DOI: https://doi.org/10.33487/edumaspul.v9i1

EDUMASPUL
JURNAL PENDIDIKAN

Vol 10 No. 02 (2026) page 583-593

p-ISSN 2548-8201 | e-ISSN 236-0469
https://ummaspul.e-journal.id/maspuljr/

The Quality of Multi Creative Works of Grade XI Students Oriented to Learning Style in Learning the *C-R-E-A-T-E* Model Assisted *by Artificial Intelligence* (AI) in the Making of Natural Material Buffer Solutions

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Abstrak

Penelitian ini bertujuan menganalisis kualitas multi karya kreatif murid kelas XI berdasarkan perbedaan gaya belajar melalui penerapan model pembelajaran *C-R-E-A-T-E* (*Connecting, Restructuring, Elaborating, Applying, Tasking, Evaluating*) berbantuan kecerdasan buatan (AI) pada topik pembuatan larutan penyangga berbahan alami. Metode yang digunakan adalah deskriptif kualitatif dengan subjek satu kelas XI IPA di SMAN 13 Bandung yang dipilih melalui convenience sampling. Instrumen utama adalah lembar penilaian multi karya kreatif berdasarkan lima indikator kreativitas Williams (*fluency, flexibility, originality, elaboration, evaluation),* yang dianalisis menggunakan model Miles, Huberman, dan Saldaña. Multi karya yang dinilai meliputi produk larutan penyangga alami, video kreatif, makalah ilmiah, dan presentasi PowerPoint. Hasil penelitian menunjukkan rata-rata kualitas multi karya kreatif sebesar 86,7%, dengan capaian tertinggi pada murid bergaya belajar visual (92,0%), diikuti auditori (87,8%), audio visual (85,7%), dan kinestetik (81,4%). Analisis per indikator mengungkap bahwa *fluency* dan flexibility dikuasai sangat baik (93,75–100%), sementara elaboration menjadi indikator terlemah khususnya pada murid visual (75,00%) dan originality terendah pada murid kinestetik (81,25%). Temuan ini mengonfirmasi bahwa model *C-R-E-A-T-E* berbantuan AI efektif memfasilitasi pencapaian multi karya kreatif secara inklusif, namun scaffolding yang lebih terdiferensiasi berdasarkan gaya belajar diperlukan terutama pada tahap *Elaborating* untuk murid visual dan kinestetik.

Kata kunci: *gaya belajar; indikator kreativitas Williams; kecerdasan buatan; larutan penyangga alami; model C-R-E-A-T-E; multi karya kreatif*

Abstract

This study aims to analyze the quality of multi-creative works of grade XI students based on differences in learning styles through the application of *the C-R-E-A-T-E* (*Connecting, Restructuring, Elaborating, Applying, Tasking, Evaluating*) learning model assisted by artificial intelligence (AI) on the topic of making natural material buffer solutions. The method used was qualitative descriptive with the subject of one class XI Science at SMAN 13 Bandung which was selected through convenience sampling. The main instrument was a multi-creative work scoresheet based on five Williams creativity indicators (*fluency, flexibility, originality, elaboration, evaluation),* which were analyzed using the Miles, Huberman, and Saldaña models. The multi-works assessed include natural buffer solution products, creative videos, scientific papers, and PowerPoint presentations. The results showed an average quality of multi-creative works of 86.7%, with the highest achievement in visual learning style students (92.0%), followed by auditory (87.8%), audio visual (85.7%), and kinesthetic (81.4%). Analysis per indicator revealed that *fluency* and flexibility were mastered very well (93.75–100%), while elaboration was the weakest indicator, especially in visual students (75.00%) and the lowest originality in kinesthetic students (81.25%). These findings confirm that the *AI-assisted C-R-E-A-T-E* model effectively facilitates the achievement of multi-creative work in an inclusive

manner, but more differentiated scaffolding based on learning style is needed especially at the *Elaborating stage* for visual and kinesthetic students.

Keywords: *learning style; Williams creativity indicator; artificial intelligence; natural buffer solution; C-R-E-A-T-E model; multi creative works*

Research Background

Creativity is one of the most fundamental competencies demanded of the 21st century generation, alongside the ability to think critically, collaborate, and communicate (Thornhill-Miller *et al*., 2023). In the context of chemistry education, creativity is manifested as scientific creativity, the ability to propose new hypotheses, design original experiments, interpret data innovatively, and produce meaningful science-based products (Nilada *et al*., 2024; Cautious *et al*., 2025). The urgency of its development is even more urgent considering that chemistry learning in Indonesia is still dominated by lecture methods that do not provide room for exploration so that students' creativity is relatively low (Putra *et al*., 2018; Khamying *et al*., 2022; Marsita *et al*., 2010). The concept of multi-creative works (*Multiple Creative Products*) is rooted in Besemer (1998) product creativity theory which emphasizes that creativity must be manifested in concrete products that have novelty attributes (*novelty*), resolution, and elaboration. In science and chemistry education, this concept was expanded by Zhan *et al*. (2022) as an achievement of creativity that is reflected in a variety of physical and digital products produced by students in response to scientific challenges.

Biazus and Mahtari (2022) prove that structured project-based models significantly improve students' creative thinking skills across all Williams indicators, while Kim and Lee (2022) mark an important paradigm shift: student-AI collaboration has been shown to increase creativity, expressiveness, and value for work compared to individual work making AI an active cognitive partner. The dimension of learning style is an important variable in the analysis of multi-creative works because each visual, auditory, audio-visual, and kinesthetic learning modality has a different tendency in the way of representing, processing, and expressing creativity into the form of concrete works (Kolb, 1984). Visual students tend to excel in representational and aesthetic works, while kinesthetic students have strengths in physical manipulation and direct experience but often have difficulty in translating those experiences into digital works or scientific writings (Fleming & Mills, 1992). Understanding these patterns is crucial for designing differentiated and effective scaffolding.

Models *C-R-E-T-E* (C*onnecting, restructuring, elaborating, applying, tasking, evaluating*) was chosen because it synergistically integrates problem-solving and project work production within a single constructivistic framework, with the Tasking stage positioning creating as the highest cognitive level (Anderson & Krathwohl, 2001; Wahyu & Kusrijadi, 2022). The topic of making a natural buffer solution was chosen because ingredients such as lime extract contain triprotic citric acid as a chemically weak acid, forming an authentic buffer system according to the Henderson-Hasselbalch principle, while providing a concrete context that encourages various forms of creative expression (Whitten *et al*., 2013; Saputra & Anggraeni, 2021). The novelty of this research lies in a combination that has never been studied before: the *C-R-*

E-A-T-E, artificial intelligence, in-depth analysis of multi-work quality based on the five Williams indicators, context of natural buffer solutions, differentiation per learning style. Based on this background, this study examines: How is the quality of multi-creative works of grade XI students based on the learning style produced through the application of the model *C-R-E-T-E* Artificial intelligence assisted on the topic of making a buffer solution made from natural materials?

B. Method of Practice

The research uses a descriptive method with a qualitative approach to contextually capture the quality of students' multi-creative works in a real learning setting (Creswell, 2014; Sugiyono, 2019). The subject is one class XI science even semester of the 2025–2026 school year at SMAN 13 Bandung, selected through convenience sampling with consideration of diversity of learning styles (visual, auditory, audio-visual, kinesthetic) and mastery of prerequisite material for chemical balance, acid-base, and salt hydrolysis (Etikan *et al*., 2016). The main instrument is a multi-work creative scoresheet developed based on five indicators of creativity by Williams (1993): (1) *fluency* that is, the ability to generate many relevant ideas; (2) *flexibility* namely the ability to look at problems from various perspectives; (3) the ability to generate unique and unconventional ideas; (4) *Elaboration* namely the ability to expand and detail ideas in depth; and (5) *Evaluation* namely the ability to assess and filter concepts based on eligibility criteria. The multi-work assessed included four types of products that students chose according to their learning modalities: (1) buffer solution products made from natural materials as a result of the experiment; (2) creative videos documenting the manufacturing process; (3) scientific papers; and (4) presentations *PowerPoint*. The instrument was tested by two chemistry education lecturers and three chemistry teachers, obtaining a very decent average score (3.3–3.6). The data were analyzed using the interactive model of Miles, Huberman, and Saldaña (2014) through three stages: data reduction, data presentation, and conclusion drawing and verification. The scores were processed in percentage form and categorized using the standard range of Al-Abdali and Al-Balushi (2016): ≥ 88% = Excellent, 76–87% = Good, 64–75% = Adequate, < 64% = Poor. The validity of the data was strengthened through triangulation of sources involving observation data on learning implementation (TCOF: 95.97%), self-assessment (88.73%), and peer-assessment (90.02%) as supporting data.

C. RESULTS AND DISCUSSION

1. Overview of the Quality of Multi Creative Works

The assessment of the multi-creative works produced by all grade XI students showed an overall average of 86.7%, which was included in the category of Good to Very Good based on the range of Al-Abdali and Al-Balushi (2016) categories. This finding is important because it shows that *the artificial intelligence-assisted C-R-E-A-T-E* model is able to facilitate students from various learning backgrounds to produce quality creative works. All learning style groups managed to exceed the 80% threshold, indicating the inclusivity of this learning model to the diversity of student learning modalities (Table 1).

Learning Style	Score (%)	Categories	Ratings
Visual	92,0	Excellent	1
Auditory	87,8	Good	2
Audio Visual	85,7	Good	3

Kinesthetic	81,4	Good	4
Average	86,7	Good	–

Table 1. Quality of Multi Creative Works per Learning Style

Students with visual learning styles achieved the highest score (92.0%) and were the only group to be in the Very Good category, while the other three learning styles were in the Good category with a range of 81.4%–87.8%. The difference between visual and kinesthetic by 10.6 points is the largest gap that needs special attention in the design of the next learning. The excellence of visual pupils can be explained by the correspondence between the characteristics of their learning style and the dominant nature of the creative products produced in the C-R-E-A-T-E model: PowerPoint presentations and creative videos that are inherently visual in nature demand the representational, aesthetic, and logical visual communication skills that are the natural strengths of visual learners (Fleming & Mills, 1992). In contrast, kinesthetic students who are characteristically superior in physical manipulation face greater challenges when it comes to translating such practical experiences into multiform forms of work that require digital representation skills (Kolb, 1984).

2. Multi-Work Quality Analysis per Williams Creativity Indicator

A more in-depth analysis was carried out by mapping the achievements of each Williams creativity indicator cross-referencing with learning styles, resulting in a 5×4 matrix that describes the strengths and weaknesses of students' creativity specifically (Table 2). The patterns that emerge from these matrices provide much more valuable diagnostic information than just average numbers, as they allow the identification of which aspects of creativity have not been optimally facilitated by the learning model for each group of pupils.

Indicator	Visual (%)	Auditory (%)	Audio Visual (%)	Kinesthetic (%)
Fluency	93,75	100,00	100,00	100,00
Flexibility	93,75	93,75	100,00	100,00
Originality	87,50	93,75	93,75	81,25
Elaboration	75,00	87,50	81,25	81,25
Evaluation	100,00	87,50	75,00	62,50
Average	90,00	92,50	90,00	85,00

Table 2. Williams Creativity Indicator Achievement (%) per Learning Style

a. Fluency

Indicator *fluency* The ability to produce many relevant ideas smoothly and productively is the indicator with the most equal achievement among the four learning styles. Students with auditory, audio-visual, and kinesthetic learning styles all achieved a perfect score of 100%, while visual students reached 93.75% are still very high. This pattern shows that the *C-R-E-T-E* AI-assisted AI successfully facilitates all types of learners to generate diverse and many ideas, especially at the *Connecting* which explicitly encourages the activation of early knowledge and the exploration of early ideas about natural ingredients that can be used as components of buffer solutions (Wahyu & Kusrijadi, 2022).

Perfect achievement in auditory pupils can be attributed to their characteristics of being responsive to verbal discussions and verbal exchange of ideas of activities that dominate the stage *Connecting* and *Restructuring*. In this stage, the use of AI as a conversational tool provides a special advantage for auditory students because it allows them to explore ideas through interactive dialogue with the AI system, which is naturally in line with their learning modalities (Almasri, 2024). The slightly lower visual score (93.75%) is not a disadvantage, but rather reflects higher selectivity in generating ideas visual pupils tend to filter their ideas early on based on the visual feasibility of their representation before writing them down.

b. Flexibility

Indicator *flexibility* measures the ability of students to view a problem from various perspectives and move between categories of thought dynamically. Audio-visual and kinesthetic students again reached 100%, followed by visual and auditory which both obtained 93.75%. This almost even pattern indicates that the context of making natural buffer solutions naturally encourages flexibility for all types of students, because students are exposed to a diversity of natural ingredients that can be chosen from limes, star fruits, to tomatoes so that they are encouraged to consider various alternative formulations of buffer solutions (Saputra & Anggraeni, 2021). The audio-visual and kinesthetic advantages in this indicator are relevant to the characteristics of the two learning styles. Audio-visual pupils who are accustomed to processing information through a combination of dual-sensory stimuli have a natural ability to relate chemical concepts to their representation in multiple media at once, resulting in a richer variety of perspectives. Kinesthetic pupils, on the other hand, show high flexibility because the hands-on experience of experiments making natural buffer solutions encourages them to experimentally try a variety of materials and procedures experimentally in a form of flexibility that is hands-on and concrete (Kolb, 1984).

c. Originality

The originality indicator measures the ability to generate ideas that are unique, unconventional, and different from existing common ideas. In this indicator, more significant variations between learning styles began to emerge: auditory and audio-visual both reached 93.75%, while visual was at 87.50% and kinesthetic was the lowest at 81.25%. The gap between auditory/audio-visual and kinesthetic of 12.5 points was the most striking difference between learning styles in this indicator. The low originality score of kinesthetic pupils (81.25%) can be interpreted through the tendency of this group to follow existing experimental procedures rather than developing completely new variations of materials or methods. When given the freedom to design natural buffer solution formulations, kinesthetic pupils tend to refer to examples that have been discussed in class or that have been derived from AI, without developing truly original modifications. Zhai's Warning *et al*. (2024) on the risk of cognitive dependence on AI is particularly relevant here: pupils who rely too much on AI suggestions in the Elaborating and Applying levels tend to produce works that reflect 'AI creativity' rather than their own genuin creativity.

Visual scores were lower in originality (87.50%) compared to auditory and audio-visual had different interpretations. Visual students tend to pay close attention to the appropriateness and visual aesthetics of their work, so they sometimes sacrifice the originality of the content for neatness and beauty of the appearance. In contrast, auditory pupils with high originality (93.75%) showed that intensive involvement in verbal discussions—both with friends and with AI as a conversation partner—encourages the formation of more unconventional ideas through a process of free association stimulated by the exchange of ideas (Almasri, 2024).

d. Elaboration

The elaboration indicator—the ability to expand, refine, and enrich a basic idea into a more in-depth and complete product—is the most challenging dimension of creativity overall. Visual pupils reached 75.00% (Adequate), audio-visual and kinesthetic pupils 81.25% (Good), and auditory highests 87.50% (Good). This is the only indicator where no learning style reaches the Excellent category, and is the lowest score of visual pupils in the entire matrix. The weakness of elaboration in visual students (75.00%) is a finding that at first seems paradoxical: visual students have the highest overall score (92.0%), but are actually the lowest in elaboration. This paradox can be explained through the typical characteristics of visual students who tend to think holistically and capture the big picture quickly, but are less accustomed to describing the idea in detail and depth in the form of long written or verbal explanations. Visual works such as PowerPoints and infographics can indeed look beautiful and visually structured, but they are often shallow in their depth of scientific content—especially when it comes to explaining the mechanisms of acid-base reactions, calculating pH using the Henderson-Hasselbalch equation, and interpreting experimental data (Whitten *et al*., 2013).

These findings converge with TCOF observational data which shows the Elaborating stage has the lowest implementation among the six model stages *C-R-E-T-E* (90.64%), forming strong triangulation evidence that the depth of idea elaboration is a systemic challenge in learning implementation—not just individual weaknesses of a particular student. In the framework of Williams (1993), elaboration requires students not to stop at the surface of concepts, but to organize and refine the important details of a metacognitive skill that requires time, explicit scaffolding, and repetitive practice. The low elaboration of all learning styles also indicates that the use of AI has not been optimally directed to encourage students to deepen their analysis; AI is being used more to generate initial ideas (*fluency*) rather than elaborating (Saritepeci & Durak, 2024). Auditory pupils who were relatively better at elaboration (87.50%) were likely to be influenced by their habit of elaborating long and detailed verbal thoughts—an ability that naturally transfers into the elaboration of writing in scientific papers. This is consistent with the finding that auditory students are more likely to choose the type of work in the form of scientific papers, where content elaboration is the main component of assessment.

e. Evaluation

Evaluation indicators measure students' critical thinking skills in assessing, testing, and selecting concepts based on the criteria of feasibility, effectiveness, and suitability with real needs. The pattern of achievement on this indicator was the most varied and contained the most surprising findings: visual pupils reached 100.00% (the highest), followed by auditory 87.50%, audio-visual 75.00%, and kinesthetic only 62.50% (Sufficient)—the only score that fell below Good in the entire matrix. The excellence of visual students in evaluation (100.00%) reflects their high ability to critically assess the quality of work from the perspective of aesthetics, visual logic, and presentation coherence. The types of work that visual students predominate—PowerPoint presentations and infographics—inherently demand a high level of aesthetic evaluation ability: choosing the right colors, compiling a hierarchy of visual information, and assessing whether a scientific message is conveyed clearly through graphic elements.

The iterative process of perfecting the visual appearance of this work indirectly trains the visual students' evaluation skills intensively.

In contrast, a very low kinesthetic score on evaluation (62.50%) is a critical finding that requires serious attention. Kinesthetic students who tend to be process-oriented and focus on physical activity in making natural buffer solution products often have great difficulty when they have to stop from the process and do metacognitive reflection to evaluate the quality of their work. When asked to assess whether the buffer solution product they create is really effective in maintaining pH, or whether the procedure they develop is more original than the standard procedure, kinesthetic students are often caught up in the belief that 'done means done'—without entering the stage of true critical reflection (Black & Williams, 1998). The low audio visual evaluation (75.00%) is also interesting to analyze. Although audio-visual pupils achieve perfect scores on *fluency* and flexibility, their lower evaluation ability, indicating an imbalance between the ability to generate a lot of ideas and the ability to filter and critically evaluate them. In the context of the C-R-E-A-T-E model, this suggests that the Evaluating stage requires a specific approach for audio-visual learners—for example, through more structured self-assessment rubrics or AI-assisted review sessions that explicitly encourage students to identify gaps in their own work.

3. Cross-Indicator Patterns: Creativity Profiles by Learning Style

Reading Table 2 holistically reveals the unique creativity profile for each learning style. Auditory pupils showed the most even profile with scores ranging from 87.50%–100.00%, with no large gap between the strongest and weakest indicators (a difference of 12.5 points). This indicates a relatively balanced development of creativity across all dimensions, likely because auditory modalities support both generative processes (generating many ideas through discussion) and evaluative processes (assessing ideas through verbal argumentation). Visual pupils displayed the most contrasting profiles: the highest score on evaluation (100.00%) as well as the lowest score on elaboration (75.00%), resulting in a difference of 25 points between the strongest and weakest indicators of the largest gap among all learning styles. This profile reflects students who are very critical of the quality of the appearance of the work but lack diligence in developing the depth of the content. For subsequent learning, visual learners need AI guidance that explicitly pushes them beyond the aesthetic surface to the depths of chemical analysis—for example with an AI prompt like 'Explain the chemical mechanism behind each component of the buffer solution you create in at least 3 scientific paragraphs detailing the equilibrium reactions that occur.'

The kinesthetic pupil displays the most uneven profile with a sharp peak-valley pattern: perfect on *fluency* and flexibility (100.00%), but plummeted in evaluation (62.50%). The 37.5-point difference between the strongest and weakest indicators is the largest gap in the entire dataset of this study. This pattern explicitly describes the character of kinesthetic students who are productive in generating and trying out ideas in a practical way, but weak in the reflective and evaluative stages. Audio-visual pupils showed a profile similar to kinesthetic on the generative indicator, but with weakness in evaluation (75.00%) that was not as severe as kinesthetic. The pedagogical implication of these patterns is that the scaffolding of AI in the model *C-R-E-T-E* It needs to be differentiated based on the creativity profile of learning styles, not just one and the same approach for all students. Squirt *et al*. (2023) through a meta-analysis of 12 journals found that AI-assisted learning has a high influence on creativity (effect size = 0.851), but this influence will be more optimal when AI is used as a tool that targets specific creativity dimensions that are the weaknesses of each learning style, not just as a generic content generating machine.

4. Suitability of Multi-Work Type with Learning Style

The freedom of students to choose the type of work according to the learning modality is one of the advantages of model design *C-R-E-T-E* The most significant in this study. This principle of product differentiation is in line with the concept of Product Dimensions in Rhodes' (1961) 4P theory which affirms that creativity is manifested in various forms of products according to the unique characteristics of each individual. Visual pupils predominantly choose PowerPoint presentations and creative videos as their primary forms of expression. This choice resulted in the highest overall score because the multi-work assessment rubric in this study did include aspects that are continuous with visual strength: clarity of presentation, organization of information, and creativity of data representation. Auditory students, on the other hand, are more likely to opt for scientific papers and presentations based on verbal narratives, which explain their relatively better elaboration scores—the format of a scientific paper structurally demands the development of in-depth and detailed arguments.

Kinesthetic pupils showed a strong tendency to choose natural buffer solution products as their main work, with direct experiments using ingredients such as star fruit extract, lime and tomato. This choice is consistent with their learning modalities that are oriented to concrete experiences (Kolb, 1984). However, the focus on physical products also explains their weaknesses in evaluation and elaboration—two indicators that require abstract reflection and analytical writing that are not naturally the strengths of kinesthetic pupils. The audio-visual students showed the highest diversity of work choices, combining video documentation of the experimental process (which satisfies visual needs) with oral explanations in the video (which satisfies auditory needs). Despite producing products that are diverse in modalities, the depth of scientific content in students' audio-visual works still needs to be improved—reflected in the elaboration (81.25%) and evaluation (75.00%) scores that are still below the auditory and visual achievements.

5. The Role of Artificial Intelligence in Facilitating Multi Creative Works

Artificial intelligence in this study is positioned as a technological scaffolding that accompanies – not replacing the creative thinking process of students at each stage of the model *C-R-E-A-T-E*. At the stage *Connecting*, AI is used as an exploration partner that helps students identify natural ingredients that have potential as buffer solution components based on their organic acid content. In the Restructuring stage, AI facilitates students in constructing a conceptual understanding of buffer mechanisms and Henderson-Hasselbalch equations through interactive dialogues that are responsive to students' questions (Almasri, 2024).

In the Elaborating and Tasking stages—the two most critical stages for multi-work achievement—the role of AI becomes the most significant and the most vulnerable to abuse. Kim and Lee (2022) show that effective student-AI collaboration occurs when students become the main agents in the creative process and AI acts as an amplifier that expands the scope of exploration. However, when students are passive and simply accept AI outputs without critical elaboration, the quality of the work produced tends to be uniform and loses the dimension of originality—a phenomenon that was identified mainly in kinesthetic students with the lowest originality score (81.25%). To optimize the role of AI in supporting quality multi-creative work, prompt designs are needed that explicitly challenge students beyond the direct output of AI. Prompts like 'Compare the idea the AI gives you with your own understanding—what's different? What can you add from your experiment experience that the AI can't figure out?' has been shown to be more effective in encouraging elaboration and originality than prompts that simply ask the AI to generate content (Saritepeci & Durak, 2024; Zhai *et al*., 2024).

D. Conclusion

The quality of multi-creative works of grade XI students produced through the learning model *C-R-E-T-E* Artificial intelligence-assisted on the topic of making natural buffer solutions reached an average of 86.7% with significantly different achievement patterns based on learning styles. Students with visual learning styles achieved the highest quality (92.0%), followed by auditory (87.8%), audio visual (85.7%), and kinesthetic (81.4%). An in-depth analysis of Williams' creativity indicators reveals three key findings: first, *fluency* and flexibility is the dimension of creativity that is most evenly mastered by all learning styles (93.75–100%), indicating the success of the model *C-R-E-T-E* AI-assisted in facilitating the idea generation stage. Second, elaboration is the weakest indicator universally, especially in visual students (75.00%), indicating that the depth of idea development requires more explicit and structured AI scaffolding. Third, the evaluation showed the most extreme variation between learning styles: perfect visual (100.00%) versus critical kinesthetic (62.50%), reflecting fundamental differences in metacognitive reflection skills between learning modalities. Based on these findings, the study recommends three things. First, the design of AI scaffolding in the model *C-R-E-T-E* It needs to be differentiated based on the creativity profile of each learning style is not one approach for all students. Second, specific reinforcement at the Elaborating stage is required through an AI prompt that directs pupils to deepen chemical analysis explicitly, especially for visual and kinesthetic pupils. Third, the development of a more structured self-evaluation component in the Evaluating stage is needed, especially for kinesthetic students through an AI-assisted reflection rubric that guides the metacognition process gradually. Further research is suggested to examine the effectiveness of this differentiated AI scaffolding design in an experimental context with a control group.

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