (Wu, 2007). Each writing assignment therefore received a final creativity score (from 1 to 7) that was based on mutual agreement from the judges, offering a more balanced and accurate evaluation of the creative work while minimizing individual biases.

The creativity scores assigned to the writing samples demonstrated clear and consistent interrater reliability, with no scoring departures larger than a single point between the two judges. An analysis comparing the scores of each judge yielded a Krippendorff's alpha of 0.80, indicating substantial agreement between them. This value reaches the conventional threshold of 0.800, and our judges afterward convened to reach consensus and assign a mutual score, thereby enhancing the reliability and validity of the final rating they provided.

Results
Exploratory Data Analysis
Of the 40 students who gave permission to have their writing samples included in the study, nine did not submit a writing sample in at least one of the three conditions. Because of the study's within-subjects design, writing samples from these students were neither collected nor delivered to the judges. The 31 remaining participants had complete data, resulting in a total of 93 writing samples.

The expert-rated creativity scores were normally distributed with good variability, although the range was truncated at the extremes—no sample earned a creativity score of "1" and only a single sample received a creativity score of "7." The number of samples to receive each creativity score are aggregated in Table 2 below:

Table 2. Creativity Score Distribution Across All Three Conditions

|	Range of possible creativity scores (N = 93 writing samples)						
	1 (low)	2	3	4	5	6	7 (high)
Frequency of creativity scores	0 (0%)	12 (13%)	27 (29%)	29 (32%)	17 (18%)	7 (8%)	1 (1%)

The mean creativity scores were similar for condition 1 (original student writing) and condition 2 (ChatGPT without instructions). Condition 3 (ChatGPT with instructions) had the highest mean creativity scores, as shown in Table 3.

Table 3. Descriptives Statistics by Condition

Condition (ns = 31)	Mean	SD	SE
Baseline (1)	3.61	1.20	0.22
ChatGPT (2)	3.52	0.77	0.14
ChatGPT + Instructor (3)	4.32	1.33	0.24

Figure 1 shows the mean creativity scores and the limits of their variation levels from chance alone.

Figure 1. Average Creativity Scores by Condition
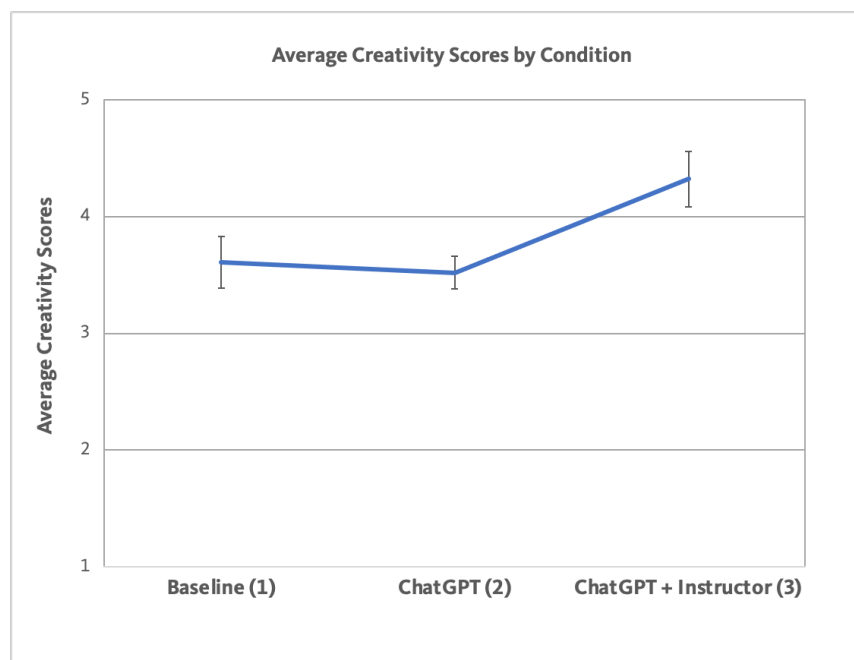
Condition Differences

A within-subjects ANOVA with condition as the within subjects factor and creativity scores as the dependent measure revealed a main effect of condition, $F(2, 60) = 5.01$, $p = .01$, $\eta^2 = 0.14$, as shown in Table 4. Posthoc tests revealed that this main effect was driven by significant differences between conditions 1 and 3, $p = .05$, Cohen's d = .63 and conditions 2 and 3, $p = .03$, Cohen's d = .72, as shown in Table 5 below.

Table 4. Repeated Measures ANOVA of Creativity Scores Across Three Writing Samples

Source	Sum of Squares	df	Mean Square	F	p	η^2
Condition	12.02	2	6.01	5.01	0.01	0.14
Residuals	71.98	60	1.20			

Note: Type III Sum of Squares

Table 5. Post Hoc Tests of Creativity Scores by Condition

Condition		Mean Difference	SE	t	p	Cohen's D
Baseline (1)	ChatGPT (2)	0.01	0.26	0.37	1.00	0.09
	ChatGPT + Instructor (3)	-0.71	0.28	-2.51	.05	0.63
ChatGPT (2)	ChatGPT + Instructor (3)	-0.81	0.29	-2.81	.03	0.72

Note: p values adjusted with a Bonferroni correction

Exploratory Analysis: Individual Differences in Initial Creativity Scores

Closer examination of the data revealed some individual differences in students' creativity scores across the three conditions. Specifically, variation in students' creativity scores suggested that the effects of condition 3 (the use of ChatGPT with instructor scaffolding) might not have been uniform across all participants, particularly those who received high and low creativity scores in the baseline control condition, Original Student Writing.

To explore individual differences in the effects of ChatGPT on students' creativity scores, we began by coding students into one of three creativity levels at baseline:

> 1) low starting creativity level (scores at the low point of the scale, 1- 3, n = 15)

> 2) moderate starting creativity level (scores at the midpoint of the scale, 4, n = 7)

> 3) high starting creativity level (scores at the highpoint of the scale, 5 - 7, n = 9)

We then conducted a 3 × 3 mixed model ANOVA with baseline creativity scores (low, moderate, and high) as the between subjects' factor, condition as the within subjects factor, and creativity scores as the dependent measure. As expected, the main effect of condition was significant, $F(2, 56) = 5.17$, $p = .01$, $\eta^2 = 0.16$, as was the starting creativity level, $F(2, 28) = 12.42$, $p < .001$, $\eta^2 = 0.47$. However, these main effects are best understood in light of a significant interaction between condition and starting creativity level, $F(4, 56) = 7.15$, $p < .001$, $\eta^2 = 0.34$ (see descriptive statistics in Table 6 and Figure 2).

Table 6. Average Creativity Scores and Standard Errors by Condition and Starting Creativity Level

Starting creativity level	Condition			
	Condition 1 (n = 31)	Condition 2 (n = 31)	Condition 3 (n = 31)	Total* (N = 31)
Low (n = 15)	2.43 (0.11)	3.47 (0.20)	4.13 (0.34)	3.38 (0.13)
Moderate (n = 7)	4.00 (0.15)	3.86 (0.29)	4.00 (0.50)	3.95 (0.19)
High (n = 9)	5.11 (0.14)	3.33 (0.26)	4.89 (0.44)	4.44 (0.17)
Total (N = 31)*	3.88 (0.08)	3.55 (0.15)	4.34 (0.25)	3.93 (0.01)

Note: Total row averages show the main effect of starting creativity level and total column averages show the main effect of condition.

Figure 2. Interaction Between Condition and Individual Differences in Starting Creativity Levels
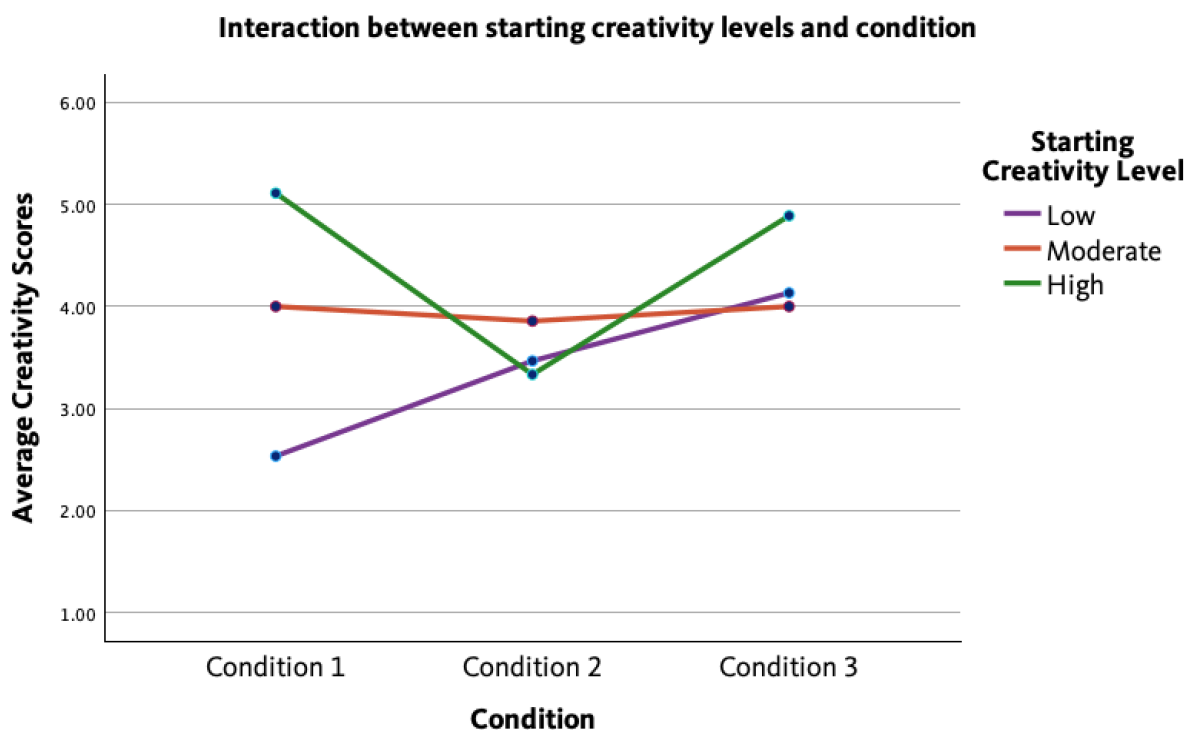
Simple effects tests with a Bonferroni correction revealed that students who started low in creativity in condition 1 experienced significant improvement when using ChatGPT independently (condition 2), $p < .001$. Their highest scores were with instructor-guided ChatGPT use (condition 3), although these improvements did not differ significantly from condition 2, $p = .33$. For students with initially moderate and high creativity scores, the use of ChatGPT alone or with an instructor did not improve their creativity scores. Students who started with moderate levels of creativity experienced no benefit from ChatGPT; their creativity scores remained consistent across all three conditions, ps = 1.0 . Students who started with high creativity scores initially experienced a significant *decline* in their creativity scores when using ChatGPT independently, $p < .001$. However, their scores returned to their baseline levels when using ChatGPT with instructor support, $p = 1.00$.

Another way to interpret these individual differences was to compare the gap between each group within each condition. As expected, in condition 1, simple effects tests revealed that average creativity scores were significantly different among students who were coded as low, moderate, and high in baseline creativity levels, ps $< .001$. However, when ChatGPT was used independently (condition 2) and with scaffolding from an instructor (condition 3), there were no significant differences in average creativity scores among students with low, moderate, and high baseline creativity levels, ps $> .05$. In other words, with the use of ChatGPT (independently and with instructor support), students who started out as having low creativity scores caught up with students who started out with higher creativity ratings. The results suggest that students who were judged as less creative initially gained the most from using a generative AI tool to support their creative writing.

Student Reflections
The student opinions collected through the reflection assignment were not formally analyzed using qualitative approaches; however, the

responses provide further context about participant levels of satisfaction, inspiration, and frustration during their experiences using ChatGPT in creative writing.

Although a wide range of reactions were expressed about all three conditions, most students conveyed approval of the video lessons and greater enthusiasm for their writing in condition 3 (supported AI use) when compared to condition 2 (unsupported AI use). In other words, they felt they benefited from the instructor support and subsequently enjoyed their writing experience with ChatGPT more. For some students, that meant they enjoyed the condition 3 collaborations with ChatGPT more than writing on their own in condition 1, with many predicting that they would continue to use the prompting techniques in their future fiction writing. For other students, it meant that they disliked writing with AI in both condition 2 and condition 3, but disliked it less when they asserted more authority over the collaboration, as they'd learned to do in the video lessons. These students often expressed frustration about AI's function, capabilities, or effects on their cognitive processes in both condition 2 and condition 3, though usually for these students the dissatisfaction seemed to peak in condition 2.

These attitudes did *not* seem to correlate with creativity scores. Some students who received high scores in condition 1 expressed enthusiasm for writing with AI while others from this group expressed aversion to it. Similarly, some students who received low scores in condition 1 indicated that they enjoyed using AI while others from this group indicated that they disliked it. The students who saw their scores increase when using ChatGPT conveyed similar differences of opinion, and so did students who saw their scores decrease when using ChatGPT.

Below are some representative passages from these reflections, which show both the variety of participant attitudes and the variety of correlations with creativity scores:

Participant #2 (who scored 5/3/6 on the three samples, respectively) wrote, "Our Week Eight 'Learning Materials' videos changed everything. The bland fiction that results from generic prompting belies the brainstorming and analytical possibilities of ChatGPT. I would have never known the optimal pathways to utilize ChatGPT in writing fiction without this guidance. … My initial experience [with ChatGPT] was uninspiring, while my second felt like I was really in a creative flow."

Participant #27 (who scored 6/3/4) wrote, "To compare both exercises, it definitely felt a little wrong to do the first one [in condition 2]. ChatGPT and I also have very different writing styles, so I definitely felt a little bit like an imposter. For the second exercise [in condition 3], it felt a lot better to work alongside it. Giving it the prompt and asking for guidance was really helpful! It took me in a far different direction than where I thought I would go, but I was happy with my product nonetheless. I overall had a really good time working with it, and I think it's an incredible tool to have as a writer."

Participant #24 (who scored 2/4/4) wrote, "I went into this exercise a little reluctantly, and while it was an informative and interesting experience, I don't think it's changed my overall perspective. I was impressed with the responsiveness of the tool, and its ability to interpret and react to fairly organically structured requests and information. As a writing exercise, having chat GPT write something for me was a good way to get a baseline understanding of what it is capable of, but was also unsatisfying and left me a bit bored. The writing it generated was similarly unsatisfying."

Survey Results
The post-exercise survey delivered to participants was meant to informally quantify some of the attitudes expressed in their reflections, offering additional perspective on the impact of ChatGPT on students' creative output. Only eight of the 31 participants completed the survey, limiting its validity.

The first three questions asked students to rate the creativity of their output in each of the three conditions, respectively, using a scale of 1 - 5, with 1 being "not creative" and 5 being "extremely creative." For condition 1, four of the eight students rated their creative output toward the top of the scale, choosing the labels "Quite Creative" or "Extremely Creative," and no student rated it at the bottom of the scale, "Not Creative."

For condition 2, only two students chose the top designations, and three students chose the bottom designation. For condition 3, four students chose the top designations, and one chose the bottom designation.

Table 7 below shows the average values students assigned to the creativity of their own output across the three conditions:

Table 7. Mean Creativity Self-Assessment by Condition

	Condition 1	Condition 2	Condition 3
Mean Creativity Self-Rating	3.63	2.25	3.25

The next two questions asked students which condition they felt had produced their most creative and least creative outputs. Six answered that their *most* creative output was in condition 1, zero that it was in condition 2, and two that it was in condition 3. All eight students said their *least* creative sample was in one of the two conditions involving ChatGPT, with six choosing condition 2 and two choosing condition 3. Table 8 below shows the percentage of students who rated each condition as the one that produced their most creative and least creative samples:

Table 8. Most and Least Creative Self-Assessment

	Condition 1	Condition 2	Condition 3
Most Creative Sample	75%	0%	25%
Least Creative Sample	0%	75%	25%

In both of these first two sections of the survey, students rated their output in condition 2 consistently and severely as the least creative. In other words, they found that using ChatGPT without instructor support was least conducive to their creativity. By smaller margins, they rated their output in condition 1 as more creative than their output in condition 3.

The final question asked students how likely they were to use ChatGPT in the future for creative writing, using a scale of 1 - 7, with 1 being "very unlikely" and 7 being "very likely." The responses showed high variability, with at least one student choosing every value except 6 (likely), and no value being selected more than twice. Collectively, this produced an average rating of 4.125, which most closely aligns with the "Neutral" rating on the scale. Table 9 below shows how many students chose each degree of likelihood for their future use of ChatGPT in creative writing:

Table 9. Participant Predictions of Future Generative AI Use

	Very Unlikely	Unlikely	Slightly Unlikely	Neutral	Slightly Likely	Likely	Very Likely
Count	1	1	1	2	1	0	2

Discussion

College students now approach writing assignments equipped with generative artificial intelligence programs like ChatGPT, but any description of its effect on their writing has been limited almost entirely to anecdote and speculation. Our goal was to provide data about how this new tool actually impacts student creativity, particularly in online creative writing courses, and whether pedagogical intervention could alter the impact. This study also measured the success of the online instruction we provided about how to use ChatGPT effectively.

Unsupported AI Use

Our results show that, on average, use of ChatGPT alone (without guidance from the instructor) neither improved nor decreased student creativity with any statistical significance when compared with original student writing. This suggests that in courses that offer no instruction about how to use AI, students who enlist it to complete assignments are submitting work that is equivalent in creativity to their original writing. But while this might be true at a collective level, it seems to arise from two complementary shifts, which cancel each other out in the mean creativity scores.

The students who showed good creativity in their own original writing had their creativity diminished when using ChatGPT without instruction. The students who showed low creativity in their own writing had their creativity enhanced when using ChatGPT without instruction. This suggests that, at an individual level, student creativity levels are not usually maintained during unsupported AI use but rather flattened out. Indeed, condition 2 produced the fewest number of writing samples that were rated

low in creativity and, simultaneously, the fewest number of writing samples that were rated high in creativity. Under this condition, both groups of students seem to provoke mediocre levels of creativity from the program, which for some students is an improvement and for others a deterioration. The end result of both these trends might be a similar creativity *average*, but on a case-by-case basis, it appears that students produce a more uniformly middling body of work, a creative landscape with fewer elevation changes.

Student reflections appear to acknowledge this effect. They reported the lowest levels of satisfaction and the lowest self-assessments of creativity when they were given access to ChatGPT but no instruction about how to use it, even when it increased their individual creativity scores. In short, their views of ChatGPT were largely negative when using it on their own, despite the collective similarity in their mean creativity scores. This negativity was greatly reduced after the instructional intervention. This suggests that instruction about using AI effectively makes a significant improvement to student outcomes, satisfaction, and learning.

Supported AI Use

Our data showed that the combination of ChatGPT and targeted instruction produced a significant increase in student creativity, compared to both original student writing and unsupported ChatGPT use. This suggests that well-designed instructional support can indeed benefit students, both those who are already using generative AI on their own and those who have so far avoided it. It also suggests that AI can be a powerful tool for enhancing creativity when users leverage its

capabilities effectively, without relinquishing their own contributions to the creative process.

Because generative AI is a relatively new tool, with a role in education that is still evolving, it's likely that students are unfamiliar with all but its most basic functions, have limited ability to craft effective prompts, and tend to rely passively on the AI outputs when they encounter it on their own. Providing students with lessons about AI use likely empowered them to bring more agency into their collaboration with it, to think more critically and creatively about its output, and to use the technology as an extension of their cognitive processes rather than as a replacement for them. Most students expressed relief and gratitude for the strategies they learned in our AI lessons, and/or acknowledged the ignorance with which they had approached the tool beforehand. This suggests not only that students are open to improvements in how they interact with AI but that they are in fact hungry for it.

Most of the overall improvement came from the students who received low creativity scores for their own original writing. This suggests enormous potential gains for the students who need it most. With this tool, the students with lower levels of creativity reached levels that were nearly indistinguishable from the students who began with the highest levels of creativity, closing the gap between them. Conversely, it suggests that not all students benefit from the integration of AI, even with instructor intervention, since the moderate and high groups saw no significant gains in creativity from their own original writing. However, it's important to note that the highly creative group did see significant improvement after their unsupported use of AI. This suggests that even students who are creatively capable don't usually know how to apply that capability when incorporating AI into their writing process, likely because they approach it with passivity and inexperience. They benefit from instructional intervention as much as lower-level students when integrating the new technology into their writing

process — something that seems more and more inevitable as AI use increases in student coursework.

It's possible that the collapse of the creativity gap in condition 3 could have consequences on the student learning experience. For students with lower creativity, it might improve morale and motivation to see their relative success in comparison with their peers, or it might reduce their engagement as they see better results when using ChatGPT, even without instructor intervention. For students with higher creativity, ChatGPT use might have inverted effects, making their gifts less evident and harder to acknowledge, thereby reducing positive reinforcement and, ultimately, motivation. It's also possible that this effect will spur them to greater effort or originality. They might push further with their AI collaborations, either to distinguish themselves creatively from their peers or to satisfy their higher levels of innate creativity, especially as they move beyond this initial phase in which they are only first being introduced to more collaborative techniques. In other words, it's possible that the more creative students will accelerate more quickly from this point of launch.

The overall increases in creativity further suggest that the instruction we provided was at least somewhat effective, and that other instructors might consider implementing similar pedagogical interventions into their own courses, whether they teach fiction writing or a different discipline. Especially in courses that attract a great deal of AI in student submissions, this kind of support can combat the "flattening out" of creativity that comes with unregulated use, thereby producing a more varied creative landscape in each batch of student writing. It can also prevent highly creative students from letting AI decrease their performance. Instructors might consider using our lessons and/or scaffolding as the basis from which they build their own. In video lessons that lasted less than twenty minutes total, we described and modeled the phases of the writing process at

which ChatGPT could be helpful, the phases at which human agency was more effective, and the importance of retaining autonomy in the decision-making and the writing. We reinforced the learning with a quiz, let students deploy it in a low-stakes exercise, and asked them to engage in metacognition about their experience. We also positioned this instruction late in the term, after students had already built understanding and skill in the fundamentals of the discipline.

The significant improvement in creativity scores achieved through such a modest instructional intervention suggests enormous potential for more comprehensive approaches to AI integration in education. That students demonstrated measurable creative growth after less than twenty minutes of targeted instruction, a brief quiz, and a single exercise indicates that even small investments in AI guidance can yield meaningful returns. This efficiency is particularly promising given the pressing need for AI instruction across disciplines and the limited time available in most course schedules. While our study focused on fiction writing, the core principles we employed—strategic tool use, retained autonomy, and metacognitive reflection—could readily transfer to other contexts where AI use is prevalent. The success of this approach demonstrates that educators do not need to choose between fighting AI use and surrendering to it; instead, they can harness its potential while preserving and even enhancing the essential human elements of learning and creativity.

Limitations & Questions for Further Research

The size and makeup of the participant pool presents an important limitation in what can be concluded from this study. The number of participants was small, and replications on a larger scale will be important in determining whether the findings can be generalized. This is particularly true of the individual differences we found in our study. These findings are preliminary, exploratory, and should be treated with caution until they can be replicated with a larger group of participants.

Our participants' level of expertise might also have impacted the results; it is not well known whether these findings apply to writers with more expertise, such as graduate-level fiction writers or professionals, or to writers with less expertise, such as people who have never studied creative writing.

The prompt topic used in this study might also have had undetected impacts on the findings. In fact, the prompt was designed to ground student writing in the particulars of real experience, which is something the principal investigators have found to enhance creativity. A more general prompt, such as the one used in the video lessons, "write a scene about a character discovering something tangible or intangible," might have produced outputs of a different creativity level, particularly in condition 1. Future research might measure the effects that different prompts elicit in creativity levels, and whether it alters the relative success of student-AI collaborations.

There was no mechanism in condition 3 that ensured students were using ChatGPT in the way that they were instructed. For example, although the video lessons instructed students to do their own writing in this condition, it cannot necessarily be assumed that students followed this advice and refused to let the AI do the writing. In fact, the style, structure, and mechanical conventions of samples from condition 3 overall resembled those in condition 2 (unsupported AI use) more than those in condition 1 (original student writing), suggesting students could indeed have relegated the writing to ChatGPT. Alternative study designs could provide oversight or confirmation mechanisms to better ensure the differentiation of AI use in these conditions.

The evaluation methods could further limit the usefulness of the findings in two ways. First, judges interpreted general creativity rather than localized creativity or specific factors contributing to creativity, and so it is not known what aspects of the writing samples produced higher creativity

scores. It could have been the originality of the premise, the exoticism of the setting, the sharpness of the descriptive details, other unknown factors, or a blend thereof. Additional research that isolates these factors could provide more precise descriptions of AI's impact on creativity. Second, it is not known the degree to which "creativity" was conflated with "quality" in the judges' scores, nor what effect the quality of the writing sample had on its perceived or actual creativity. In the same vein, the data collected here about creativity cannot necessarily be used to infer the quality of the writing samples.

One of the most suggestive implications in the data was the way unregulated AI use had different impacts on highly creative and less creative students, but this trend is evident only in exploratory work that is not conclusive. More research is needed to confirm it; such research might also help clarify which type of student tends to benefit, and how much, from the *supported* use of AI, especially as it continues beyond an introductory phase.

Conclusion

AI has become unavoidable, not just in educational contexts that involve writing but also in the broader world as industries continue evolving around the new technology (Brumfiel, 2023). To provide the highest quality education, college instructors must better understand the effects of this tool on creative processes and how to provide effective instruction about it. This study provides a pathway to begin meeting that challenge, providing a model for effective AI instruction and demonstrating the significant improvement in creativity scores that results from it. These findings underscore the importance of thoughtful implementation and the role of educators in enabling students to harness the full potential of AI technologies. By providing explicit guidance and fostering active engagement, educators can empower students to use tools like ChatGPT as catalysts for greater creativity.

Most importantly, this research signals that the choice between embracing and rejecting AI could be a false dichotomy. When students use AI without guidance, creativity tends to flatten toward the average, with stronger writers losing their edge and weaker writers seeing modest gains. However, with less than twenty minutes of targeted instruction about strategic AI use and creative autonomy, students achieved significantly higher creativity scores than either their original writing or their unsupported AI use produced. This suggests that the path forward lies not in resistance to AI nor in unrestricted adoption, but in thoughtful integration supported by explicit instruction. As AI tools continue to evolve, educators who provide this kind of strategic guidance can help ensure these technologies enhance student creativity while preserving the full range of creative expression.

Conflicts of Interest

The principal investigators declare no conflict of interest. They were not paid or otherwise influenced by OpenAI to conduct this study.

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Appendix 1. Student Reflection Assignment

Week 8 - ChatGPT Reflection

Purpose

This is your chance to process and discuss your experiences using ChatGPT. The goal is to clarify (for you and for me) what it means to incorporate this technology into fiction writing, and whether students should adopt or avoid it.

This is the first time I've deployed these lessons and assignments. I'm truly interested in hearing your perspectives!

Assignment

Reflect on your experiences using ChatGPT to help you produce fiction. In other words, how did it go? Write at least 300 words about the surprises, challenges, satisfaction, or concerns you derived from using it in both of the exercises this week, especially in comparison to each other.

Please consider both the quality of the product and the quality of the process. Did it *feel* the same, better, worse? Did you learn as much, exercise your brain as hard? Was it as satisfying as solo writing? Do you think college students should use this tool in their stories? What about pros?

Appendix 2. Participant Survey

Please rate your creative output for the Week 7 Exercise: Writing From Experience. (Completed without ChatGPT):
- Not Creative
- Slightly Creative
- Moderately Creative
- Quite Creative
- Extremely Creative

Please rate your creative output for the Week 8 ChatGPT Exercise: Let It Rip. (Completed with ChatGPT but no instructor support.)
- Not Creative
- Slightly Creative
- Moderately Creative
- Quite Creative
- Extremely Creative

Please rate your creative output for the Week 8 ChatGPT Exercise: Collaboration. (Completed with ChatGPT and instructor support)
- Not Creative
- Slightly Creative
- Moderately Creative
- Quite Creative
- Extremely Creative

Which exercise do you feel best reflected your most creative output?
- Without ChatGPT
- With ChatGPT but no instructor support
- With ChatGPT and instructor support

Which exercise do you feel best reflected your least creative output?
- Without ChatGPT
- With ChatGPT but no instructor support
- With ChatGPT and instructor support

How likely are you to use ChatGPT in your future creative writing endeavors?
- Very unlikely
- Unlikely
- Slightly unlikely
- Neutral
- Slightly Likely
- Likely
- Very Likely

Appendix 3. Creativity Scores

The chart below reflects the consensus creativity scores that the judges awarded to each participant's writing samples across all three conditions, though the samples were randomized during judging. Participant identities were also embedded in six-digit codes to make them less discernible across the various conditions. The judges couldn't tell that Participant 1, for instance, was responsible for all three of their writing samples; each sample had a different six-digit code.

Participant	COND1_score	COND2_score	COND3_score
1	3	3	3
2	5	3	6
3	5	4	4
4	3	3	6
5	2	4	5
6	3	3	2
7	4	3	4
8	5	4	6
9	3	3	4
10	4	2	6
11	4	4	2
12	3	3	4
13	2	3	3
14	2	4	3
15	5	2	3
16	4	5	3
17	3	3	5
18	2	4	4
19	4	4	6
20	3	4	5
21	5	3	5
22	5	4	5
23	2	4	4
24	2	3	4
25	3	5	6
26	6	3	4
27	4	5	2
28	2	3	4
29	5	4	4
30	5	3	7
31	4	4	5

About the Research Unit at Oregon State Ecampus

Vision
The Ecampus Research Unit strives to be leaders in the field of online higher education research through contributing new knowledge to the field, advancing research literacy, building researcher communities and guiding national conversations around actionable research in online teaching and learning.

Mission
The Ecampus Research Unit responds to and forecasts the needs and challenges of the online education field through conducting original research; fostering strategic collaborations; and creating evidence-based resources and tools that contribute to effective online teaching, learning and program administration.

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Suggested Citation
Bushnell, J. T., & Harrison, W. (2025) *A new muse: How guided AI use impacts creativity in online creative writing courses*. [White Paper]. Oregon State University Ecampus Research Unit.