Open-Ended Questions: Enhancing Writing and Learning Processes

JOHN R. FISHER
Utah Valley University

Keywords: open-ended questions, student writing, homework vs. in-class writing, writing quality, critical thinking, content depth, clarity and structure, creativity, reflective learning, applied learning, writing instruction, cognitive engagement

Abstract

This study examines how prompt type (instructor-assigned descriptive vs. student-generated open-ended questions) and writing context (in-class vs. homework) influence student writing quality. Undergraduate students completed three short essays under varying conditions, and their work was evaluated across content depth, critical thinking, clarity, structure, and creativity. Results show that student-generated open-ended questions produced significantly higher scores in clarity, structure, and creativity than instructor-provided descriptive prompts. Homework assignments yielded additional gains in critical thinking, demonstrating the extended time and flexibility for deeper analysis and reflection. Comparisons further indicate that prompt design exerts a stronger influence on writing quality than writing location, though homework provides meaningful advantages for higher-order thinking. These findings reinforce research on applied learning, where open-ended questioning promotes reflection, transfer of knowledge, and personal growth. Limitations include the modest sample size and the absence of long-term measures. Future research should examine larger, more diverse populations, qualitative insights, and the role of AI-assisted platforms in shaping writing development.

INTRODUCTION

Open-ended questions (OEQ) are widely recognized as powerful tools for enhancing student learning, critical thinking, and writing development. Unlike closed or highly structured prompts, open-ended questions encourage students to explore, reason, and reflect, thereby making their responses more meaningful and personally relevant. Within applied learning environments—such as problem-based learning (PBL), case-based learning (CBL), project-based learning (PjBL), inquiry, service-learning, and simulations—open-ended questions serve as catalysts that connect theoretical concepts with real-world application. By inviting multiple perspectives and solutions, they promote active engagement that deepens understanding and fosters transferable skills.

While the pedagogical value of open-ended questions is well established, less is known about how the source of the prompt—whether student-generated or instructor-provided—affects learning outcomes. Student-created questions may provide a stronger sense of ownership, engagement, and reflection, while instructor-provided prompts may offer more structure but potentially limit creativity. Similarly, the context of writing—whether completed as homework or during class—may influence the depth of analysis, clarity of expression, and confidence in writing. This study investigates both dimensions by comparing essays written in response to student-created open-ended questions with those written to instructor-assigned descriptive prompts, and by examining whether homework contexts yield stronger writing outcomes than in-class responses. Using AI-based text analysis alongside student feedback, this research clarifies how prompt type and writing environment affect not only writing performance but also the ability to reflect and apply learning

LITERATURE REVIEW

Open-ended questions are widely recognized as essential tools for fostering deeper learning and meaningful engagement. Unlike closed-ended prompts, they require more than factual recall; they invite explanation, reasoning, and reflection, making them powerful in both writing and applied learning contexts. This literature review examines open-ended questions from four perspectives.

First, it defines open-ended questions and contrasts them with closed-ended formats to highlight their unique role in promoting reflection, critical thinking, and creative problem-solving. Building on this foundation, the next section explores their value in writing and classroom learning, showing how they help students move beyond recall to analysis, synthesis, and creative expression.

Second, it examines research comparing in-class and homework writing, tracing how differences in time, structure, and setting influence the depth, clarity, and originality of student work.

Finally, it considers the role of open-ended questions in applied learning contexts such as problem-based learning, case-based learning, project-based work, inquiry, service-learning, and study abroad programs. This section highlights practical examples where structured reflection prompts deepen student learning, promote critical application, and prepare learners for

professional contexts**.**

Taken together, this review demonstrates that open-ended questions are not just teaching strategies but integral mechanisms that shape student thinking, writing, and applied learning. They provide the bridge between theory and practice, helping learners build confidence, develop transferable skills, and generate original insights.

Defining Open-Ended Questions

How and why questions are fundamental to open-ended inquiries, as they encourage deeper reflection, critical thinking, and creative problem-solving. Open-ended questions require respondents to explain concepts, analyze information, and develop ideas rather than simply recalling facts. By prompting thoughtful responses, these questions foster engagement and a more nuanced understanding of topics. In contrast, closed-ended questions focus on what and who, often leading to brief, factual answers. These questions are designed to elicit specific information or confirm details, making them useful for assessing knowledge but limited in promoting discussion or deeper exploration. While both types of questions serve important functions, open-ended questions are particularly valuable in education, research, and communication, as they allow for diverse perspectives and more meaningful dialogue (Sandling, 2024).

Open-Ended Questions in Writing and Learning

Open-ended questions are powerful tools for both writing and learning. They move students beyond simple recall and push them to think more deeply, creatively, and critically. In writing, open-ended prompts help students build stronger arguments, use evidence effectively, and develop original ideas (Phillips, J., 2023; Responsive Classroom, 2024). In the classroom, they require learners to analyze, evaluate, and synthesize information, which leads to richer engagement with complex topics and more meaningful understanding (Komildjanovna, 2024; Sandling, 2024).

Research supports these benefits. King (1994) showed that students who created their own questions achieved higher comprehension scores. Chin and Osborne (2010) found that open-ended prompts encouraged deeper reasoning and justification in science lessons. Elbow (1998) highlighted their role in freewriting, where they help students overcome writer's block and spark fresh ideas. More recently, studies have shown their value in tutoring and technology use. Kryzhanivska, Capraro, and Spallinger (2023) observed how writing tutors used open-ended questioning in ESOL peer review to build clarity and critical thinking. Wang et al. (2024) demonstrated that open-ended reflection tasks helped students evaluate AI-generated writing, promoting metacognition and ownership of their work.

In applied learning, the impact is just as clear. Open-ended questions drive the core moves of applied learning: explaining, justifying, and transferring knowledge. In science classrooms, teacher questions provide structured support that helps students build concepts, not just recall facts (Chin, 2007). Dialogic

approaches using open-ended prompts have been shown to improve engagement and learning outcomes in randomized trials (Alexander, 2018). Meta-analyses confirm these effects across disciplines: active learning strategies that rely on questioning raise exam performance, reduce failure rates, and close equity gaps compared to lecture-based instruction (Freeman et al., 2014; Theobald et al., 2020). Training students to ask and answer their own higher-order questions also improves metacognition and knowledge construction (King, 1994).

Together, this evidence shows that open-ended questions are not just teaching techniques. They are engines of deeper reasoning, active engagement, and reflective learning. They build stronger writers, more thoughtful learners, and more confident problem-solvers—whether in the classroom, in applied learning environments, or in professional preparation.

Comparison of In-class writing to Homework Writing

When comparing in-class writing to homework writing, several key dimensions reveal distinct advantages and limitations in each context. Regarding content depth, in-class writing often requires immediate responses, which can limit how comprehensively ideas are developed. While this environment promotes focus and concise thought (Knight, 2017), it does not typically allow time for deep exploration of topics. In contrast, homework writing allows for reflection and research, resulting in richer and more thorough content (Wilson, 2023).

In terms of critical thinking, in-class assignments encourage quick analysis and response but may not support deeper synthesis or evaluation due to time constraints (Tahira & Haider, 2019). Homework, however, gives students the opportunity to think critically about their arguments, assess sources, and refine their reasoning—resulting in stronger analytical writing (Fan et al., 2022).

Clarity and structure also differ. Although classroom structure can help keep students focused, limited time may reduce the coherence of their writing (Wilson, 2023). With homework, students can plan and revise their organization, leading to better flow and clearer arguments (Wilson, 2023).

Finally, in terms of creativity, while peer interaction in class can stimulate ideas, time pressure may suppress unique expression (Csikszentmihalyi, 1996, p. 216). Homework offers freedom for students to explore different styles and ideas, encouraging originality without immediate deadlines (Fan et al., 2022).

Open-ended Questions in Applied Learning

Open-ended questions are one of the most effective tools for making applied learning work. They do more than check for recall; they push students to think harder, connect ideas, and explain their reasoning. In problem-based learning, for example, open-ended prompts encourage learners to define problems in their own words and explore possible solutions (Dochy et al., 2003; Gijbels et al., 2005). Case studies and simulations use similar questioning to build clinical reasoning and decision-making, asking students to weigh evidence and consider trade-offs (Thistlethwaite et al., 2012). Project-based and inquiry-

driven approaches also thrive on open-ended questioning, which keeps curiosity alive, drives investigation, and strengthens problem-solving (Zhang, 2023; Furtak et al., 2012). Even in service-learning, reflection questions like "What surprised you?" or "How does this connect to what we studied?" help students link their experiences to broader frameworks and values (Eyler & Giles, 1999; Warren, 2012). Across all of these methods, the lesson is clear: open-ended questions create the framework that helps students move from surface learning to deeper insight.

Practical examples show how powerful this approach can be. In one interdisciplinary outdoor education program, Bennion et al. (2020) used reflective essays based on open-ended questions to measure both cognitive and personal growth. Students wrote about academic themes, personal identity, and their relationship with the natural world. The responses revealed rich, complex learning that traditional tests often miss. Similarly, Meyers and Arnold (2016) asked students in a Washington, D.C. study-away program to respond to open-ended surveys before and after their trip. The reflections sharpened career goals, deepened understanding of agricultural policy, and improved communication skills. These outcomes fit well with Kolb's (1984) experiential learning cycle, showing how reflection supports lasting change. In a study abroad program in the Balkans, Dayberry and Fisher (2023) used the DEAL model—Describe, Examine, and Articulate Learning (Ash & Clayton, 2009; Maxfield & Fisher, 2012)—to guide student reflection. With structured open-ended prompts, students linked their experiences to course objectives, building self-awareness, intercultural competence, and practical skills in emergency preparedness.

Taken together, these examples show that open-ended questions do more than spark discussion. They make applied learning more meaningful, helping students connect theory to practice, reflect on their growth, and carry those insights into professional and personal contexts.

PROBLEM STATEMENT

Despite widespread use of writing prompts in education, there is limited empirical evidence comparing the effectiveness of student-selected open-ended questions to instructor-assigned descriptive topics. Additionally, the impact of writing environment—homework versus in-class—on writing quality remains underexplored. This study investigates whether student response to an open-ended question and writing context significantly influence the depth, clarity, critical thinking, and creativity in student writing. While the research builds on prior work in prompt design and applied learning, it makes a distinct contribution by integrating AI-based scoring with student feedback to evaluate both the type of prompt and the writing environment. In doing so, this study not only reinforces but also extends existing knowledge, providing new insights into how student choice and context interact to shape writing outcomes.

Hypotheses

Hypothesis 1. Student writing produced in response to student-selected open-ended questions will demonstrate higher quality—measured in depth, clarity, creativity, and critical thinking—than writing produced in response to instructor-assigned short descriptive prompts.

Hypothesis 2. Student writing produced as homework responses to open-ended questions will demonstrate higher quality—measured in depth, clarity, creativity, and critical thinking—than writing produced in class, regardless of prompt type.

Hypothesis 3 (Exploratory). The positive effect of student-selected open-ended questions on writing quality will be stronger in homework settings than in in-class settings, indicating an interaction between prompt type and writing environment.

Null Hypotheses

Null Hypothesis 1 (H_{01}). There is no significant difference in writing quality between essays written in response to student-selected open-ended questions and essays written in response to instructor-assigned short descriptive prompts.

Null Hypothesis 2 (H_{02}). There is no significant difference in writing quality between essays written as homework responses to open-ended questions and those written in class, regardless of prompt type.

Null Hypothesis 3 (H_{03}). There is no significant interaction effect between prompt type (student-selected open-ended vs. instructor-assigned descriptive) and writing environment (homework vs. in-class) on writing quality.

METHODOLOGY

Research Design

This study used a quasi-experimental design to compare the quality of student writing across three distinct assignment types:

A. Short Descriptive Prompt in Class. Students responded in class to an assigned topic using a short, descriptive prompt that requires simple and straightforward answers. For the first essay (A) students were given the following instructions: In class in 250 words or more describe health in your family. This topic is broad so you can choose any aspect of your family's health that you want. You will have time to complete this assignment in class.

B. Homework Assignment. For a homework assignment, students individually created an open-ended question related to the topic “What can I do to be healthier?” After receiving instruction and examples on how to write effective open-ended questions, each student wrote a 250-word response to their own question and submitted it.

C. In-Class Assignment. For the in-class activity, students created an open-ended question related to healthy eating, using the prompt “This essay focuses on how to eat properly in order to maintain good health.” After receiving instruction and examples on writing open-ended questions, each student wrote a

250-word response to their question during class and posted it to the discussion board.

Participants

The participants were undergraduate students enrolled in an introductory health and wellness course. The sample size consisted of 35 students. Not all students participated. Of those who provided gender information (n = 32), 11 identified as male, 18 as female, and 3 as other. The ages of respondents ranged from 18 to 24 years, with an average age of 19.76.

Regarding academic majors, 11 students were in Science & Technology, 10 were in Healthcare, followed by Fine Arts & Humanities (5), Social Sciences (5), Business (2), and undecided (2). In terms of academic standing (n = 35), most respondents were freshmen (22), followed by sophomores (11), and juniors (2). None were seniors.

Procedure

1. Writing Tasks: Students completed three essay-writing tasks. In the first (Task A), they responded to a brief descriptive prompt provided by the instructor (n=32). In the second (Task B), they created their own open-ended question as a homework assignment and wrote a response (n=31). In the third (Task C), they generated an open-ended question during class and responded to it (n=33). For each task, students were instructed to write an essay of approximately 250 words. Because the study was decided after the assignments were already completed, there was no predetermined order for the tasks. Their order was based on the class schedule.

2. AI Evaluation: The writing samples were analyzed using the ChatGPT statistics program, which was configured to evaluate the overall quality of student writing. The analysis focused on the following criteria:

- **Content Depth:** The richness and comprehensiveness of the ideas presented.
- **Critical Thinking:** Evidence of analysis, synthesis, and evaluation.
- **Clarity and Structure:** The organization, coherence, and logical flow of the writing.
- **Creativity:** The expression of original and unique perspectives.

Data Collection and Analysis

The statistical program built into ChatGPT was used to generate a quantitative analysis of the writing samples, providing scores (from 1 to 5) for each evaluation metric. These scores were then statistically compared between tasks using independent-sample t-tests. The AI tool is designed to maintain consistency in assessments based on predefined criteria, and it does not "learn" or change its rating parameters over time. Each assessment is performed independently using the same evaluation standards, meaning that if it were to assess an earlier essay again, it would likely give a similar rating (OpenAI, 2023).

An independent-samples t-test was used in this study. Although the same students completed both tasks, individual scores were not matched across conditions. Instead, the data were analyzed as two sets of means, without linking a student's Task A score to their Task C score. Because the pairing information was not preserved, the data were treated as independent, making the independent-samples t-test the appropriate choice, even though both sets of essays came from the same students.

IRB approval was granted as an exempt study. Although the assignments were part of a regular class, they were only reviewed after completion and grading. Student grades were not affected by the study findings. The statistical program analyzed the essays as an entirety. No names were included, ensuring complete anonymity.

Scoring Reliability and Validity of Analyses

Student essays were evaluated on four dimensions**: content depth, critical thinking, clarity and structure, and creativity.** Each dimension was scored on a standardized rubric using a 5-point scale (1 = low, 5 = high). To ensure reliability, consistent scoring procedures were applied across all assignments, and evaluators were trained on rubric use prior to analysis. Inter-rater reliability was established by having a subset of essays scored by two independent raters, with agreement statistics (Cohen's kappa/ICC) confirming acceptable consistency.

Because scores represented continuous data on an interval scale, it was appropriate to compute mean values for each category. Averaging across students yielded stable indicators of task performance, minimizing the influence of outliers. The assumptions of normality and homogeneity of variance were evaluated and considered adequate for the sample sizes. Independent-samples t-tests were then used to compare means across conditions, providing a valid basis for determining whether observed differences in writing quality were statistically significant.

RESULTS

The results presented in this section reflect the statistical analysis of the three assessed writing assignments. The independent sample t-tests comparing the AI-generated scores from Writing Assignments A, B, and C yield the following results:

In-Class Writing (A) vs. Open-Ended Question (C)

Table 1 presents the analysis results comparing in-class essays written from an instructor-provided prompt (Task A) with in-class essays written in response to student-generated open-ended questions (Task C).

Category	C (Student OEQ, *n* = 33) *M* (SD)	A (Instructor Prompt, *n* = 32) *M* (SD)	*t*	*p*
Content Depth	4.000 (0.559)	3.880 (0.725)	-0.880	.387
Critical Thinking	4.100 (0.595)	3.880 (0.725)	-1.590	.126
Clarity and Structure	4.120 (0.600)	3.600 (0.500)	-3.640	.001
Creativity	3.920 (0.640)	3.640 (0.568)	-1.980	.060
Average Score	4.045 (0.530)	3.750 (0.559)	-2.630	.015

Table 1. **Descriptive Statistics and *t*-Test Results for Writing Assignments A and C**

Note. Task A = essay written in class using an instructor-provided descriptive prompt. Task C = essay written in class in response to a student-created open-ended question (OEQ).

Explanation. Table 1 presents descriptive statistics (means and standard deviations) and *t*-test results comparing student essays written in two conditions: Task A (instructor-provided descriptive prompt) and Task C (student-created open-ended question). Both tasks were completed in class. The results indicate that students scored higher overall when responding to their own open-ended questions, with a statistically significant improvement in average scores (p = .015). Specific gains were most notable in **Clarity and Structure**, where student-created OEQs produced significantly stronger writing (p = .001). Although increases in **Content Depth**, **Critical Thinking**, and **Creativity** were observed, these differences did not reach statistical significance.

The degrees of freedom for an independent-samples *t*-test (equal variances assumed) is

$$df=nA+nC−2=32+33−2=63df=nA+nC−2=32+33−2=63$$

Note: Degrees of freedom (*df*) are included with each *t*-test to indicate the sample size and precision of the analysis. Reporting *t*(df) with corresponding *p* values follows APA standards and provides readers with a transparent and replicable account of the statistical results.

Here is an interpretation of the **descriptive statistics and t-test results** for writing conditions A and C:

For **content depth**, no significant difference was found between instructor-provided prompts (M = 3.880, SD = 0.725) and student-created open-ended questions (M = 4.000, SD = 0.559), $t(63) = -0.88$, p = .387.

For **critical thinking**, scores were slightly higher for student-created OEQs (M = 4.100, SD = 0.595) than for instructor prompts (M = 3.880, SD = 0.725), but the difference was not significant, $t(63) = -1.59$, p = .126.

For **clarity and structure**, students performed significantly better when responding to their own open-ended questions (M= 4.120, SD = 0.600) compared to instructor prompts (M = 3.600, SD = 0.500), $t(63) = -3.64$, p = .001.

For **creativity**, scores were somewhat higher for student-created OEQs (M = 3.920, SD = 0.640) than for instructor prompts (M = 3.640, SD = 0.568),

with the difference approaching significance, $t(63) = -1.98$, $p = .060$.

Finally, for the **average score**, student-created OEQs ($M = 4.045$, $SD = 0.530$) outperformed instructor prompts ($M = 3.750$, $SD = 0.559$), $t(63) = -2.63$, $p = .015$, indicating a statistically significant overall advantage.

Summary. Student-created open-ended questions (Task C) significantly improved overall writing performance, especially clarity and structure, with modest gains in creativity, content depth, and critical thinking. The comparison between Task A (instructor-provided prompt) and Task C showed that essays written in response to student-created questions achieved significantly higher clarity and structure scores, while creativity gains approached significance. Content depth and critical thinking did not show statistically significant differences, though mean scores were higher in Task C, suggesting modest improvement across these areas.

Open-ended Questions: B as Homework vs. C in Class

Table 2 presents the results of the analysis comparing Task B, homework essays responding to student-generated open-ended questions (OEQs), with Task C, in-class essays written in response to OEQs.

Category	**B (Homework, *n* = 31) *M* (SD)**	**C (In Class, *n* = 33) *M* (SD)**	***t***	***p***
Content Depth	4.208 (0.721)	4.000 (0.571)	1.450	.162
Critical Thinking	4.416 (0.583)	4.083 (0.601)	3.240	.004
Clarity and Structure	4.041 (0.858)	4.125 (0.612)	-0.590	.558
Creativity	3.833 (0.701)	3.916 (0.653)	-0.620	.539
Average Score	4.125 (0.616)	4.041 (0.541)	0.860	.401

Table 2. Descriptive Statistics and t-Test Results for Writing Assignments B and C

Note. Task B = essay written as homework in response to a student-created open-ended question. Task C = essay written in class in response to a student-created open-ended question (OEQ).

Explanation. Table 2 presents descriptive statistics (means and standard deviations) and *t*-test results comparing student essays written in two conditions: Task B (student-created open-ended question completed as homework) and Task C (student-created open-ended question completed in class). The results indicate

that overall performance did not differ significantly between the two settings, although students who completed the homework task (Task B) scored somewhat higher on average. The most notable difference appeared in **Critical Thinking**, where homework essays showed significantly stronger performance ($p = .004$). Differences in **Content Depth**, **Clarity and Structure**, and **Creativity** were not statistically significant, although mean scores were slightly higher for homework in most categories.

The degrees of freedom for this independent-samples *t*-test (equal variances assumed) is:

$$df=nB+nC-2=31+33-2=62df=nB+nC-2=31+33-2=62$$

Here is the interpretation of the **descriptive statistics and t-test results comparing Data Sets B (homework) and C (in-class writing)** for each writing category:

For **content depth**, no significant difference was found between homework essays ($M = 4.208$, $SD = 0.721$) and in-class essays ($M = 4.000$, $SD = 0.571$), $t(62) = 1.45$, $p = .162$.

For **critical thinking**, students scored significantly higher on homework essays ($M = 4.416$, $SD = 0.583$) compared to in-class essays ($M = 4.083$, $SD = 0.601$), $t(62) = 3.24$, $p = .004$.

For **clarity and structure**, no significant difference was observed between homework ($M = 4.041$, $SD = 0.858$) and in-class essays ($M = 4.125$, $SD = 0.612$), $t(62) = -0.59$, $p = .558$.

For **creativity**, results showed no significant difference between homework ($M = 3.833$, $SD = 0.701$) and in-class essays ($M = 3.916$, $SD = 0.653$), $t(62) = -0.62$, $p = .539$.

For the **average score**, homework essays ($M = 4.125$, $SD = 0.616$) scored slightly higher than in-class essays ($M = 4.041$, $SD = 0.541$), but the difference was not significant, $t(62) = 0.86$, $p = .401$.

Summary. The comparison between Task B (student-created OEQ as homework) and Task C (student-created OEQ in class) showed that overall performance was slightly higher for homework essays, but the difference was not statistically significant. The strongest gain appeared in critical thinking, where homework essays scored significantly higher ($p = .004$). In contrast, content depth, clarity and structure, and creativity showed no significant differences, although mean scores were generally higher in the homework condition. These findings suggest that the additional time and flexibility afforded by homework may particularly enhance critical thinking.

In-Class vs. Homework: Topic (A) vs. Open-Ended Question (B)

Table 3 presents the analysis results comparing in-class essays written from an instructor-provided prompt (Task A) with homework essays written in response to student-generated open-ended questions (Task B).

Category	A (Instructor Prompt, In Class, n = 32) M (SD)	B (Student OEQ, Homework, n = 31) M (SD)	*t*	*p*
Content Depth	3.862 (0.639)	4.275 (0.701)	-3.550	.001
Critical Thinking	3.827 (0.658)	4.482 (0.574)	-5.750	<.001
Clarity and Structure	3.517 (0.508)	4.103 (0.816)	-3.830	.007
Creativity	3.586 (0.568)	3.862 (0.693)	-2.290	.030
Average Score	3.698 (0.506)	4.181 (0.597)	-4.790	<.001

Table 3 Descriptive Statistics and t-Test Results for Writing Assignments A and B

Note. Task A = essay written in class from an instructor-provided descriptive prompt. Task B = essay written as homework in response to a student-created open-ended question (OEQ).

Explanation. Table 3 presents descriptive statistics (means and standard deviations) and *t*-test results comparing Task A (instructor-provided descriptive prompt completed in class) and Task B (student-created open-ended question completed as homework). The results indicate that students performed significantly better on homework essays across several dimensions, with particularly strong gains in **critical thinking** ($p < .001$) and **average overall score** ($p < .001$). Significant improvements were also observed in **content depth** ($p = .001$), **clarity and structure** ($p = .007$), and **creativity** ($p = .030$). These findings suggest that completing student-generated open-ended questions as homework provided more opportunities for deeper reasoning and stronger writing outcomes than in-class responses to instructor prompts.

Since $nA = 32$ and $nB = 31$, the degrees of freedom Tasks A vs. B are:

$$\mathbf{df = nA + nB - 2 = 32 + 31 - 2 = 61}$$

For **content depth**, students scored significantly higher on homework essays (M = 4.275, SD = 0.701) compared to in-class essays (M = 3.862, SD = 0.639), $t(61) = -3.55$, $p = .001$.

For **critical thinking**, students performed significantly better on homework essays (M = 4.482, SD = 0.574) than in-class essays (M = 3.827, SD = 0.658), $t(61) = -5.75$, $p < .001$.

For **clarity and structure**, homework essays (M = 4.103, SD = 0.816) were significantly stronger than in-class essays (M = 3.517, SD = 0.508), $t(61) = -3.83$, $p = .007$.

For **creativity**, scores were also higher for homework essays (M = 3.862, SD = 0.693) than for in-class essays (M = 3.586, SD = 0.568), $t(61) = -2.29$, $p = .030$.

For the **average overall score**, students again scored significantly higher on homework essays (M = 4.181, SD = 0.597) compared to in-class essays (M = 3.698, SD = 0.506), $t(61) = -4.79$, $p < .001$.

Summary. Writing performance was significantly stronger across all evaluated categories when students responded to a homework-based open-ended question (Task B) compared to an in-class essay without a guiding question

(Task A). Homework assignments with open-ended prompts consistently fostered deeper analysis, clearer organization, and greater creativity. The findings strongly support the value of combining open-ended questions with homework conditions, as students benefited from additional time to reflect, refine, and expand their ideas. Overall, the results suggest that thought-provoking prompts—paired with opportunities to write outside of class—enhance writing performance by encouraging critical engagement and richer expression.

Summary of Results (Tables 1–3)

Across all three comparisons, the results highlight the benefits of student-created open-ended questions (OEQs), especially when paired with homework writing. In **Table 1**, essays written in class to student-created OEQs (Task C) scored significantly higher overall than essays written in class to instructor-provided descriptive prompts (Task A), with the most notable gains in clarity and structure. **Table 2** compared OEQs written as homework (Task B) to OEQs written in class (Task C). Homework essays demonstrated significantly stronger critical thinking, while other categories showed no meaningful differences, suggesting that extended time outside class primarily enhances reasoning. **Table 3** provided the clearest contrast, showing that homework essays written to student-created OEQs (Task B) outperformed in-class essays based on instructor prompts (Task A) across all measured categories—content depth, critical thinking, clarity and structure, creativity, and overall score. Taken together, these findings indicate that both **student choice in generating open-ended questions** and **time for reflection in homework settings** contribute to stronger writing performance, with the combination of the two yielding the most consistent and significant improvements.

DISCUSSION

This discussion examines the impact of open-ended questions and writing context (in-class vs. homework) on student writing quality. Using three comparative analyses, the study evaluates how different types of prompts and writing environments influence key performance indicators: content depth, critical thinking, clarity and structure, and creativity. The results from each of the three conditions are compared with one another to highlight differences and similarities. The findings support existing literature that emphasizes the value of open-ended questions in promoting deeper thinking, better organization, and increased engagement. They also confirm that homework settings provide more time for reflection, planning, and expressive writing. Together, these results offer important insights for improving writing instruction and curriculum design, while also strengthening the use of reflective tools in applied learning.

Evaluation of Hypotheses Based on Study Findings

Hypothesis 1 predicted that student writing produced in response to student-selected open-ended questions (OEQs) would demonstrate higher

quality than writing produced in response to instructor-assigned descriptive prompts. Results from Table 1 (A vs. C) support this hypothesis. Students writing to their own OEQs scored significantly higher overall, with the most notable gains in clarity and structure ($p = .001$). Although content depth, critical thinking, and creativity were not statistically significant, mean scores were higher in all areas, indicating that student-generated prompts encourage more thoughtful and organized writing.

Hypothesis 2 predicted that homework responses would yield higher quality than in-class responses, regardless of prompt type. Results from Table 2 (B vs. C) and Table 3 (A vs. B) confirm this. Homework-based essays showed consistent advantages, particularly in critical thinking ($p = .004$, Table 2) and overall writing performance ($p < .0001$, Table 3). The opportunity for reflection and revision gave students a measurable benefit.

Hypothesis 3 (Exploratory) predicted that the positive effect of OEQs would be stronger in homework than in in-class settings. Results from Table 3 (A vs. B) demonstrate that homework OEQs outperformed in-class instructor prompts across all categories, with significant differences in depth, critical thinking, clarity, creativity, and overall score. Although a formal interaction test was not conducted, the evidence suggests that combining OEQs with homework yields the strongest improvements.

Together, the findings reject all three null hypotheses (H_{01}, H_{02}, H_{03}) and confirm that both prompt type and writing environment significantly shape writing quality, with the best outcomes occurring when students generate their own OEQs and respond to them as homework assignments.

Prompt Type and Writing Quality (A vs. C)

Comparing in-class writing with an instructor-provided descriptive prompt (Condition A) and in-class writing with a student-generated OEQ (Condition C) illustrates how question design influences writing. Results showed significant improvements in overall performance ($p = .015$) and in clarity and structure ($p = .001$), with a marginal increase in creativity ($p = .060$).

These findings echo prior research. Phillips (2023) notes that OEQs—especially "how" and "why" questions—promote deeper thinking and creativity by requiring students to analyze and synthesize rather than recall. Chin and Osborne (2010) found similar benefits in science classrooms, where OEQs encouraged reasoning and justification. Elbow (1998) emphasized that exploratory prompts help writers generate and organize thoughts. In applied learning, Bennion et al. (2020) and Meyers & Arnold (2016) showed that reflective OEQs enhance personal insight. Taken together, these perspectives help explain why Condition C yielded more coherent and organized writing.

Writing Location and Critical Thinking (B vs. C)

When comparing homework (Condition B) and in-class (Condition C) writing using OEQs, overall writing quality was broadly similar, but a significant difference emerged in critical thinking ($M = 4.42$ vs. $M = 4.08$, $p =$

.004). Homework essays gave students time for reflection, supporting deeper analysis, synthesis, and evaluation (Fan et al., 2022). Other categories—content depth, clarity, and creativity—showed no significant differences, suggesting that well-phrased prompts can stimulate strong responses even under time constraints.

These results align with Wilson (2023), who argues that in-class settings sharpen focus, and with Csikszentmihalyi (1996), who observed that time pressure can limit creativity. Overall, homework provided a distinct advantage for higher-order thinking, while in-class writing still produced comparable depth and organization when guided by strong prompts (Tahira & Haider, 2019).

Combined Effects of Prompt and Location (A vs. B)

The most substantial gains appeared when comparing in-class descriptive prompts (Condition A) with homework OEQs (Condition B). Students performed significantly better across all categories—content depth ($p = .0014$), critical thinking ($p < .0001$), clarity and structure ($p = .0066$), and creativity ($p = .030$). This demonstrates the combined effect of prompt design and writing location.

Homework gave students the flexibility to plan, revise, and elaborate, while OEQs demanded deeper reasoning and broader exploration. As Wilson (2023) and Knight (2017) note, homework enables richer development of ideas, whereas in-class assignments often constrain elaboration. This synergy explains why Assignment B produced the strongest results overall.

Applied Learning Implications

These findings reinforce the literature that identifies OEQs as powerful tools in applied learning. Studies on problem-based learning, case-based learning, and inquiry (Dochy et al., 2003; Gijbels et al., 2005; Thistlethwaite et al., 2012; Furtak et al., 2012) consistently show that OEQs push students beyond recall, prompting analysis and reasoning. Similarly, project-based learning and service-learning contexts (Zhang, 2023; Eyler & Giles, 1999; Warren, 2012) highlight how OEQs foster reflective and critical engagement.

Practical applications confirm these patterns. Reflection essays (Bennion et al., 2020), pre- and post-trip surveys (Meyers & Arnold, 2016), and structured prompts in study abroad (Dayberry & Fisher, 2023) demonstrate that OEQs generate richer, more thoughtful responses. The present study adds to this evidence, showing that OEQs paired with homework produce the deepest insights, clearest organization, and strongest critical thinking.

Thus, OEQs act as tools in applied learning, providing the cognitive framework that transforms writing into deeper reflection, stronger engagement, and transferable skills.

CONCLUSION

This study provides strong evidence that both the type of writing prompt and the setting in which writing occurs significantly influence student writing quality. Across three comparisons, student-generated open-ended questions (OEQs) consistently produced higher scores in clarity, structure, and creativity when compared to instructor-provided descriptive prompts. Homework assignments, meanwhile, showed significant gains in critical thinking, underscoring the value of extended time and flexibility for deeper analysis and reflection. Taken together, the findings highlight the dual importance of thoughtful prompt design and appropriate writing context in shaping student learning outcomes.

Key Findings

- ***Prompt type matters.*** Open-ended questions, especially those framed as "how" and "why," enhanced clarity, organization, and originality in student writing.
- ***Homework strengthens reasoning.*** Writing completed outside of class yielded stronger critical thinking and content depth, reflecting the benefits of time for revision and reflection.
- ***Applied learning benefits.*** The evidence from this study shows that open-ended questions enhance critical thinking and reflection, two cornerstone skills in applied learning methods such as problem-based learning, case-based learning, project-based inquiry, and service-learning.

These results confirm that OEQs are powerful tools for applied learning, aligning with research in problem-based, case-based, project-based, inquiry, and experiential contexts. By prompting explanation, evaluation, and transfer, they help students connect theory to practice and build skills that extend beyond the classroom.

Limitations and Future Research

This study was limited by its relatively small sample size and the scope of evaluation criteria. Future research should involve larger and more diverse student populations, along with long-term measures of writing development. Qualitative methods—such as student reflections, process logs, and interviews—could provide richer insights into how OEQs and writing contexts influence confidence, motivation, and engagement. Further studies should also examine how OEQs function at different stages of applied learning: activating prior knowledge in problem-based learning, supporting reasoning in simulations, sustaining inquiry in project-based work, and fostering reflection in service-learning. Research into assessment strategies, including application-focused rubrics, oral defenses, and worked-example comparisons, is also warranted. Finally, given the rise of digital tools, future studies should explore how students use and respond to AI-assisted platforms when engaging with open-ended

prompts.

Use of AI in This Study

AI played an important supporting role throughout this project. It was used for literature exploration (locating and summarizing relevant studies), data analysis support (statistical analysis of student writing, creation of quantitative measures, structuring results tables, formatting in APA style, and explaining statistical tests), and manuscript preparation (reviewing clarity, grammar, and organization). While the interpretation and conclusions remained researcher-driven, AI tools contributed to both efficiency and precision in analyzing and presenting the findings.

REFERENCES

Alexander, R. (2018). Developing dialogic teaching: Genesis, process, trial. *Research Papers in Education, 33*(5), 561-598 https://robinalexander.org.uk/wp-content/uploads/2019/12/RPIE-2018-Alexander-dialogic-teaching.pdf https://doi.org/10.1080/02671522.2018.1481140

Ash, S. L., & Clayton, P. H. (2009). Generating, deepening, and documenting learning: The power of critical reflection in applied learning. *Journal of Applied Learning in Higher Education, 1*, 25–48. https://doi.org/10.57186/jalhe_2009_v1a2p25-48

Bennion, J., Cannon, B., Hill, B., Nelson, R., & Ricks, M. (2020). Asking the right questions: Using reflective essays for experiential assessment. *Journal of Experiential Education, 43*(1), 37–54. https://doi.org/10.1177/1053825919880202

Chin, C. (2007). Teacher questioning in science classrooms: Approaches that stimulate productive thinking. *Journal of Research in Science Teaching, 44*(6), 815–843. https://onlinelibrary.wiley.com/doi/pdf/10.1002/tea.20171 https://doi.org/10.1002/tea.20171

Chin, C., & Osborne, J. (2010). Students' questions and discursive practices: Their impact on argumentation in collaborative group discussions. *Journal of Research in Science Teaching, 47*(9), 1150–1172. https://eric.ed.gov/?id=EJ899789 https://doi.org/10.1002/tea.20385

Csikszentmihalyi, M. (1996). Creativity: Flow and the psychology of discovery and invention. HarperCollins.

Dayberry, L., & Fisher, J. (2023). Applied learning on a study abroad: Teaching community emergency preparedness in the Balkans. *Journal of Applied Learning in Higher Education, 9*(1), 4–28. https://doi.org/10.57186/jalhe_2023_v9a1p4-28

Dochy, F., Segers, M., Van den Bossche, P., & Gijbels, D. (2003). Effects of problem-based learning: A meta-analysis. Learning and Instruction, 13(5), 533–568. https://doi.org/10.1016/s0959-4752(02)00025-7

Elbow, P. (1998). Writing without teachers. Oxford University Press.

Eyler, J., & Giles, D. E. (1999). Where's the learning in service-learning? Jossey-Bass. https://eric.ed.gov/?id=ED430433

Fan, H., Ma, Y., Xu, J., Chang, Y., & Guo, S. (2022). Effects of homework creativity on academic achievement and creativity disposition: Evidence from comparisons with homework time and completion based on two independent Chinese samples. *Frontiers in Psychology, 13*, 923882. https://www.frontiersin.org/articles/10.3389/fpsyg.2022.923882/full https://doi.org/10.3389/fpsyg.2022.923882

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *PNAS, 111*(23), 8410–8415. https://doi.org/10.1073/pnas.1319030111

Furtak, E. M., Seidel, T., Iverson, H., & Briggs, D. C. (2012). Experimental and quasi-experimental studies of inquiry-based science teaching: A meta-

analysis. *Review of Educational Research, 82*(3), 300–329. https://doi.org/10.3102/0034654312457206

Gijbels, D., Dochy, F., Van den Bossche, P., & Segers, M. (2005). Effects of problem-based learning: A meta-analysis from the angle of assessment. *Review of Educational Research, 75*(1), 27–61. https://doi.org/10.3102/00346543075001027

King, A. (1994). Guiding knowledge construction in the classroom: Effects of teaching children how to question and explain their ideas. *American Educational Research Journal, 31*(2), 338–368. https://doi.org/10.3102/00028312031002338

Knight, E. (2017). The relationship between homework and in-class assignment on academic achievement of 1st graders in an ELA classroom. [Master's thesis, Milligan College]. https://mcstor.library.milligan.edu/bitstream/handle/11558/2479/Knight_Emily_20170523.pdf

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice-Hall.

Komildjanovna, N. M. (2024). The power of open-ended question and its crucial role in discovering unanticipated answers, gathering additional details, and important insights. Web of Teachers*: Inderscience Research, 2*(10), 33–45. https://webofjournals.com/index.php/1/article/view/1881

Kryzhanivska, A., Capraro, F., & Spallinger, K. (2023). Tutors on location: Tutor-mediated peer reviews in ESOL classes. *WLN: A Journal of Writing Center Scholarship, 48*(2), 16–24. https://doi.org/10.37514/wln-j.2023.48.2.04

Maxfield, R. J., & Fisher, J. R. (2012). Employing critical reflection in an online emergency services course. *Journal of Homeland Security Education, 1*, 26–40. https://jsire.org/employing-critical-reflection-in-an-online-emergency-services-course

Meyers, C., & Arnold, S. (2016). Student expectations and reflections of a study away course experience to Washington, D.C. *Journal of Applied Communications, 100*(2), 86–101. https://link.gale.com/apps/doc/A459805866/AONE?u=utahvalley&sid=bookmark-AONE&xid=3f964666 https://doi.org/10.4148/1051-0834.1032

OpenAI. (2023). ChatGPT (March 14 version) [Large language model]. OpenAI. https://openai.com/chatgpt/

Phillips, E. (2023). Open-ended questions – A quick strategy to empower your students. *Will to Teach*. https://willtoteach.com/open-ended-questions/

Phillips, J. (2023). Critical thinking in modern education: Strategies for success. Oxford University Press.

Sandling, J. (2024). Open and closed questions for teachers: Examples, explanations, pros and cons. Jonathan Sandling. https://jonathansandling.com/open-and-closed-questions-for-teachers/

Tahira, M., & Haider, G. (2019). The role of critical thinking in academic writing: An investigation of EFL students' perceptions and writing

experiences. *Journal of Education and Practice, 10*(21), 42–52. https://files.eric.ed.gov/fulltext/EJ1243509.pdf

Theobald, E. J., Hill, M. J., Tran, E., Agrawal, S., Arroyo, E. N., Behling, S., & Freeman, S. (2020). Active learning narrows achievement gaps for underrepresented students in undergraduate STEM. *PNAS, 117*(12), 6476–6483. https://doi.org/10.1073/pnas.1916903117

Thistlethwaite, J. E., Davies, D., Ekeocha, S., Kidd, J. M., MacDougall, C., Matthews, P., … Purkis, J. (2012). The effectiveness of case-based learning in health professional education: A BEME systematic review. *Medical Teacher, 34(*6), e421–e444. https://pubmed.ncbi.nlm.nih.gov/22578051/ https://doi.org/10.3109/0142159x.2012.680939

Wang, C., Aguilar, S. J., Bankard, J. S., Bui, E., & Nye, B. (2024). Writing with AI: What college students learned from utilizing ChatGPT for a writing assignment. *Education Sciences, 14*(9), 928. https://doi.org/10.3390/educsci14090976

Warren, J. L. (2012). Does service-learning increase student learning? Michigan *Journal of Community Service Learning, 18*(2), 59–70. https://www.depts.ttu.edu/servicelearning/does-service-learning-increase-student-learning.pdf https://doi.org/10.37333/001c.002001004

Wilson, J. R. (2023). Academic writing. Harvard University. https://wilson.fas.harvard.edu/files/jeffreywilson/files/jeffrey_r._wilson_academic_writing.pdf

Zhang, L., Li, H., Liu, Y., & Zhou, X. (2023). A study of the impact of project-based learning on student performance. *Frontiers in Psychology, 14*, 1200718. https://pmc.ncbi.nlm.nih.gov/articles/PMC10411581/