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TITLE (*Times New Roman Font 12, Capital and bold, max 20 words, arranged in an inverted pyramid)*

(one article consists of a maximum of 10 pages)

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Abstract

*Abstract and keywords are written in English. The abstract is a concise (short and clear) summary of your work. It should clearly state **background problem**, **research purposes**, **brief methods**, **main results/findings**, and **conclusion.** The abstract should not include citations, tables, figures, and formulas. It should not be more than 250 words.*

....

Key words: asesment, e-learning, mastery learning *(key words contain 3-5 words)*

INTRODUCTION

The introduction contains ***state of the art***, ***gap analysis***, and ***research objectives***. *State of the art* discusses similar studies that have been conducted. Authors are highly recommended to cite at least 10 scientific articles to have a good state of the art. After discussing the relevant studies, an analysis of the problems that will be examined in the research is carried out in the gap analysis section. *Gap analysis* is a statement of why research needs to be done and reflects the novelty of the research. Gap analysis analyzes existing studies and explains the differences in the research that will be studied with these studies to bring out novelty in research. The final part of the introduction is a statement of the *purpose of the study*. In the introduction, there is no need for a general definition and/or a large number of theories considering that the journal reader is the scientific community, not the general public. Important Note: The number of pages for manuscripts in UJCEd is between 5-15 pages.

METHOD

The research method is written in full and in detail so that other researchers can repeat the research (reproducible) for confirmation and clarification. General methods do not need to be written down in detail. This section contains the research design, research procedure, data sources or participants, data collection techniques, and data analysis techniques.

Where applicable, the Method section should report relevant ethical considerations, including Ethical Clearance, institutional permission, informed consent, or an ethical self-declaration. For low or negligible

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risk research where formal Ethical Clearance is not required, authors should state the basis for non-requirement

basis for non-requirement and the relevant institutional permission obtained, where applicable.

Example 1: Research with Ethical Clearance

Ethical approval for this study was obtained from the [Name of Ethics Committee/Institution], Ethical Clearance No. [number/year]. All procedures involving research participants were conducted in accordance with the approved ethical protocol, and informed consent was obtained where applicable.

Example 2: Low or Negligible Risk Research without Formal Ethical Clearance

The authors declare that this study was classified as low or negligible risk and did not require formal Ethical Clearance under the applicable institutional requirements. Permission to conduct the research was obtained from the relevant school/institution, and appropriate ethical safeguards, including voluntary participation, consent where applicable, and protection of participant confidentiality, were implemented.

RESULTS AND DISCUSSION

Results summarize the findings of the study. In this section, it is unnecessary to write the research results in detail. Results can also come from data analysis (in tables or graphs) or hypothesis testing. The data in the results are used to support the discussion. Discussion is the most important part of a scientific article. This section must answer the problem, interpret research results or findings into existing knowledge, confirm and/or contrast research results with existing research, develop new theories, and/or modify existing theories. Results and Discussion should be written as one integrated section, not as separate Results and Discussion sections. This section must answer the questions of what, why, and what else. Research findings should be written down and discussed clearly. Furthermore, the research findings are compared with existing theories and research and are comprehensively discussed. Thus, it needs a lot of citations in the discussion section. In the final paragraph, the limitations of the study should be clearly stated.

Mathematical equations are written using *Microsoft Equation Editor* or *Design Science: MathType - Equation Editor*. Chemical reaction equations are also written according to the established rules and are assigned a number. The equation number is written on the right side of the equation in the order in which the equation appears, as in the example of Equation.

$$-\frac{\hbar^2}{2m}\nabla^2\Psi\left(\vec{r}\right)+V\left(\vec{r}\right)\Psi\left(\vec{r}\right)=E\Psi\left(\vec{r}\right) \quad (1)$$

$$C_6H_{12}O_6(aq) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l) + energy \quad (2)$$

Pictures, figures, graphs, diagrams, or charts are written with the title at the bottom of the object, as shown in Figure 1.

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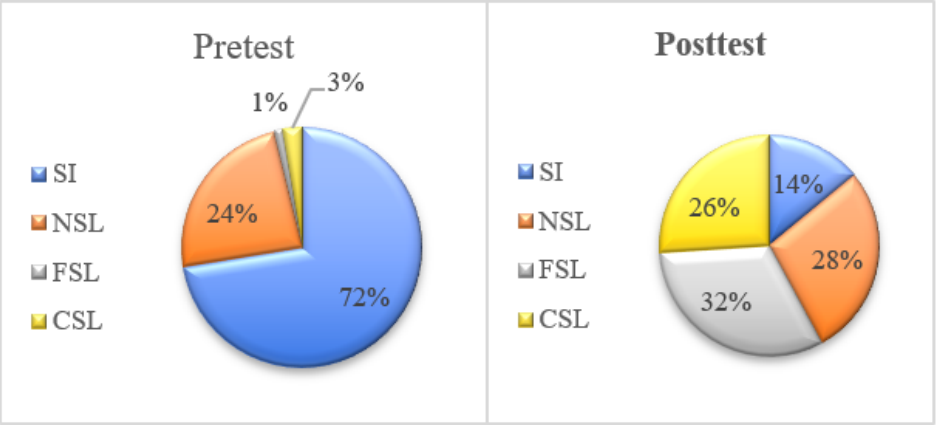


Figure 1. Pretest and Posttest Results of Students' Chemical Literacy Skills

The existence of pictures, graphs, diagrams, charts, tables, etc., must be significant, not just showing pictures/data of activity implementation (must be discussed in the text). Images, graphs, diagrams, charts, tables, etc., must be comprehensively referred to and discussed in the discussion. Tables are written with titles at the top of the table, as in Table 1.

Table 1. Scoring of Chemical Literacy Test Answers

Scientific Literacy Level	Score
Scientific Illiteracy (SI)	0
Nominal Scientific Literacy (NSL)	1
Functional Scientific Literacy (FSL)	2
Conceptual Scientific Literacy (CSL)	3
Multidimensional Scientific Literacy (MSL)	4

CONCLUSION

Conclusions are written in paragraph form. Conclusions must be brief, do not re-explain the research results, and answer research problems. In addition to answering research problems, conclusions contain limitations and future research development. Therefore, there is no need to include specific recommendations in this section.

ACKNOWLEDGEMENT (Optional; must be completed if the research is funded by grants)

Acknowledgments are addressed to a person, group, and/or institution/institution that assists with research. If the research is funded by a grant, the type of grant, the granting institution, and the grant contract number must be written in this section.

AUTHOR CONTRIBUTIONS (Must be completed)

The Authors must state all of the Author's contributions to this research/manuscript. The contribution must be stated in the term of CRediT (Contributor Roles Taxonomy), see Appendix 1. Example: **Kusumawati Dwiningsih**: Conceptualization, Methodology, and Validation; **Findiyani Ernawati Asih**: Methodology, Formal Analysis, Resources, and Writing - Original Draft; and **Mitarlis**: Data Curation, Project Administration, and Writing - Original Draft. All authors have read and approved the final version of this manuscript.

DECLARATION OF COMPETING INTEREST (Must be completed; Modify if applicable)

The authors declare no known financial conflicts of interest or personal relationships that could have influenced the work reported in this manuscript.

DECLARATION OF ETHICS (Do not change this section)

The authors declare that the research and writing of this manuscript adhere to ethical standards of research and publication, in accordance with scientific principles, and are free from plagiarism.

DECLARATION OF ASSISTIVE TECHNOLOGIES IN THE WRITING PROCESS (Must be completed; select and modify as applicable, see Appendix 2)

The authors declare that generative artificial intelligence (Gen AI) and other AI-assisted tools were used prudently, not excessively, during the research and preparation of this manuscript. Specifically, [AI tool 1] was used for [function 1]; [AI tool 2] for [function 2]; …; and [AI tool n] for [function n]. All AI-generated material was reviewed and edited for accuracy, completeness, and compliance with ethical and scholarly standards. The authors accept full responsibility for the final content of the manuscript.

REFERENCE

The number of references in the bibliography is at least **20 references (for the next edition January 2027)**. with the provision that more than 80% come from up-to-date scientific articles published in Reputable International Journals (less than 10 years old). The author is required to provide a link/DOI if the reference can be accessed online. Writing a bibliography is highly recommended using Mendeley, End Note, or Zotero software with the **IEEE style**. Older references may be used where they represent foundational theories, landmark studies, established instruments, or other essential scholarly sources. All sources cited in the manuscript must appear in the reference list, and all references listed must be cited in the manuscript.

Examples

[1] Jegstad, K. M. 2024. Studies in Science Education Inquiry-based chemistry education : a systematic review Inquiry-based chemistry education : a systematic review. *Stud. Sci. Educ.* Vol. 60, No. 2, pp. 251–314. https://doi.org/10.1080/03057267.2023.2248436
[2] Nagarajan, S., and Overton, T. 2019. Promoting Systems Thinking Using Project- And Problem-Based Learning. *J. Chem. Educ.* Vol. 96, pp. 2901–2909. https://doi.org/10.1021/acs.jchemed.9b00358
[3] Anggraeni, C., Permanasari, A., and Heliawati, L. 2022. Students' Scientific Literacy in Chemistry Learning through Collaborative Techniques as a Pillar of 21st-Century Skills. *J. Innov. Educ. Cult. Res.* Vol. 3, No. 3, pp. 457-462. https://doi.org/10.46843/jiecr.v3i3.162
[4] Costa, A. M., Escaja, N., Fité, C., González, M., Madurga, S., and Fuguet, E. 2023. Problem-Based Learning in Graduate and Undergraduate Chemistry Courses: Face-to-Face and Online Experiences. *J. Chem. Educ.* Vol. 100, No. 2, pp. 597–606.
[5] Sjöström, J., Yavuzkaya, M., Guerrero, G., and Eilks, I. 2024. Critical Chemical Literacy as a Main Goal of Chemistry Education Aiming for Climate Empowerment and Agency. *J. Chem. Educ.* Vol. 101, No. 10, pp. 4189–4195. https://doi.org/10.1021/acs.jchemed.4c00452
[6] Arends, R. I. 2008. Learning to Teach Belajar untuk Mengajar (Edisi Ketujuh/Buku Dua). terj. *Helly Pajitno Soetjipto Sri Mulyantini Soetjipto*.
[7] Fareza, F. S., Van Hayus, E. S., Shidiq, A. S., Yamtinah, S., Masykuri, M., Ulfa, M., Saputro, A. N. C., dan Mulyani, B. 2024. Problem-Based Learning Model on Students ' Chemical Literacy and Critical Thinking on Reaction Rate Material. *Jurnal Pendidikan Indonesia*. Vol. 13, No. 3, pp. 426–435. https://doi.org/10.23887/jpiundiksha.v13i3.79331
[8] Overton, T.L., and Randles, C. A. 2015. Beyond Problem-based Learning: Using Dynamic PBL in Chemistry. *Chem. Educ. Res. Pract.* Vol. 16, No. 2, pp. 251–259. doi: https://doi.org/10.1039/c4rp00248b.
[9] Leppink, J. 2017. Cognitive load theory: Practical implications and an important challenge. *J. Taibah Univ. Med. Sci.* Vol. 12, No. 5, pp. 385–391. http://dx.doi.org/10.1016/j.jtumed.2017.05.003
[10] Paas, F., and van Merriënboer, J. J. G. 2020. Cognitive-Load Theory: Methods to Manage Working Memory Load in the Learning of Complex Tasks. *Current Directions Psychological Science.* Vol. 29, No. 4, pp. 394–398. https://doi.org/10.1177/0963721420922183 10.1177/0963721420922183

[11] Suparman, A. R., Rohaeti, E., and Wening, S. 2024. Student Misconception In Chemistry: A Systematic Literature Review. *Pegem J. Educ. Instr.* Vol. 14, No. 2, pp. 238–252. https://doi.org/10.47750/pegegog.14.02.28

[12] Sadeghi, N., Janatolamakn, M., Rezaeian, S., Rashi, M., and Khatony, A. 2024. Exploring self-directed learning readiness and related factors: the role of time management skills in nursing students. *BMC Med. Educ.* Vol. 24, No. 1088, pp. 1-11. 10.1186/s12909-024-06083-w

Appendix 1
CRediT (Contributor Roles Taxonomy)

Term	Definition
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims *Ide dan perancangan awal penelitian*
Methodology	Development or design of methodology; creation of models *Pengembangan metode atau rancangan penelitian*
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components *Pengembangan atau pemrograman perangkat lunak yang digunakan dalam penelitian*
Validation	Verification, whether as a part of the activity or separate, of the overall replication/ reproducibility of results/experiments and other research outputs *Verifikasi hasil dengan metode independen*
Formal Analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data *Teknik analisis statistik, matematika, atau komputasi*
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection *Pengumpulan data penelitian*
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools *Penyediaan sumber daya, fasilitas, atau alat penelitian*
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse *Pengelolaan dan penyimpanan data penelitian*
Writing - Original Draft	Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation) *Penyusunan draf awal manuskrip*
Writing - Review & Editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre-or postpublication stages *Revisi dan penyuntingan manuskrip*

Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/ data presentation *Pembuatan dan penyajian data visual*
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team *Pengawasan dan bimbingan dalam penelitian*
Project Administration	Management and coordination responsibility for the research activity planning and execution *Pengelolaan dan koordinasi penelitian*
Funding Acquisition	Acquisition of the financial support for the project leading to this publication *Pengusulan dan pengelolaan pendanaan penelitian*

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Appendix 2

Example of AI-assisted Tools and Their Function

No	AI Tools	Function
1	ChatGPT, Microsoft Copilot, Gemini, Claude, DeepSeek	Brainstorming ideas, discussing concepts, drafting or refining text, generating outlines, and assisting with general scholarly writing
2	Grammarly, QuillBot, LanguageTool, DeepL Write	Grammar and spelling correction, language polishing, paraphrasing, improving clarity, readability, style, and coherence
3	ChatPDF, SciSpace, NotebookLM	Reading and interacting with documents or PDFs, generating summaries, extracting key points, organizing information, and assisting with document comprehension
4	Perplexity, Elicit, Consensus	AI-assisted literature discovery, question answering, semantic search, identifying relevant studies, synthesizing evidence, and identifying research trends or gaps
5	Scite	Analysing citation contexts and assisting authors in checking whether cited literature supports, contrasts with, or discusses particular claims
6	GitHub Copilot, Cursor, Codeium	Assisting with code generation, code completion, debugging, documentation, and development of data-analysis or computational scripts
7	DataRobot, RapidMiner, H2O.ai	Assisting with automated machine-learning workflows, model development, model comparison, and predictive data analysis
8	DeepL, Google Translate, Microsoft Translator	Machine-assisted translation of text and language conversion, followed by human verification and editing
9	Otter.ai, Microsoft Teams Transcription, Zoom AI Companion, Whisper-based transcription tools	Transcribing interviews, discussions, meetings, or recorded research data into text, subject to applicable consent, privacy, and confidentiality requirements
10	NVivo AI features, ATLAS.ti AI features, MAXQDA AI Assist	Assisting with organization, coding support, summarization, exploration, or analysis of qualitative research data, subject to human verification
11	Wolfram|Alpha, Wolfram Language AI-assisted features	Assisting with mathematical calculations, symbolic computation, equation checking, and computational exploration
12	Canva AI, Adobe Firefly, DALL·E, Midjourney	Generating or editing illustrative and graphical materials, where permitted and appropriately disclosed; not for fabricating or misleadingly altering research evidence
13	Microsoft Excel Copilot, Python AI assistants, other AI-assisted data-analysis tools	Assisting with data organization, formula generation, exploratory analysis, code preparation, and visualization, with all outputs verified by the authors
14	Zotero AI plugins, Mendeley-related AI tools, other AI-assisted reference tools	Assisting with reference organization, literature classification, metadata processing, or citation-related tasks; all references must be independently verified by the authors
…	Other relevant tools	Authors should specify the exact name of the tool and its actual function in the research or manuscript preparation process

Note: The tools and functions listed above are provided only as examples and do not constitute automatic permission for their use. Authors must comply with the journal Gen AI Utilization Policy, disclose the actual tools and functions used, independently verify all AI-assisted outputs, and remain fully responsible for the accuracy, integrity, originality, and final content of the manuscript.

Example of AI/Assistive Technology Used:

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The authors declare that generative artificial intelligence (Gen AI) and other AI-assisted tools were used prudently, not excessively, during the research and preparation of this manuscript. Specifically, ChatGPT was used for brainstorming ideas; Grammarly for grammar and style correction; and Scite for analysing citation contexts. All AI-generated material was reviewed and edited for accuracy, completeness, and compliance with ethical and scholarly standards. The authors accept full responsibility for the final content of the manuscript.

Example of No AI/Assistive Technology Used:

DECLARATION OF ASSISTIVE TECHNOLOGIES IN THE WRITING PROCESS

The authors declare that no generative artificial intelligence (Gen AI), AI-assisted technologies, or other assistive technologies were used in the research or preparation of this manuscript.