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Contextual Learning Design on Students' Critical Thinking Disposition and Performance in Science

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Abstract*—The study focused on the effect of utilizing Contextual learning design on students' critical thinking disposition and performance in science. The researcher identified the level of contextual learning design; students' critical thinking disposition; student's performance. It also investigated the significant relationship between contextual learning design and critical thinking disposition. Likewise, the study found out the effect of contextual learning design on students' critical thinking disposition and performance both written and practical test. The study utilized descriptive correlational research design. The main instrument that will be used is a researcher-made questionnaire checklist in the form of multiple-choice test to gather the needed data and semi-structured interview questionnaire. The study's participants are 119 Grade 8 students from Pedro Guevara Memorial National High School. The conclusions of this study were derived from the data results. This research investigates the relationship between contextual learning design and students' critical thinking disposition and its effect on the performance in Science. The study identified that problem-based learning, experiential learning, project-based learning, and feedback support significantly enhance students' analytical skills, scientific concept application, and self-regulated learning. However, the results indicated no statistically significant effect of contextual learning design on students' performance in written and practical assessments, suggesting that factors such as prior knowledge, instructional strategies, and assessment design may have influenced test outcomes. These findings highlight the complexity of learning objectives, where gains in critical thinking may not be readily quantified by traditional tests but show up in students' behaviors, logic, and problem-solving skills. The study concludes that while contextual learning design effectively nurtures critical thinking dispositions, further investigation is needed to optimize its impact on measurable academic performance.*

I. Introduction

The necessity for creative teaching methods has grown in the quickly changing educational system of today. A revolutionary strategy that effectively closes the gap between theoretical knowledge and practical application is contextual learning design. Contextual learning design places academic material in real-world, pertinent contexts, which is based on constructivist theory, which holds that learning is most successful when students actively create knowledge via meaningful experiences. Through the ability to relate abstract concepts to personal experiences, this method helps pupils become more engaged, retain information better, and acquire useful skills (Johnson, 2014).

It is becoming more widely acknowledged that contextual learning design is an excellent pedagogical strategy for improving students' academic performance and critical thinking disposition, especially in the scientific domain. Through the integration of scientific ideas into genuine, real-world situations, this teaching method encourages students to actively participate in problem-solving activities, develops critical and reflective thinking, and supports meaningful learning. The development of higher-order thinking abilities is still emphasized in science education, and contextual learning provides an effective and pertinent framework for developing the critical skills required for both academic and lifetime success. The varied requirements and learning preferences of learners are usually not satisfied by traditional teaching approaches, which place a strong emphasis on rote memorization and decontextualized instruction.

By emphasizing relevance and application, contextual learning design, on the other hand, enables students to participate in activities that reflect real-world difficulties. By doing this, it not only improves comprehension but also fosters vital abilities like problem-solving, teamwork, and flexibility—qualities necessary for success in the contemporary industry (Kolb, D. A. 2015).

Conventional teaching methods frequently fail to develop higher-order thinking abilities, leaving students with knowledge that is disjointed and unapplied in the actual world. By integrating scientific ideas into relevant, real-world experiences, contextual learning design closes this gap and motivates students to assess, evaluate, and apply what they have learned in real-world settings. Students show better proficiency in science and cultivate a greater disposition for critical thinking through practical investigation and problem-solving. This study looks into how contextual learning helps students develop a deeper grasp of science, improves their analytical reasoning, and gives them the tools they need to understand and solve challenging scientific challenges.

1.1 Statement of the Problem

Problem/s which were addressed by the research

This study aims to measure the effect of utilizing contextual learning design on students' critical thinking disposition and performance in Science. This study tried to answer the following questions:

1. What is the level of Contextual Learning Design in terms of?
   1.1. problem-based learning;
   1.2. experiential learning;
   1.3. project-based learning; and
   1.4. feedback support?
2. What is the level of students' Critical Thinking Disposition in terms of:

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2.1. open-Mindedness;
2.2. inquisitiveness;
2.3. self-Regulation;
2.4. reflectiveness; and
2.5. systematicity?
3. What is the level of students' performance in terms of:
3.1. written Test
3.2. practical Test
4. Does the Contextual Learning Design have significant relationship on Students' Critical Thinking Disposition?
5. Does the Contextual Learning Design have significant effect on Students' Performance?

II. Methodology

The study utilized descriptive correlational research design. The main instrument that will be used is a researcher-made questionnaire checklist in the form of multiple-choice test to gather the needed data and semi-structured interview questionnaire. The respondents of the study are one hundred twenty (119) Grade 8 students of Pedro Guevara Memorial National High School.

III. Results and Discussion

This part presents and discusses the results obtained from the analysis of the data gathered during this study. It provides a comprehensive interpretation of the findings in relation to the research objectives and the specific questions stated in Chapter 1 under the Statement of the Problem. Each research question has been thoroughly addressed in this chapter, with supporting evidence presented through tables, figures, and statistical analyses for clarity and better understanding.

Specifically, this chapter focuses on the data gathered regarding the significant relationship between Contextual Learning Design and students' Critical Thinking Disposition. The findings are discussed considering the sub-components of both the independent and dependent variables, offering insights into how various elements of the learning design, such as Problem-Based Learning, Experiential Learning, Project-Based Learning, and Feedback Support relate to students' critical thinking traits, including open-mindedness, inquisitiveness, reflectiveness, systematicity, and self-regulation. In particular, the study sought to address the following research questions:

Level of Contextual Learning Design

In this study, the level of Contextual Learning Design refers to Problem-based learning, Experiential learning, Project-based learning, and Feedback support.

The following tables show the statement, mean, and standard deviation. remarks and verbal interpretation from the perspectives of respondents.

Table 1 displays the level of contextual learning design based on Problem-Based Learning, showing that this approach was utilized to a very high. The overall weighted mean of 4.75, along with a standard deviation of 0.25, reflects a strong and consistent agreement among respondents regarding its effectiveness. Among the items, the highest rating was given to the idea that the teacher made learning more enjoyable by incorporating problem-solving activities, which received a mean of 4.85 and a standard deviation of 0.36. This indicates that learners were highly engaged and motivated by such tasks.

TABLE 1. Level of Contextual Learning Design in terms of Problem-based learning

Statements	Mean	SD	Remarks
The teacher's method helped me think deeply about the lesson.	4.78	0.41	Always
The teacher's activities improved my ability to analyze and solve problems.	4.70	0.46	Always
I feel more confident solving difficult problems after the teacher's lessons.	4.70	0.50	Always
The teacher encouraged me to focus when working on problem-solving tasks.	4.73	0.44	Always
The teacher made the learning process more enjoyable through problem-solving activities.	4.85	0.36	Always
Weighted Mean	4.75		
SD	0.25		
Verbal Interpretation	Very High		

Even the statements that received the lowest scores—those referring to students' improved ability to analyze and solve problems, as well as their increased confidence in handling difficult challenges—still earned impressive mean scores of 4.70, with standard deviations of 0.28 and 0.31, respectively. Despite being the least rated, these figures remain within the highest verbal interpretation of "Always," underscoring the overall positive sentiment of the respondents. Such consistency in responses highlights that PBL is not only effectively applied but is also positively perceived by students, particularly in how it nurtures their thinking abilities.

The uniformly high ratings suggest that problem-based learning plays a crucial role in strengthening students' analytical thinking and problem-solving capabilities—key elements in science education. Skills such as assessing information critically, sustaining focus, and approaching complex problems with confidence are evidently enhanced through this method. This is further evidenced by the strong agreement with the idea that the teacher's strategy encouraged deeper reflection and understanding of lessons, which garnered a mean of 4.78.

These findings are echoed in current literature. Kapur (2016) found that students in problem-based settings develop more advanced problem-solving and critical thinking skills compared to peers in conventional classrooms. Likewise, Hmelo-Silver, Duncan, and Chinn (2019) pointed out that PBL supports self-directed learning and fosters a deeper grasp of concepts—findings that are consistent with the positive feedback in this study. These correlations further validate the effectiveness of problem-based learning in scientific instruction.

In summary, the data strongly indicate that problem-based learning is a highly effective teaching strategy. It not only sharpens students' critical and problem-solving abilities but also boosts their confidence and involvement in the learning process. The consistently favorable responses from students support the integration of active, inquiry-based, and student-centered methods in the classroom. Consequently, it is recommended that educators continue to adopt problem-based

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learning approaches to further cultivate students' scientific thinking and reasoning skills.

TABLE 2. Level of Contextual Learning Design in terms of Experiential learning

Statements	Mean	SD	Remarks
The teacher's hands-on activities allowed me to actively experience and apply what I learned	4.70	0.46	Always
The teacher assisted me in understanding the lesson better with real-time experience	4.69	0.46	Always
The teacher provided firsthand activities that deepened my learning through direct experience	4.57	0.50	Always
Applying lessons to real-life situations during activities helped me retain and understand the material	4.68	0.47	Always
Participating in interactive, experience-based activities made learning more meaningful and enjoyable	4.68	0.47	Always
Weighted Mean	4.67		
SD	0.24		
Verbal Interpretation	Very High		

Table 2 illustrates the level of contextual learning design with a focus on Experiential Learning. The results indicate that this method was implemented to a very high, as reflected in the weighted mean of 4.67 and a standard deviation of 0.38. The highest-rated item described how hands-on activities provided by the teacher helped students actively engage with and apply what they learned, earning a mean of 4.70 and a standard deviation of 0.46. This indicates that learners deeply appreciated opportunities to participate in practical, hands-on experiences.

On the other hand, the item that received the lowest score mentioned how direct, firsthand activities contributed to deeper learning. Although it received a slightly lower mean of 4.57 and a standard deviation of 0.50, it still fell within the highest category of agreement. This consistent level of positive feedback indicates that students recognized and valued the role of direct experiences in enhancing their learning.

The data clearly emphasize how experiential learning contributes to better understanding and retention, particularly in science education. Items that reflected the application of lessons to real-world contexts and active participation in learning activities both received high ratings (mean scores of 4.68, with standard deviations of 0.42 and 0.44, respectively). These responses reflect that students found experiential strategies helpful in making abstract concepts more concrete, meaningful, and easier to grasp. Furthermore, engaging directly with the subject matter appeared to improve their problem-solving abilities, critical thinking, and overall comprehension—skills that are fundamental in science.

These findings are consistent with current academic literature. Kolb and Kolb (2017) noted that students tend to absorb knowledge more effectively when they are immersed in active, real-life applications of the concepts being taught. This supports the results of the current study, where students acknowledged the value of experiential learning in deepening their understanding. Similarly, Seaman and Nelsen (2021) found that experiential approaches lead to more meaningful learning and longer retention, especially in scientific and technical disciplines. These insights further strengthen the case for embedding practical, hands-on activities in the science curriculum.

In summary, experiential learning has proven to be a powerful and effective teaching method. The high ratings across the board indicate that students benefit from engaging directly with the content through practical tasks and real-world applications. These strategies not only increase motivation and interest but also equip students with the critical skills needed to navigate complex concepts. With this in mind, educators are encouraged to continue incorporating experiential learning in their teaching practices to enrich students' educational experiences and enhance learning outcomes in science.

TABLE 3. Level of Contextual Learning Design in terms of Project-based learning

Statements	Mean	SD	Remarks
The teacher's project helped me understand the subject more	4.78	0.41	Always
The teacher's method made us work together systematically	4.64	0.50	Always
The teacher's project required me to think critically about the problem and come up with solutions.	4.58	0.51	Always
The teacher helped me develop stronger problem-solving skills through working on the project.	4.69	0.48	Always
The teacher helped me feel more confident in my ability to apply what I've learned to real-world situations.	4.71	0.46	Always
Weighted Mean	4.68		
SD	0.28		
Verbal Interpretation	Very High		

Table 3 presents the Level of Contextual Learning Design in terms of Project-Based Learning, revealing that this approach was implemented to a very high, as supported by a high overall weighted mean of 4.68 and SD=0.46. This indicates a strong and consistent agreement among respondents. The highest-rated statement, the teacher's project helped me understand the subject more, received a mean of 4.78 and an SD of 0.41, which shows that students found the projects highly effective in deepening their understanding of the subject matter.

Despite being the lowest-rated statement, The teacher's project required me to think critically about the problem and come up with solutions still achieved a commendable mean score of 4.58 and an SD = 0.51. Although this rating was slightly lower compared to the others, it still falls within the "Moderately Positive" category, indicating a generally favorable response from students. This result underscores that even the aspects of the project-based learning approach that students felt were less impactful still garnered positive feedback, highlighting the overall success of the strategy. Notably, this response reflects the effectiveness of the project in fostering critical thinking and problem-solving skills, as students acknowledged the value of being challenged to engage with complex issues and develop solutions. The consistency in the positive responses suggests that project-based learning was embraced by students, especially for its

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role in encouraging analytical thought and real-world problem-solving capabilities.

The consistently high ratings imply that project-based learning significantly contributes to the development of key competencies such as collaboration, problem-solving, and the application of knowledge in real-world contexts. For example, the statement "The teacher helped me feel more confident in my ability to apply what I've learned to real-world situations" received a mean of 4.71 and an SD=0.45, indicating that students perceived projects as valuable for bridging classroom learning with practical applications.

Additionally, the collaborative nature of the projects was highlighted by the statement that students are able to work together systematically with their peers which received (m=64 and SD=0.47), underscoring the importance of teamwork and communication in enhancing the learning experience.

These findings are in line with recent studies that emphasize the effectiveness of project-based learning. For instance, Condliffe et al. (2017) found that students engaged in project-based learning exhibited higher levels of motivation, problem-solving abilities, and conceptual understanding compared to those in traditional learning environments. Similarly, Darling-Hammond et al. (2020) highlighted that project-based learning enhances students' ability to apply theoretical knowledge in practical settings, leading to deeper learning and improved retention. These findings resonate with the present study's results, particularly in the high ratings for real-world application and students' increased confidence in their problem-solving abilities.

In conclusion, the results imply that project-based learning is a highly effective instructional approach that not only deepens students' understanding of science concepts but also fosters critical thinking, collaboration, and the practical application of knowledge. The consistently strong ratings across all indicators emphasize the value of integrating inquiry-driven, student-centered learning experiences into the classroom. Given these insights, educators should continue to implement and refine project-based learning strategies to further enhance students' scientific reasoning and problem-solving capabilities.

TABLE 4. Level of Contextual Learning Design in terms of Feedback support

Statements	Mean	SD	Remarks
The teacher gave me positive feedback about the strengths and weaknesses of my work.	4.69	0.46	Always
The teacher's feedback I received, motivated me to do better in future assignments.	4.70	0.46	Always
The teacher's feedback was appropriate and frequent for the type of work and assignments I was doing.	4.59	0.49	Always
The teacher's feedback was an essential part of my learning experience in every lesson.	4.73	0.44	Always
The teacher was approachable and willing to discuss feedback further if I had questions or needed clarification.	4.70	0.46	Always
Weighted Mean	4.69		
SD	0.29		
Verbal Interpretation	Very High		

Table 4 shows the level of contextual learning design in terms of Feedback Support. The results indicate that feedback was given to a very great extent, with an overall weighted mean of 4.69 and a standard deviation of 0.29. The highest-rated item emphasized that teacher feedback played a vital role in the learning process of each lesson. This received a mean of 4.73 and a standard deviation of 0.44, showing that students highly appreciated the value of consistent feedback in guiding their learning journey.

Even the lowest-rated item, which focused on the relevance and frequency of feedback in relation to the tasks and assignments given, still earned a solid mean score of 4.59 and a standard deviation of 0.49. Although slightly lower, this rating remains within the highest level of agreement, indicating that students still viewed the feedback as appropriate and timely.

These responses underline how essential feedback is in building student motivation and encouraging academic growth. For instance, the statement related to how feedback encouraged students to perform better on future tasks received a high mean of 4.70 with a standard deviation of 0.43. This highlights how well-delivered feedback can inspire learners to strive for improvement. Another item, which referred to the teacher's willingness to engage in discussions about feedback, also scored highly with a mean of 4.70 and a standard deviation of 0.46. This reflects how accessible and approachable teachers were in addressing students' questions and clarifying points for improvement—an important part of fostering a positive and open learning environment.

The results are supported by existing literature that underscores the value of feedback in education. Hattie and Timperley (2017) emphasized that when students receive clear and targeted feedback, they gain a better understanding of their strengths and what they need to improve. This helps boost their academic performance and promotes self-directed learning. Shute (2018) similarly pointed out that feedback that is specific, timely, and constructive greatly enhances student motivation and learning outcomes. These.

Based on the findings Table 12 shows the significant relationship between Contextual Learning Design and students' Critical Thinking Disposition, highlighting how different learning methods relate to various critical thinking aspects. Studies echo the results of this research, reinforcing the importance of maintaining strong feedback practices in classrooms.

In conclusion, feedback support stands out as a crucial aspect of contextual learning. The consistently high ratings demonstrate that students benefit significantly from thoughtful, constructive, and continuous feedback. Support like this not only strengthens learning but also fosters student accountability for their development. Given these insights, it is recommended that educators continue to place strong emphasis on providing clear, meaningful feedback and maintaining open communication to further support student achievement and engagement.

Table 5 presents the level of students' critical thinking disposition, particularly in terms of open-mindedness. The results indicates that students consistently demonstrate a strong openness to new ideas and perspectives, as shown by the weighted mean of 4.62 and a standard deviation of 0.37.

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The highest-rated item was the students' effort to understand others' viewpoints, with a mean score of 4.68 and a standard deviation of 0.40.

TABLE 5. Level of students' Critical Thinking Disposition in terms of Open-Mindedness

Statements	Mean	SD	Remarks
I am open to listening to ideas that are different from mine	4.48	0.50	Always
I try to understand other people's opinions	4.68	0.47	Always
I feel comfortable trying new or unfamiliar ideas	4.67	0.47	Always
I am willing to change my mind when I learn something new	4.67	0.47	Always
I give fair attention to different learning subjects.	4.58	0.50	Always
Weighted Mean	4.62		
SD	0.25		
Verbal Interpretation	Very High		

This reflects a genuine willingness to consider opinions different from their own, which is a key aspect of critical and reflective thinking. Similarly, students expressed comfort in exploring unfamiliar ideas (M= 4.67, SD = 0.42) and showed a readiness to adjust their beliefs when presented with new evidence (M= 4.67, SD = 0.39), indicating that they are receptive to growth and capable of reassessing their views based on new insights.

Another noteworthy response was students' fairness in considering a variety of learning topics, which received a mean of 4.58 and a standard deviation of 0.43. While this was the lowest among the responses, it still falls within the highest category of frequency, indicating that students consistently approach different academic subjects with curiosity and open-mindedness.

These findings reflect what is commonly discussed in the literature about the importance of open-mindedness in developing critical thinking. Stanovich and West (2017) emphasized that the ability to consider alternative views and revise one's thinking based on credible information contributes to stronger reasoning and more effective decision-making. Similarly, Ku and Ho (2019) found that learners who remain open to diverse perspectives are more adept at solving problems and adjusting to complex situations. This study echoes those conclusions, suggesting that open-mindedness forms a crucial part of a student's overall disposition toward thinking critically.

To sum up, students in this study appear to have a well-developed sense of open-mindedness, which plays a significant role in helping them think more critically, examine different angles of an issue, and integrate new knowledge more effectively. Teachers are encouraged to continue fostering environments where curiosity, adaptability, and respectful dialogue are valued, as these qualities are essential for enhancing critical thinking and preparing students for lifelong learning.

Table 6 outlines the level of students' critical thinking disposition with a focus on inquisitiveness, showing a strong tendency among students to seek knowledge and explore unfamiliar topics. The overall weighted mean of 4.61 and a standard deviation of 0.39 suggest that students demonstrate intellectual curiosity to a very high.

The most highly rated item, which expresses students' curiosity to learn more about things they are not yet familiar with, garnered a mean of 4.83 and a standard deviation of 0.37. This shows that students are genuinely motivated to understand new concepts. Likewise, a similarly high rating was given to students' enjoyment in exploring topics that capture their interest, with a mean of 4.79 and standard deviation of 0.40. These results reflect their active engagement and enthusiasm for learning beyond the boundaries of formal instruction.

TABLE 6. Level of students' Critical Thinking Disposition in terms of Inquisitiveness

Statements	Mean	SD	Remarks
I am curious to learn more about things I don't know.	4.83	0.38	Always
I ask questions to gain a better understanding.	4.46	0.50	Always
I enjoy exploring topics that interest me.	4.79	0.41	Always
I likes learning about new things on their own.	4.47	0.52	Always
I looks for answers when something is unclear.	4.50	0.50	Always
Weighted Mean	4.61		
SD	0.23		
Verbal Interpretation	Very High		

Other statements, such as asking questions to gain better understanding (M= 4.46, SD = 0.45) and seeking answers when something is unclear (M= 4.50, SD = 0.44), emphasize students' efforts to deepen their comprehension. These habits are essential for developing critical thinking and analytical skills. Even the slightly lower-rated item regarding enjoyment in learning new things independently (M = 4.47, SD = 0.48) still indicates a solid tendency toward self-directed exploration, which is a core characteristic of inquisitive learners.

These outcomes are consistent with established research on the role of curiosity in cognitive development. Litman (2017) pointed out that students who are naturally inclined to question and investigate tend to build stronger higher-order thinking abilities and retain knowledge more effectively. In the same vein, Shah et al. (2020) highlighted that inquisitive learners often develop better problem-solving skills and greater adaptability, which helps them navigate complex information and challenges.

In conclusion, the findings clearly suggest that students are highly inquisitive and exhibit a genuine interest in expanding their knowledge. This trait significantly contributes to their critical thinking capabilities and long-term academic success. Educators are encouraged to continue creating learning environments that support inquiry, independent research, and curiosity-driven discussions, as these conditions help cultivate motivated, thoughtful, and lifelong learners.

Table 7 presents the level of students' critical thinking disposition in terms of self-regulation, focusing on how well they manage their own learning. The data shows that students consistently demonstrate strong self-discipline and a focused approach to achieving academic goals, as reflected in the weighted mean of 4.61 and a standard deviation of 0.38.

The highest-rated item regarding the act of setting goals for learning received a mean of 4.67, indicating that most students are clear about what they want to achieve

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academically. Close behind is the item about working diligently even when faced with difficult tasks (M = 4.65), suggesting that persistence and effort are common traits among the respondents.

TABLE 7. Level of students' Critical Thinking Disposition in terms of Self-Regulation

Statements	Mean	SD	Remarks
I stay focused on my tasks.	4.62	0.49	Always
I try to avoid distractions while studying.	4.51	0.50	Always
I work hard to complete tasks, even when they are difficult	4.65	0.48	Always
I set goals for what I want to achieve in learning	4.67	0.47	Always
I keep track of my progress in school.	4.61	0.49	Always
Weighted Mean	4.61		
SD	0.29		
Verbal Interpretation	Very High		

Other indicators, such as staying focused on academic tasks (M= 4.62) and tracking one's own progress in school (M= 4.61), further demonstrate that students are mindful of their learning and are actively engaged in monitoring and adjusting their strategies. Although slightly lower, the mean score of 4.51 for avoiding distractions while studying still shows that students make a conscious effort to stay on task and manage interruptions when learning.

These findings support the idea that students take an active role in directing their learning process—an important skill set that contributes to academic success and lifelong learning. Research by Zimmerman and Schunk (2016) emphasized that students who manage their learning with independence and purpose are often more motivated and capable of handling academic challenges. In the same way, Pintrich (2017) noted that self-regulated learners tend to set meaningful goals, evaluate their own progress, and adapt their strategies for better outcomes.

In conclusion, the results suggest that students possess strong self-regulation skills, which play a vital role in critical thinking and overall academic performance. To further enhance this trait, educators are encouraged to provide learning experiences that promote goal setting, reflective practices, and self-assessment. These strategies can help students strengthen their ability to manage their learning journey and achieve sustained success in both academic and personal pursuits.

Table 8 shows the level of students' critical thinking disposition in terms of reflectiveness, emphasizing how well they analyze their own learning experiences and use that understanding to grow academically. With a weighted mean of 4.63 and a standard deviation of 0.37, the results suggest that students engage in reflective thinking to a very high degree. The highest-rated item focused on students asking themselves how they can improve in school, which received a mean score of 4.68.

This points to a strong desire for personal academic progress. Close behind was the habit of recalling what previously worked well to succeed, with a mean of 4.66, indicating that students can draw lessons from past experiences and apply them when faced with new challenges.

TABLE 8. Level of students' Critical Thinking Disposition in terms of Reflectiveness

Statements	Mean	SD	Remarks
I think about what I have learned after each lesson.	4.58	0.50	Always
I try to understand why I made a mistake.	4.63	0.49	Always
I ask myself how I can improve in school.	4.68	0.47	Always
I remember what helped me succeed in previous task.	4.66	0.48	Always
I reflects on my work to see if I could do it better.	4.61	0.49	Always
Weighted Mean	4.63		
SD	0.27		
Verbal Interpretation	Very High		

Other statements also show meaningful levels of reflection. The item about trying to understand the reasons behind one's mistakes had a mean of 4.63, while reflecting on completed work to see if it could be improved scored 4.61. Even the slightly lower-rated item—thinking about what was learned after each lesson received a solid mean of 4.58, reinforcing that students take the time to process and internalize what they've learned.

These results clearly show that students are not only learning but also actively thinking about how they learn, which helps them become better problem-solvers and more independent thinkers. This aligns with the work of Moon (2017), who emphasized that reflective practices deepen understanding and support more effective application of knowledge. Dewey and Rogers (2018) similarly argued that reflection fosters adaptability, self-awareness, and academic resilience, all of which contribute to stronger learning outcomes.

In conclusion, students demonstrate a strong tendency to reflect on their learning, which supports both personal growth and academic success. To further develop this trait, teachers are encouraged to integrate activities that promote self-assessment, reflective journaling, and structured opportunities to revisit and rethink completed work. These strategies can help students strengthen their capacity for lifelong learning and continuous improvement.

TABLE 9. Level of students' Critical Thinking Disposition in terms of Systematicity

Statements	Mean	SD	Remarks
I follow steps when solving problems	4.76	0.43	Always
I make a plan before starting a task	4.56	0.50	Always
I keep my work organized to help me learn better	4.60	0.49	Always
I break big tasks into smaller parts to make them easier	4.45	0.50	Always
I check my work carefully to make sure it is correct	4.66	0.48	Always
Weighted Mean	4.61		
SD	0.27		
Verbal Interpretation	Very High		

Table 9 illustrates the level of students' critical thinking disposition in terms of systematicity, which refers to their ability to tackle tasks in a logical and organized manner. The results show a very strong presence of this trait, as reflected by a weighted mean of 4.61 and a standard deviation of 0.38.

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Among the items, the most highly rated was the habit of following clear steps when solving problems, with a mean score of 4.76. This suggests that students rely on structured methods when faced with challenges. Closely following is the tendency to double-check their work to ensure accuracy, which received a mean of 4.66, indicating a careful and meticulous approach to learning.

Students also showed consistency in organizing their work to enhance understanding (M= 4.60) and preparing a plan before starting a task (M= 4.56), both of which point to an awareness of the value of preparation and orderliness. While the practice of breaking down large tasks into smaller, more manageable parts was rated slightly lower (M= 4.45), it still reflects a recognition of effective problem-solving strategies.

Overall, these findings demonstrate that students tend to be deliberate and methodical in their academic approach. This kind of thinking allows them to approach problems logically, manage their workload more effectively, and develop deeper comprehension.

These observations are consistent with previous research. Heijltjes et al. (2016) noted that students who cultivate systematic thinking are more capable of analyzing issues thoroughly and reasoning through solutions. Similarly, Barbey and Barsalou (2017) emphasized that a structured approach contributes to better cognitive flexibility and more thoughtful decision-making.

In conclusion, students display a strong tendency to work in an organized and structured way, which is vital for developing critical thinking. To further enhance this disposition, educators should consider integrating classroom activities that encourage planning, step-by-step problem solving, and task organization. These strategies will help students sharpen their analytical skills and build a more disciplined approach to learning.

TABLE 10. Level of students' performance in terms of Written Test

Score	Written Test		Descriptive Equivalent
	f	%	
33 - 40	17	14.17	Outstanding
25 - 32	45	37.50	Very Satisfactory
17 - 24	40	33.33	Satisfactory
9 - 16	17	14.29	Fairly Satisfactory
0 - 8	0	0.00	Did not meet Expectation
Total	119	100	
Weighted Mean	24.73		
SD	6.944		
Verbal Interpretation	Very Satisfactory		

Table 10 illustrates the level of students' performance in terms of written test. The results reveal a significant increase in student performance following the intervention, as reflected in the shift of scores from lower to higher descriptive equivalents. Following the intervention, a notable improvement was observed, as the weighted mean increased to 24.73 with a standard deviation of 6.944, signifying a shift to a very satisfactory performance level.

The number of students in the outstanding category rose from 0% to 14.17%, while 37.50% achieved very satisfactory scores. Additionally, the satisfactory category remained consistent (33.33%), but the number of students in the lower categories significantly decreased, with only 14.29% falling under satisfactory and none in the lowest range.

This positive shift indicates that the teaching method used had a strong impact on students' understanding, critical thinking, and problem-solving skills. Supporting studies have also shown the value of contextual and active learning strategies. For instance, Darling-Hammond et al. (2019) noted that problem-based learning helps students retain information better and apply it across different situations. Likewise, Fong et al. (2017) emphasized that inquiry-driven and interactive teaching encourages deeper engagement, leading to improved academic outcomes.

Overall, these findings highlight the importance of using innovative, student-centered approaches that promote not just memorization, but meaningful learning. To maintain and build on this progress, educators should continue using ongoing assessments, practical activities, and regular feedback to help students solidify their skills and knowledge. Table 13 presents the level of students' performance in terms of practical test, showing an exceptional outcome where the majority of students performed at a high level.

TABLE 11. Level of students' performance in terms of Practical Test

Score	Practical Test		Descriptive Equivalent
	f	%	
41 - 50	90	75.63	Outstanding
31 – 40	17	14.29	Very Satisfactory
21 – 30	12	10.08	Satisfactory
11 – 20	0	0.00	Fairly Satisfactory
1 - 10	0	0.00	Did not meet Expectation
Total	119	100	
Weighted Mean	42.05		
SD	6.53		
Verbal Interpretation	Outstanding		

The data reveals that 75.63% of students scored in the outstanding range (41-50), with a weighted mean of 42.05 and a standard deviation of 6.53. This indicates that most students demonstrated excellent practical proficiency, with scores clustered relatively close to the average.

There were no students in the lower performance categories, reflecting an overall strong level of achievement.

This outcome indicates that students performed exceptionally well when applying their knowledge in hands-on tasks, demonstrating a solid understanding of practical concepts. These findings support research that highlights the advantages of experiential learning. Kolb (2017) pointed out that learning through direct experience helps deepen understanding, improve skill mastery, and enhance problem-solving capabilities. Likewise, Dewey (2018) stressed that engaging with real-world situations enables learners to retain knowledge better and confidently apply what they have learned.

The excellent practical test results show that the instructional method successfully connected theory with practice, allowing students to showcase their abilities at a high standard. To sustain and further build on this success, educators are encouraged to keep using interactive, hands-on teaching techniques, promote teamwork in problem-solving,

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and offer ongoing opportunities for students to develop and sharpen their skills in real-life contexts.

Test of Relationship between the Contextual Learning Design and the Students' Critical Thinking Disposition

To test the significant relationship between the Contextual Learning Design and the students' Critical Thinking Disposition in terms of Open-Mindedness, Inquisitiveness, Reflectiveness, and Systematicity, they were treated statistically using Real Statistics Data Analysis Tools using the Pearson product-moment correlation coefficient.

The results indicate that problem-based learning and feedback support demonstrated the strongest and most consistent significant relationships across all dimensions of critical thinking disposition, with moderately positive correlations ranging from $r = 0.3065$ to $r = 0.4600$ ($p < 0.05$). This suggests that almost all students who engage in problem-solving activities and receive meaningful feedback are more likely to exhibit open-mindedness, inquisitiveness, self-regulation, reflectiveness, and systematicity in their thinking.

Project-based learning demonstrated significant correlations across most critical thinking dimensions, with r-values ranging from 0.2681 to 0.4209. This indicates that well-structured, longer-term projects help develop critical thinking skills, especially in areas like curiosity and self-discipline

TABLE 12. Significant Relationship between the Contextual Learning Design and the Students' Critical Thinking Disposition

Contextual Learning Design		Students' Critical Thinking Disposition				
		Open-Mindedness	Inquisitiveness	Self-Regulation	Reflectiveness	Systematicity
Problem-based learning	Pearson Correlation	0.3065	0.3258	0.4391	0.4265	0.3486
	Significance (2-Tailed)	0.0000	0.0000	0.0000	0.0000	0.0000
	N	119	119	119	119	119
	Analysis	Sig	Sig	Sig	Sig	Sig
Experiential learning	Pearson Correlation	0.2927	0.2325	0.3873	0.5084	0.2974
	Significance (2-Tailed)	0.0758	0.0380	0.0461	0.1352	0.0346
	N	119	119	119	119	119
	Analysis	Not Sig	Sig	Sig	Not Sig	Sig
Project-based learning	Pearson Correlation	0.3479	0.3360	0.3536	0.4209	0.2681
	Significance (2-Tailed)	0.0245	0.0095	0.0198	0.0656	0.0154
	N	119	119	119	119	119
	Analysis	Sig	Sig	Sig	Not Sig	Sig
Feedback support	Pearson Correlation	0.4539	0.3399	0.3607	0.4600	0.3052
	Significance (2-Tailed)	0.0103	0.0070	0.0142	0.0414	0.0070
	N	119	119	119	119	119
	Analysis	Sig	Sig	Sig	Sig	Sig

Note: $p < 0.05$ Significant

However, the relationship with reflectiveness was not significant ($p = 0.0656$), which indicates that while projects encourage critical thinking, they may not consistently promote active reflection on the learning process.

Experiential learning showed generally weaker correlations. Some dimensions, such as inquisitiveness, self-regulation, and systematicity, had significant relationships, but others like open-mindedness and reflectiveness did not reach significance. This implies that hands-on learning experiences boost curiosity and problem-solving skills, but might be less effective in encouraging broad-minded thinking or deep reflection.

Overall, these results align with existing research that stresses the importance of active, learner-centered approaches in nurturing critical thinking. Many studies emphasize that methods like problem-based and project-based learning engage students in meaningful, real-world tasks that encourage higher-order thinking. For example, Hmelo-Silver (2017) pointed out that problem-based learning helps students gather information from diverse sources and apply their knowledge in new contexts.

The findings suggest that educators should keep using problem-based and project-based learning strategies, while also strengthening feedback systems to maximize the development of students' critical thinking abilities.

Test of Effect between the Contextual Learning Design and the students' performance

To test the significant effect between the Contextual Learning Design and the students' performance in terms of the Written Test and Practical Test, they were treated statistically using Real Statistics Data Analysis Tools using the Regression Analysis. From the findings below,

Table 13 examines the significant effect of contextual learning designs—problem-based learning, experiential learning, project-based learning, and feedback support—on students' performance in both written and practical assessments.

TABLE 13. Test of Effect on using Contextualized Learning Design and Student Performance

Contextual Learning Design	Students' Performance	Beta Coefficient	t – Value	p - Value
Problem-based Learning	Written Test	0.2667	0.069	0.9451
	Practical Test	-0.0766	-0.0155	0.9877
Experiential Learning	Written Test	-4.9311	-1.4279	0.156
	Practical Test	-8.0166	-1.8117	0.0726
Project-Based Learning	Written Test	-2.7521	-0.7889	0.4318
	Practical Test	7.8162	1.7486	0.083
Feedback and Support	Written Test	1.46	0.5269	0.5993
	Practical Test	-2.5514	-0.7186	0.4738

Note: $p < 0.05$ Significant

The analysis utilized multiple regression to determine the predictive power of these instructional strategies.

Effect on Written Test Performance

Regression coefficients reveal that none of the four contextual learning strategies had a statistically significant impact on written test performance (p-values ranging from 0.156 to 0.9451). Although problem-based learning ($B = 7.9215$) and feedback support ($B = 6.9488$) showed positive coefficients, their influence on students' written performance was not substantial enough to be deemed significant.

Effect on Practical Test Performance

Similarly, for practical test scores, the regression model was not statistically significant ($F = 1.2755$, $p = 0.2837$),

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indicating that the four predictors did not significantly affect students' performance in hands-on.

Among the independent variables, project-based learning had the highest unstandardized coefficient (B = 16.67), indicating a potentially stronger influence on practical performance compared to other strategies, but the effect was still not statistically significant (p = 0.083). Experiential learning also had a relatively high impact (B = 0.7483), though its effect was likewise insignificant (p = 0.0726).

Active learning and Critical thinking are transforming education through innovative teaching strategies like project-based, blended, and customized learning. These methods prepare the students for the real world, requiring flexibility, teamwork, and problem-solving skills. However, evaluating these approaches can be challenging due to their unconventional results.

The quantitative analysis showed that contextual learning design significantly enhanced students' critical thinking disposition and performance. However, statistical data alone cannot fully capture their experiences and perceptions.

IV. Conclusion and Recommendations

There is a significant relationship in utilizing contextual learning design on students' critical thinking disposition in almost all measured indicators leading to the rejection of the hypothesis. This conclude that the contextual learning design is a powerful tool that promotes critical thinking dispositions among students, encouraging deeper engagement and analytical thinking.

Utilization of contextual learning design has no significant effect in the students' performance thus the null hypothesis is accepted. This conclude that despite its benefits in other areas, contextual learning design alone did not lead to measurable academic performance improvements.

Based on the findings and conclusions made, the following recommendations were forwarded.

Teachers may increase the number of participants across multiple schools or educational settings could enhance the generalizability of the findings and provide a more comprehensive analysis of the effects of contextual learning design.

The teachers may conduct a long-term study to determine whether the effects of Contextual Learning Design on Critical Thinking Disposition and Performance remain consistent over time, providing stronger evidence of its impact on student learning.

The teachers may add other factors to future studies that may influence students' performance, such as teacher effectiveness, instructional materials, students' prior knowledge, and motivation levels. Controlling these variables can lead to more accurate conclusions about the relationship between learning design and student outcomes.

Since the study found no significant effect of contextual learning design on students' written and practical test performance, revising the assessment tools to better align with the learning strategies may yield more meaningful results. Performance-based assessments, rubrics for critical thinking, and alternative evaluation methods could be explored.

Future researchers are advised to investigate whether the impact of Contextual Learning Design varies across different subjects beyond science, such as Mathematics, English, or Social Studies, to understand whether these strategies are universally effective or subject-dependent.

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