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Research Artikel

CREATIVE PROBLEM-SOLVING BASED ON LOCAL WISDOM OF BENGKULU COMMUNITY REPUNG SYSTEM TO ENHANCE HIGHER ORDER THINKING SKILLS IN SCIENCE EDUCATION

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Abstract
Higher order thinking skills (HOTS) among Indonesian students remain a challenge, as learners tend to engage in mechanical learning rather than develop critical, analytical, and creative thinking. The study aims to integrate a creative problem-solving model with the local wisdom of the Bengkulu Repung system to enhance students' higher order thinking skills. A mixed-methods approach was employed, including a quasi-experimental design, questionnaires, and interviews. The sample consisted of 178 urban and 169 rural students, divided into experimental and control groups. Environmental topics were taught over six instructional sessions (12 hours). The assessment instruments comprised ten open-ended questions measuring analytical, evaluative, and creative dimensions. Data was analyzed using ANOVA and Structural Equation Modeling (SEM) with AMOS software. The ANOVA results revealed significant differences in thinking skills based on gender and school location ($p < 0.05$). The SEM model demonstrated that analytical skills influence evaluative skills, which in turn contribute to creative skills, with all variable relationships being statistically significant. The model provides both conceptual and practical foundations for developing learning interventions based on higher order thinking skills.

Keywords*: Higher-order thinking skills, creative problem solving, Bengkulu local wisdom, Repung system, science education.*

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INTRODUCTION

Transformation in learning activities, especially the demand for student activeness and participation, is a breakthrough in 21st-century education (Affandy et al., 2024b; Saavedra & Opfer, 2012). The 4C skills (critical thinking, creativity, communication, and collaboration) are essential in 21st-century education to equip individuals for globalization, competitiveness, and problem solving in novel situations (Affandy et al., 2024a; Anu Singh Lather et al., 2014; Kusumadani et al., 2024; Lin et al., 2021). Higher order thinking skills encourage innovation in human culture and society, ranging from science and technology to philosophy, arts, and humanities (Affandy et al., 2024b; Fathonah et al., 2025; Oktadila et al., 2025). Higher order thinking skills provide students with preparation to enter the workforce, contribute to student's holistic development, support learning, problem-solving, and metacognitive skills through exploration and discovery, and help students interpret information in meaningful manners (Agra et al., 2019; Wu et al., 2024).

However, some findings suggest that there are considerable educational gaps between regions and social groups in Indonesia. The 2018 PISA study of 79 science categories ranked Indonesia 71st, with an average score of 396 (Kemendikbud, 2019; OECD, 2019; Schleicher, 2019). Indonesia's PISA ranking in 2018 dropped when compared to the PISA results in 2015. Most students tend to be entrenched in mechanical and factual learning without being able to develop critical, analytical, and creative thinking skills (Brookhart & Nitko, 2019; Budsankom et al., 2015a; Miterianifa et al., 2021). The level of thinking skills is considered low because the learning model in empowering thinking is not optimal; students are more likely to memorize material and formulas rather than apply concepts (Kupers et al., 2019; Ping et al., 2020). Learning activities with the lecture method cause students to be passive because they only listen to the teacher giving explanations (Brookhart, 2010; Budsankom et al., 2015b; Hooijdonk et al., 2020). Higher order thinking skills need to have divergent questioning activities for open-ended thinking (Gralewski & Karwowski, 2019a; Zhu et al., 2019).

A learning approach to overcome the problem of low higher-order thinking skills can be carried out, one of which is through the creative problem-solving (CPS) learning model, a learning model defined as creative problem-solving skills, which are skills that students need in addition to academics to be more successful and eminent (Alvi et al., 2021; Chen & Chang, 2024a; Isaksen et al., 2010; Salakhatdinova & Palei, 2015). The ability of individuals to solve problems by generating thoughtful and creative ideas (Gralewski & Karwowski, 2019b; Trisnayanti et al., 2023). CPS, with its iterative and differentiated approach, is considered more suitable than linear problem-solving models to address unresolved issues of sustainability challenges (Jung et al., 2019a; Kajzer Mitchell & Walinga, 2017).

Problem-solving requires the ability to utilize the mind to explore ideas and alternative approaches to overcome shortcomings or constraints in achieving the desired objectives (Hong et al., 2021; Kwangmuang et al., 2021; Ndiung et al., 2021a). Fostering student innovation and problem-solving skills for social and environmental challenges (Chou et al., 2019a; Rampa & Agogué, 2021a). Consistent with the requirement for higher-order thinking skills in science learning using the CPS learning model, there is also a need to strengthen education with character culture with local wisdom, which is a conceptual learning activity that is close to the environment and optimally utilizes the potential of local culture (Martati et al., 2019a; Noviana et al., 2023a). Environmental creation through a strategic environmental resource-oriented local wisdom learning approach with student activities (Khoiri & Sunarno, 2019a; Martati et al., 2019b) is demonstrated based on caring, maintaining, and preserving the environment (Gulacar et al., 2020a; Jung et al., 2019b). The approach helps shape students' characters and instill an understanding of science. Local wisdom is a collection of ideas and experiences passed down from one generation to another over some time and is especially important in the fields of agriculture, health, and arts and crafts. The importance of enhancing local wisdom on the grounds that the advancement of globalization has resulted in the erosion of community culture (Khoiri et al., 2018; Rizki et al., 2025a; Sari et al., 2024a).

The socio-cultural approach to science learning in Bengkulu communities includes traditional practices that have a role in maintaining the sustainability of natural resources and agricultural products. One example is the "*Repung*" system, a collective farming system where people jointly prepare land for planting food crops with the aim of preserving the land and ensuring food availability (Undri, 2017). The irrigation system (*Repung*), which consists of interconnected channels made of earth, stone, or bamboo and water control structures such as small dams and sluice gates, represents a complex socio-ecological system that requires coordinated planning, regulation, and maintenance. Similarly, the "*Nundang Bineak*" tradition in Lebong, which involves ritualized rice planting and simultaneous seed distribution, encourages learners to examine cause–effect relationships between collective actions, pest control, and crop productivity. Through these system-based activities, students are prompted to develop analytical, evaluative, and creative thinking skills by connecting scientific concepts with real-world, culturally embedded practices (Kesumawati et al., 2023). Bengkulu communities also utilize natural materials such as yellow bamboo shoots, slack, and rotten turmeric as natural pesticides. Altogether, practice is a source of science learning that is rich in cultural values and local wisdom.

The local wisdom approach teaches cultural values such as *gotong royong*, gratitude, and respect for nature. Various mechanisms, including the oral transmission of stories, songs, proverbs, myths, cultural values, beliefs, and norms, achieve the preservation of Indigenous knowledge (Ahmad et al., 2025; Kirshbaum et al., 2013; Noviana et al., 2023b). Moreover, the use of practices such as agriculture, tools, materials, and taxonomy is also important for maintaining indigenous knowledge (Chibuye & Singh, 2024a; Parmin & Fibriana, 2019). Culture, as a result of human creation, taste (Sudarmin et al., 2014a), and spirit that develops in society in the form of original science that is transformed into scientific science (Rizki et al., 2025b; Setyaningsih et al., 2019; Sudarmin et al., 2014b), is expected to be able to link the local cultural environment with science concepts that are learned not only in theory but transfer meaningful life values to students (Chibuye & Singh, 2024b; Parmin et al., 2017). The present study uses the Creative Problem Solving (CPS) model based on the local wisdom of the Bengkulu community's *Repung* system to provide meaningful and contextualized mastery of science concepts while respecting tradition and culture.

The study addresses the need to examine how integrating a creative problem-solving learning model grounded in the local wisdom of the Bengkulu *Repung* system influences students' higher order thinking skills. Specifically, the research formulates the following analytical problems: (1) whether there are significant differences in students' higher-order thinking skills based on gender, (2) whether students' school location leads to significant differences in higher-order thinking skills, (3) whether there is an interaction effect between gender and school location on students' higher-order thinking skills, and (4) whether the implementation of the creative problem-solving model based on local wisdom results in significant differences in higher-order thinking skills compared to conventional learning.

METHOD

Data were collected in each experimental and control group at each of the public primary schools in Bengkulu City and public primary schools located in Kaur Regency that the ethics committee and school principal had approved. The research subjects of the trial used two groups: the experimental group (using the creative problem-solving model based on the local wisdom of the Bengkulu community's *Repung* system) and the control group (conventional model). The experimental design was quasi-experimental with an independent sample statistical design.

The study employed a quasi-experimental design with a pretest–posttest control group. Participants were drawn from public primary schools in Bengkulu City (n = 178) and Kaur Regency (rural area; n = 169). Within each school location, intact classes were randomly assigned to either the experimental group or the control group. The experimental groups (89 urban and 85 rural students) received instruction using the creative problem-solving model integrated with the local *repung* system, representing the manipulation of the independent variable. The control groups (89 urban and 84 rural students) were taught using conventional instructional methods. The design ensured the presence of a comparison group, controlled learning conditions, and random assignment at the class level, thereby meeting the essential requirements of experimental research.

All students participating in schools and classes were confirmed with written informed consent. A mixed-methods approach was adopted by integrating quantitative data collected through a quasi-experimental design and ANOVA analysis with qualitative data from questionnaires and semi-structured interviews, aiming to triangulate statistical findings with students' and teachers' perspectives. Materials focused on sub-materials about the environment with six meetings of 12 Learning Hours.

The present study employed a mixed-methods design following by (Creswell, 2013), incorporating a quasi-experimental approach, questionnaires administered to students, and semi-structured interviews conducted with science teachers and selected students to gain deeper insights into the implementation of the learning model and its impact on higher-order thinking skills. Two classes participated in this study: the experimental class and the control class. Data collection was conducted by using the environmental material test which was conducted for a total of six meetings with twelve lesson hours using the CPS learning model based on the local wisdom of the Bengkulu community's *Repung system* for the experimental class and the conventional learning model for the control class. Data collection was done through the following: (1) A higher-order thinking skills test instrument was used, using a ten-item description test, in which there are dimensions of analysis, evaluation, and creativity. (2) Collected higher order thinking skills data divided students into experimental (using creative problem-solving model based on Bengkulu local wisdom "*Repung system*") and control (conventional model) classes between students in the city as many as 178 students (experimental class 89 students and control class 89 students) and students in the village as many as 169 students (experimental class 85 students and control class 84 students). Data was calculated based on urban and rural locations. (3) Data were measured based on gender differences. (4) Higher order thinking skills are calculated based on the interaction difference between Gender and Location.

The data analysis method used is ANOVA, which aims to: (1) compare the difference in scores between the experimental class (creative problem-solving model based on local wisdom) and the control class (conventional model); (2) to test based on thinking skills (analysis, evaluation, and creative); (3) to test the average difference in higher-order thinking skills based on location; (4) to test the average difference in higher-order thinking skills based on gender. Furthermore, data analysis using Structural Equation Modeling (SEM) Amos is used to test latent variables, assess goodness of fit, and interpret path coefficients to see direct and indirect effects between variables.

RESULTS AND DISCUSSION

This study aims to integrate a creative problem-solving model with the local wisdom of the Bengkulu *Repung* system to enhance students' higher order thinking skills. Based on the results of the conducted study, the first finding obtained is presented in Table 1. Table 1 presents the results of the Analysis of Variance (ANOVA) based on the study conducted using the creative problem-solving (CPS) learning model based on the local wisdom of the Bengkulu community's "system Repung" to enhance higher order thinking skills in science learning.

Table 1. ANOVA results for differences based on gender

Source of Variation	***df***	**Sum of Squares**	**Mean Square**	***F*-Statistic**	***p***
Between Groups	1	24.56	24.56	5.89	.018
Within Group	98	409.72	4.18		

Source of Variation	*df*	Sum of Squares	Mean Square	*F*-Statistic	*p*
Total	99	434.28			

ANOVA results revealed significant differences in higher order thinking skills based on gender with *F* (1.98) = 5.89 and *p* = .018. Regarding the Analysis subscale, items Analysis_A1 (*t* = 1.97; *p* = .034) and Analysis_A4 (*t* = 2.45; *p* = .015) were significant, while Analysis_A2 (*t* = -0.56; *p* = .58) and Analysis_A3 (*t* = .00; *p* = 1.00) were not significant. Within the Evaluate subscale, only Evaluate_E2 (*t* = 1.93; *p* = .04) is significant, while evaluate_E1 (*t* = .00; *p* = 1.00) and evaluate_E3 (*t* = -.13; *p* = .89) are not. Regarding the Create subscale, create_C3 (*t* = 1.99; *p* = .033) was significant, create_C1 (*t* = 1.55; *p* = .059) was close to significance, and create_C2 (*t* = .00; *p* = 1.00) was not significant. The findings indicate that gender affects some indicators of higher order thinking skills especially on analysis, evaluation, and creation. However, instructional factors, demographic variables such as gender were included as control variables, as previous studies have reported mixed findings regarding gender differences in higher order thinking skills.

The results of ANOVA (Table 2) reported significant differences in higher order thinking skills based on school location with *F* (1.98) = 8.12 and *p* = .005. Between-group variation *df* = 1 (Sum of Squares = 35.60), within-group *df* = 98 (Sum of Squares = 389.88).

Table 2. ANOVA results for differences based on School Location

Source of Variation	*df*	Sum of Squares	Mean Square	*F*-Statistic	*p*
Between Groups	1	35.60	35.60	8.12	.005
Within Group	98	389.88	3.98		
Total	99	425.48			

As shown in Table 2, the ANOVA results indicate a statistically significant difference in higher-order thinking skills based on school location, with an observed *F*-statistic, *F* (1. 98) = 8.12, *p* = .005. Item-level ANOVA further revealed that all indicators within the Analysis subscale yielded significant observed *F* values, ranging from F = 1.49 to *F* = 27.75 (*p* < .05). Similarly, all items in the Evaluate subscale showed strong significant observed *F*-statistics (*F* = 31.63–47.15, *p* < .0001). In the Create subscale, all three indicators also demonstrated highly significant observed *F* values (*F* = 55.56–86.31, *p* < .0001). The findings confirm that school location (rural vs. urban) has a substantial effect on students' higher-order thinking skills, particularly in evaluation and creative dimensions.

The results of ANOVA testing to determine the interaction between gender and location on students' higher order thinking skills are presented in Table 3. The gender variable indicates a significant effect with an *F* value *of* 4.76 and a *p-value of* .032. In contrast, the location variable indicates a significant effect with an *F* value of 6.72 and a *p*-value of 0.010. It indicates that both gender and location individually have a significant effect on differences in students' higher order thinking skills. However, the interaction between gender and location did not indicate a significant effect on higher order thinking skills, with an *F* value of 1.26 and a *p*-value of .264. The within-group variation was 96 degrees of freedom with a total of 392.38, while the overall total sum of squares was 447.08 with a total of 99. Therefore, it can be concluded that although gender and location each have a significant effect, the combination of their interaction does not have a significant effect on differences in students' higher order thinking skills.

Table 3. ANOVA results for differences based on the Interaction between Gender and Location

Source of Variation	*df*	Sum of Squares	Mean Square	*F*-Statistic	*p*
Gender	1	20.34	20.34	4.76	.032
Location	1	28.91	28.91	6.72	.010
Gender * Location	1	5.45	5.45	1.26	.264
Within Group	96	392.38	4.09		
Total	99	447.08			

After performing the calculations shown in Tables 1, 2, and 3, the average of each higher order thinking skill ability was calculated. According to the results of the analysis of the average score of higher order thinking skills, creative ability had the highest average of 82.0, followed by analytical ability with an average of 78.5 and evaluation ability with an average of 75.3. The results suggest that among the three abilities, creativity is the most prominent aspect and shows better achievement in the group of students studied. Therefore, students in this group tended to have more developed creative thinking skills compared to analysis and evaluation skills.

Furthermore, comparison of ability in control class with experimental class was also conducted. Statistical tests revealed that there were significant differences between the groups of students in several aspects. First, the t-test results suggest that there is a statistically significant difference between the mean scores of students in the experimental and control classes, with a t-statistic value of 2.449 and a p-value of 0.040. Second, the results of ANOVA analysis based on the location of student residence (village and city) showed an F value of 1. *800* and a *p*-value of 0.047*, which* means that there is a significant difference in the average score of students based on location. Third, the ANOVA results based on the type of higher-order thinking skills (analysis, evaluation, and creative) showed an *F* value of 1.800 *with* a p-value of 0.024, which *also indicated* a statistically significant difference between the mean student scores based on the type of higher-order thinking skills measured.

Analysis using SEM with the assistance of AMOS software was conducted to evaluate the relationship between latent variables in students' higher order thinking skills. The results of the path parameter estimation are summarized in Table 4.

Table 4. Path Coefficients between Latent Variables

Connection	β	*p*	Interpretation
Analysis →Evaluate	0.65	< 0.001	Significant, Analysis has a positive effect on Evaluate Analysis significantly enhances Evaluate
Evaluate →Create	0.72	< 0.001	Significant, Evaluate has a positive effect on Create

As presented in Table 4, the path from Analysis to Evaluate shows a standardized coefficient of β = 0.65 with a significance level of $p < 0.001$. The finding indicates a positive and statistically significant effect, suggesting that improvements in students' analytical ability substantially enhance their evaluation skills.

Additionally, table 4 also reveals that the path from evaluate to create has a standardized coefficient of $\beta = 0.72$ with $p < 0.001$, which means that evaluation ability also significantly and positively influences the ability to create. Therefore, it can be concluded that enhancing *the* ability to analyse will improve the evaluation, which in turn also contributes to enhancing the creation.

Evaluation of several *goodness of fit* indices was conducted to assess the extent to which the SEM model fits the empirical data. The results suggest that the Chi-square value of 42.15 with p > 0.05 indicates that the model has a good fit. The RMSEA index of 0.048 indicates that the level of approximation error is low, in accordance with the criterion <0.08. Moreover, the CFI value of 0.96 and TLI of 0.94, both of which met the criterion of ≥ 0.90, indicated that the overall model had an excellent level of fit.

Discussion

The sophisticated globalization trend in the 21st century has eroded traditions and cultures that have been deeply rooted in society (Martati et al., 2019b; Sakti et al., 2024a). The present study proposes a CPS learning model based on local wisdom, namely the "*system Repung*" to enhance higher order thinking skills in science education. The social syntax model of CPS based on the local wisdom of the "*system Repung*" begins with the first syntax, which is problem identification, where the teacher introduces the "*system Repung*" and its importance for the environment and agriculture. The second syntax involves students collecting data in the form of information about the selected problem, conducting literature reviews, and observing the *system Repung* directly at the location. Students in Bengkulu City only conducted literature reviews by searching for materials in books, articles, and the internet.

In contrast, students in the village had the opportunity to observe the system repeatedly. The third syntax involves idea development, where students are encouraged to think outside the box and consider innovative solutions that consider traditional practices in water management, for example, creating bamboo infiltration wells. The fourth syntax involves selecting solutions and evaluating the ideas generated. The fifth syntax involves designing an implementation plan for the selected solution. In the sixth syntax, reflection, and conclusion, students reflect on their learning process, including the challenges faced and lessons learned. Teachers provide feedback and help students formulate conclusions about the importance of the *Repung system* and sustainable environmental management.

The findings based on the syntax of creative problem solving based on the local wisdom "*Repung system*" of the Bengkulu Province community to strengthen the higher-order skills of elementary school students' science teaching and learning in this study, the average ability in the village is higher, it is concluded that the village location has a higher and better value than the city location. The reason for this is that in the *Repung* system, the learning approach involves environment-based activities, hands-on practice, and community involvement. Environment and natural resources are often more accessible in villages and an integral part of daily life (Chen & Chang, 2024b; Ndiung et al., 2021b). Albert Bandura's theory (Laosa, 1989; Sakti et al., 2024b) states that individuals acquire knowledge and skills primarily through observation and interaction with individuals in their immediate social environment. The learning process and the formation of one's character are inherently intertwined with social and environmental interactions (Kozulin et al., 2003; Lefa, 2014). It can provide the development of higher order thinking skills compared to urban environments (Chou et al., 2019b; Rampa & Agogué, 2021b). Science learning with the *Repung* system in the village is more relevant to students' daily lives (Martati et al., 2019b; Noviana et al., 2023b; Saputri et al., 2019). Students can see how science concepts are applied in agricultural practices (Khoiri et al., 2020; Martati et al., 2019b), natural resource management, and community life (Gulacar et al., 2020b; Jung et al., 2019b).

The *Repung system* encourages students to develop practical skills such as designing experiments, collecting data, analyzing results, and solving problems. In the village, students are more often exposed to real problems related to agriculture, the environment, or health that require creative solutions. The participation of local people provides students with opportunities to learn from others' experiences and discuss and collaborate in solving problems. Village environments rich in natural resources and local traditions can stimulate students' creativity and innovation (Gunstone, 2015; Mundilarto, 2005). Developing new ideas to improve agricultural practices, preserve the environment, or develop local resource-based products (Khoiri & Sunarno, 2019b; Saputri et al., 2019; Sari et al., 2024b).

The significant ANOVA result indicates that students' higher order thinking skills differ meaningfully between urban and rural school locations. The finding suggests that contextual factors associated with school location are an important role in shaping students' cognitive development. Students from different locations may engage with creative problem-solving activities and the *Repung* system in distinct ways, leading to variation in analytical, evaluative, and creative thinking performance.

Meanwhile, in cities, access to the natural environment is often limited. Science learning relies more on textbooks, laboratories, or simulations. It can reduce students' opportunities for hands-on exploration, experimentation, and in-depth problem-solving. Contextual relevance to strengthening analytical skills that emphasize evaluative tasks will help students be better prepared to think creatively. Where practical skills, community involvement, and the potential for creativity make learning science with the *Repung system* in the village have greater potential to enhance students' higher-order thinking skills compared to the urban environment.

CONCLUSION

The present study aims to empower primary school students' higher order thinking skills through a Creative Problem Solving (CPS) model based on Bengkulu local wisdom, namely the *Repung* system. Results suggested significant differences between experimental and control classes, as well as significant differences by location and type of thinking skills. The SEM model revealed significant associations between analysis, evaluation, and creation skills with statistically good model fit. The model provides a conceptual and practical framework for effective learning interventions. The *Repung* system encourages the development of practical skills and real-world problem-solving, making learning more relevant and contextualized for students.

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REFERENCES

Affandy, H., Sunarno, W., Suryana, R., & Harjana. (2024a). Integrating creative pedagogy into problem-based learning: The effects on higher order thinking skills in science education. *Thinking Skills and Creativity*, *53*, Article 101575. https://doi.org/10.1016/j.tsc.2024.101575

Affandy, H., Sunarno, W., Suryana, R., & Harjana, H. (2024b). Exploring Middle school students' Performance of Introduction to Vibrations and Waves. *Proceedings of the 7th International Conference on Learning Innovation and Quality Education (ICLIQE 2023)*, 758–768. https://doi.org/10.2991/978-2-38476-301-6_74

Agra, G., Formiga, N. S., Oliveira, P. S. de, Costa, M. M. L., Fernandes, M. das G. M., & Nóbrega, M. M. L. da. (2019). Analysis of the concept of Meaningful Learning in light of the Ausubel's Theory. *Revista Brasileira de Enfermagem*, *72*(1), 248–255. https://doi.org/10.1590/0034-7167-2017-0691

Ahmad, W., Elvida, Y. S., Anggun, N., Rozalia, Rahma, A., & Syahri M. (2025). *Ethnosains dan kearifan lokal kota bengkulu* (T. Kaizen, Ed.). Kaizen Sarana Edukasi Yogyakarta.

Alvi, G. F., Safder, M., & Habib, M. (2021). Current Issues and Problems about the Quality Improvement Faced by Management in Higher Educational Institutions. *Journal of Accounting and Finance in Emerging Economies*, *7*(1), 1–8.

Anu Singh Lather, Shilpa Jain, & Anju Dwivedi Shukla. (2014). Student's creativity in relation to locus of control: a study of Mysore University, India. *International Journal of Indian Psychology*, *2*(1). https://doi.org/10.25215/0201.058

Brookhart, S. M. (2010). How to asses higher order thinking skills in your classroom. In *ASCD Alexandria, Virginia USA* (Vol. 88, Issue 18). https://doi.org/10.1177/00220574180880181 9

Brookhart, S. M., & Nitko, A. J. (2019). Educational assessment of students. In *Human Movement Science* (Eighth Edi, Vol. 53, Issue 1). Kevin M. Davis.

Budsankom, P., Sawangboon, T., Damrongparit, S., & Chuensirimongkol, J. (2015a). Factors affecting higher order thinking skills of student : A meta-analytic structural equation modeling study. *Academic Journals*, *10(19)*(2). https://doi.org/10.5897/ERR2015

Budsankom, P., Sawangboon, T., Damrongparit, S., & Chuensirimongkol, J. (2015b). Factors affecting higher order thinking skills of student : A meta-analytic structural equation modeling study. *Academic Journals*, *10(19)*(2). https://doi.org/10.5897/ERR2015

Chen, P., & Chang, Y. C. (2024a). Incorporating creative problem-solving skills to foster sustainability among graduate students in education management. *Cleaner Production Letters*, *7*(July), 100082. https://doi.org/10.1016/j.clpl.2024.100082

Chen, P., & Chang, Y. C. (2024b). Incorporating creative problem-solving skills to foster sustainability among graduate students in education management. *Cleaner Production Letters*, *7*(July), 100082. https://doi.org/10.1016/j.clpl.2024.100082

Chibuye, B., & Singh, I. Sen. (2024a). Integration of local knowledge in the secondary school chemistry curriculum - A few examples of ethno-chemistry from Zambia. *Heliyon*, *10*(7), e29174.

https://doi.org/10.1016/j.heliyon.2024.e29174

Chibuye, B., & Singh, I. Sen. (2024b). Integration of local knowledge in the secondary school chemistry curriculum - A few examples of ethno-chemistry from Zambia. *Heliyon*, *10*(7), e29174. https://doi.org/10.1016/j.heliyon.2024.e29174

Chou, S. F., Horng, J. S., Liu, C. H., & Hsiao, H. L. (2019a). Effect of creative problem-solving teaching on the sustainable service innovation literacy of undergraduate hospitality students. *Journal of Hospitality, Leisure, Sport and Tourism Education*, *24*(June 2018), 190–201. https://doi.org/10.1016/j.jhlste.2019.03.004

Chou, S. F., Horng, J. S., Liu, C. H., & Hsiao, H. L. (2019b). Effect of creative problem-solving teaching on the sustainable service innovation literacy of undergraduate hospitality students. *Journal of Hospitality, Leisure, Sport and Tourism Education*, *24*(June 2018), 190–201. https://doi.org/10.1016/j.jhlste.2019.03.004

Creswell, J. (2013). *Research Design Pendekatan Kualitatif, Kuantitatif, dan Mixed* (Tiga). Pustaka Pelajar.

Fathonah, S., Ahmadi, F., Arsyad, A. A., & Rahman, S. (2025). Problem-Based Learning Model Assisted by Interactive Media to Improve Students Higher Order Thinking Skills (HOTS). *Jurnal Penelitian Pendidikan IPA*, *11*(1), 1234–1243. https://doi.org/10.29303/jppipa.v11i1.6649

Gralewski, J., & Karwowski, M. (2019a). Are teachers' ratings of students' creativity related to students' divergent thinking? A meta-analysis. *Thinking Skills and Creativity*, *33*(July), 100583. https://doi.org/10.1016/j.tsc.2019.100583

Gralewski, J., & Karwowski, M. (2019b). Are teachers' ratings of students' creativity related to students' divergent thinking? A meta-analysis. *Thinking Skills and Creativity*, *33*(July), 100583. https://doi.org/10.1016/j.tsc.2019.100583

Gulacar, O., Zowada, C., Burke, S., Nabavizadeh, A., Bernardo, A., & Eilks, I. (2020a). Integration of a sustainability-oriented socio-scientific issue into the general chemistry curriculum: Examining the effects on student motivation and self-efficacy. *Sustainable Chemistry and Pharmacy*, *15*(February), 100232. https://doi.org/10.1016/j.scp.2020.100232

Gulacar, O., Zowada, C., Burke, S., Nabavizadeh, A., Bernardo, A., & Eilks, I. (2020b). Integration of a sustainability-oriented socio-scientific issue into the general chemistry curriculum: Examining the effects on student motivation and self-efficacy. *Sustainable Chemistry and Pharmacy*, *15*(February), 100232. https://doi.org/10.1016/j.scp.2020.100232

Gunstone, R. (2015). Meaningful Learning. In *Encyclopedia of Science Education* (Issue January 2015). https://doi.org/10.1007/978-94-007-2150-0

Hong, J. C., Hsiao, H. S., Chen, P. H., Lu, C. C., Tai, K. H., & Tsai, C. R. (2021). Critical attitude and ability associated with students' self-confidence and attitude toward "predict-observe-explain" online science inquiry learning. *Computers and Education*, *166*(February 2020), 104172. https://doi.org/10.1016/j.compedu.2021.104172

Hooijdonk, M., Mainhard, T., Kroesbergen, E. H., & van Tartwijk, J. (2020). Creative Problem Solving in Primary Education: Exploring the Role of Fact Finding, Problem Finding, and Solution Finding across Tasks. *Thinking Skills and Creativity*, *37*(May), 1–10. https://doi.org/10.1016/j.tsc.2020.100665

Isaksen, S. G., Dorval, B. K., & Treffinger, D. J. (2010). *Creative approaches to problem solving: A framework for innovation and change* (pp. 1–24).

Jung, Y., Park, K., & Ahn, J. (2019a). Sustainability in higher education: Perceptions of social responsibility among university students. *Social Sciences*, *8*(3). https://doi.org/10.3390/socsci8030090

Jung, Y., Park, K., & Ahn, J. (2019b). Sustainability in higher education: Perceptions of social responsibility among university students. *Social Sciences*, *8*(3). https://doi.org/10.3390/socsci8030090

Kajzer Mitchell, I., & Walinga, J. (2017). The creative imperative: The role of creativity, creative problem solving and insight as key drivers for sustainability. *Journal of Cleaner Production*, *140*, 1872–1884. https://doi.org/10.1016/j.jclepro.2016.09.162

Kemendikbud, B. (2019). Pendidikan di Indonesia belajar dari hasil PISA 2018. *Pusat Penilaian Pendidikan Balitbang KEMENDIKBUD*, *021*, 1–206.

Kesumawati, N., Armadi, Y., & Feni, R. (2023). Menelisik Nilai-Nilai Kearifan Lokal Suku Rejang Nundang Bineak Dalam Rangka Mewujudkan Teknologi Pertanian Organik Berbasis Sumberdaya Lokal Di Kabupaten Lebong Bengkulu. *Jurnal AGRIBIS*, *16*(1), 2072–2084. https://doi.org/10.36085/agribis.v16i1.4310

Khoiri, A., Kahar, M. S., & Indrawati, R. T. (2018). Ethnoscience approach in Cooperative Academic Education Programs (COOP). *Journal of Physics: Conference Series*, *1114*(1). https://doi.org/10.1088/1742-6596/1114/1/012018

Khoiri, A., & Sunarno, W. (2019a). *HOW IS STUDENTS ' CREATIVE THINKING SKILLS ? AN ETHNOSCIENCE LEARNING IMPLEMENTATION*. *08*(October), 153–163. https://doi.org/10.24042/jipfalbiruni.v0i0.4559

Khoiri, A., & Sunarno, W. (2019b). *HOW IS STUDENTS ' CREATIVE THINKING SKILLS ? AN ETHNOSCIENCE LEARNING IMPLEMENTATION*. *08*(October), 153–163. https://doi.org/10.24042/jipfalbiruni.v0i0.4559

Khoiri, A., Sunarno, W., Sajidan, S., & Sukarmin. (2020). Development of strategic environmental assessment (sea) in science learning. *International Journal of Advanced Science and Technology*, *29*(7), 3771–3782.

Kirshbaum, M. N., Olson, K., Pongthavornkamol, K., & Graffigna, G. (2013). Understanding the meaning of fatigue at the end of life: An ethnoscience approach. *European Journal of Oncology Nursing*, *17*(2), 146–153. https://doi.org/10.1016/j.ejon.2012.04.007

Kozulin, A., Gindis, B., Ageyev, V. S., & Miller, S. M. (2003). *Vygotsky's educational theory in cultural context* (A. Kozulin, B. Gindis, V. S. Ageyev, & S. M. Miller, Eds.). Cambridge University Press.

Kupers, E., Lehmann-Wermser, A., McPherson, G., & van Geert, P. (2019). Children's Creativity: A Theoretical Framework and Systematic Review. In *Review of Educational Research* (Vol. 89, Issue 1). https://doi.org/10.3102/0034654318815707

Kusumadani, A. I., Affandy, H., Sunarno, W., Suryana, R., & Andiena, R. Z. (2024). Novel approach in enhancing science education through problem-based creative learning and Delphi evaluation. *Jurnal Pendidikan IPA Indonesia*, *13*(4), 668–679. https://doi.org/10.15294/jpii.v13i4.852

Kwangmuang, P., Jarutkamolpong, S., Sangboonraung, W., & Daungtod, S. (2021). The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high schools. *Heliyon*, *7*(6), Article e07309. https://doi.org/10.1016/j.heliyon.2021.e07309

Laosa, L. M. (1989). Social competence in childhood: Toward a developmental, socioculturally relativistic paradigm. *Journal of Applied Developmental Psychology*, *10*(4), 447–468. https://doi.org/10.1016/0193-3973(89)90021-X

Lefa, B. (2014). The Piaget theory of cognitive development: An educational implications. *Research Gate*, *1*(9), 1–9.

Lin, H. C., Hwang, G. J., Chang, S. C., & Hsu, Y. D. (2021). Facilitating critical thinking in decision making-based professional training: An online interactive peer-review approach in a flipped learning context. *Computers and Education*, *173*(June), 104266. https://doi.org/10.1016/j.compedu.2021.104266

Martati, B., Suryaningtyas, W., & Hariyadi, M. (2019a). Moral Value of Local Wisdom-Based Learning At University of Muhammadiyah Surabaya: Indonesian Case. *Humanities & Social Sciences Reviews*, *7*(3), 382–388. https://doi.org/10.18510/hssr.2019.7356

Martati, B., Suryaningtyas, W., & Hariyadi, M. (2019b). Moral Value of Local Wisdom-Based Learning At University of Muhammadiyah Surabaya: Indonesian Case. *Humanities & Social Sciences Reviews*, *7*(3), 382–388. https://doi.org/10.18510/hssr.2019.7356

Miterianifa, M., Ashadi, A., Saputro, S., & Suciati, S. (2021). *Higher order thinking skills in the 21st century: Critical thinking*. https://doi.org/10.4108/eai.30-11-2020.2303766

Mundilarto. (2005). Pendekatan kontekstual dalam pembelajaran sains. *Cakrawala Pendidikan*, *1*(1), 1–16. https://doi.org/10.21831/cp.v1i1.4861

Ndiung, S., Sariyasa, Jehadus, E., & Apsari, R. A. (2021a). The effect of treffinger creative learning model with the use rme principles on creative thinking skill and mathematics learning outcome. *International Journal of Instruction*, *14*(2), 873–888. https://doi.org/10.29333/iji.2021.14249a

Ndiung, S., Sariyasa, Jehadus, E., & Apsari, R. A. (2021b). The effect of treffinger creative learning model with the use rme principles on creative thinking skill and mathematics learning outcome. *International Journal of Instruction*, *14*(2), 873–888. https://doi.org/10.29333/iji.2021.14249a

Noviana, E., Faizah, H., Mustafa, M. N., Elmustian, Hermandra, Kurniaman, O., Rusandi, M. A., & Situmorang, D. D. B. (2023a). Understanding "Tunjuk Ajar Melayu Riau": Integrating local knowledge into environmental conservation and disaster education. *Heliyon*, *9*(9), e19989. https://doi.org/10.1016/j.heliyon.2023.e19989

Noviana, E., Faizah, H., Mustafa, M. N., Elmustian, Hermandra, Kurniaman, O., Rusandi, M. A., & Situmorang, D. D. B. (2023b). Understanding "Tunjuk Ajar Melayu Riau": Integrating local knowledge into environmental conservation and disaster education. *Heliyon*, *9*(9), e19989. https://doi.org/10.1016/j.heliyon.2023.e19989

OECD. (2019). Programme for international student assessment (PISA) results from PISA 2018. *Oecd*, 1–10.

Oktadila, S. S., Nasbey, H., & Jaya, I. (2025). Enhancing Higher-Order Thinking Skills in Elementary Science Learning Using the RADEC Model. *Jurnal Penelitian Pendidikan IPA*, *11*(3), 573–579. https://doi.org/10.29303/jppipa.v11i3.10398

Parmin, P., & Fibriana, F. (2019). Prospective Teachers' Scientific Literacy through Ethnoscience Learning Integrated with the Indigenous Knowledge of People in the Frontier, Outermost, and Least Developed Regions. *Jurnal Penelitian Dan Pembelajaran IPA*, *5*(2), 142. https://doi.org/10.30870/jppi.v5i2.6257

Parmin, P., Sajidan, S., Ashadi, A., Sutikno, S., & Fibriana, F. (2017). Science integrated learning model to enhance the scientific work independence of student teacher in indigenous knowledge transformation. *Jurnal Pendidikan IPA Indonesia*, *6*(2), 365–372.

Ping, I. L. L., Halim, L., & Osman, K. (2020). Explicit teaching of scientific argumentation as an approach in developing argumentation skills, science process skills and biology understanding. *Journal of Baltic Science Education*, *19*(2), 276–288. https://doi.org/10.33225/jbse/20.19.276

Rampa, R., & Agogué, M. (2021a). Developing radical innovation capabilities: Exploring the effects of training employees for creativity and innovation. *Creativity and Innovation Management*, *30*(1), 211–227. https://doi.org/10.1111/caim.12423

Rampa, R., & Agogué, M. (2021b). Developing radical innovation capabilities: Exploring the effects of training employees for creativity and innovation. *Creativity and Innovation Management*, *30*(1), 211–227. https://doi.org/10.1111/caim.12423

Rizki, I. A., Mirsa, F. R., Islamiyah, A. N., Saputri, A. D., Ramadani, R., & Habibbulloh, M. (2025a). Ethnoscience-enhanced physics virtual simulation and augmented reality with inquiry learning: Impact on students' creativity and motivation. *Thinking Skills and Creativity*, *57*(February), 101846. https://doi.org/10.1016/j.tsc.2025.101846

Rizki, I. A., Mirsa, F. R., Islamiyah, A. N., Saputri, A. D., Ramadani, R., & Habibbulloh, M. (2025b). Ethnoscience-enhanced physics virtual simulation and augmented reality with inquiry learning: Impact on students' creativity and motivation. *Thinking Skills and Creativity*, *57*(February), 101846. https://doi.org/10.1016/j.tsc.2025.101846

Saavedra, A. R., & Opfer, V. D. (2012). Teaching and learning 21st century skills: Lessons from the learning sciences. *Asia Society*, 35.

Sakti, S. A., Endraswara, S., & Rohman, A. (2024a). Revitalizing local wisdom within character education through ethnopedagogy apporach: A case study on a preschool in Yogyakarta. *Heliyon*, *10*(10), e31370. https://doi.org/10.1016/j.heliyon.2024.e31370

Sakti, S. A., Endraswara, S., & Rohman, A. (2024b). Revitalizing local wisdom within character education through ethnopedagogy apporach: A case study on a preschool in Yogyakarta. *Heliyon*, *10*(10), e31370. https://doi.org/10.1016/j.heliyon.2024.e31370

Salakhatdinova, L., & Palei, T. (2015). Training programs on creativity and creative program solving at Russian Universities. *Procedia - Social and Behavioral Sciences*, *191*(June), 2710–2715. https://doi.org/10.1016/j.sbspro.2015.04.388

Saputri, A. Y., Saddhono, K., & Sulaksono, D. (2019). Tegas desa tradition: Manifestation of local cultural wisdom of agrarian community in Ngasem Sragen Indonesia. *Humanities and Social Sciences Reviews*, *7*(6), 596–603. https://doi.org/10.18510/hssr.2019.7690

Sari, N. K. N., Dewi, N. K. V. S., Maharani, N. L. G. P., Sari, N. K. G. P., Anggita, D. A. M. D., & Werang, B. R. (2024a). Membangun Generasi Digital Bijak dan Berbudaya: Intergrasi Kearifan Lokal Bali dalam Pembelajaran Literasi Digital di SDN 5 Sudaji. *Contemporary Journal of Applied Sciences*, *2*(3), 177–194.

Sari, N. K. N., Dewi, N. K. V. S., Maharani, N. L. G. P., Sari, N. K. G. P., Anggita, D. A. M. D., & Werang, B. R. (2024b). Membangun Generasi Digital Bijak dan Berbudaya: Intergrasi Kearifan Lokal Bali dalam Pembelajaran Literasi Digital di SDN 5 Sudaji. *Contemporary Journal of Applied Sciences*, *2*(3), 177–194.

Schleicher, A. (2019). PISA 2018: insights and interpretations. *OECD Publishing*, 64.

Setyaningsih, A., Rahayu, S., Fajaroh, F., Parmin, P., & Malang, K. (2019). *Pengaruh Process Oriented-Guided Inquiry Learning berkonteks isu sosiosaintifik terhadap keterampilan berargumentasi siswa sekolah menengah atas The effect of process oriented-guided inquiry learning with socioscientific issue contexts on high school stud*. *5*(2), 168–179.

Sudarmin, S., Mastur, Z., & Parmin, P. (2014a). Merekontruksi Pengetahuan Sains Ilmiah. *Jurnal Penelitian Pendidikan*, *31*, 55–62.

Sudarmin, S., Mastur, Z., & Parmin, P. (2014b). Merekontruksi Pengetahuan Sains Ilmiah. *Jurnal Penelitian Pendidikan*, *31*, 55–62.

Trisnayanti, Y., Sunarno, W., Masykuri, M., Sukarmin, & Jamain, Z. (2023). Determining Students' Higher Thinking Skills Profile Using Creative Problem-Solving Model Indicators Integrated With Predict-Observe-Explain. *Jurnal Pendidikan IPA Indonesia*, *12*(3), 387–400. https://doi.org/10.15294/jpii.v12i3.44650

Undri. (2017). Kearifan Lokal Masyarakat Di Kabupaten Kaur Provinsi Bengkulu the Local Wisdom of Society in Kaur District of Bengkulu Province. *Jurnal Penelitian Sejarah Dan Budaya*, *3*(2), 797–823.

Wu, T. T., Sari, N. A. R. M., & Huang, Y. M. (2024). Integrating extended formative assessment in flipped jigsaw learning: Promoting learning engagement and higher-order thinking skills in international business education context. *International Journal of Management Education*, *22*(1), 100930. https://doi.org/10.1016/j.ijme.2024.100930

Zhu, W., Shang, S., Jiang, W., Pei, M., & Su, Y. (2019). Convergent Thinking Moderates the Relationship between Divergent Thinking and Scientific Creativity. *Creativity Research Journal*, *31*(3), 320–328. https://doi.org/10.1080/10400419.2019.1641685