# Motivation, Mentorship, and Peer Role among Indonesian Students in Creative Literature Projects: An Exploration of Problem-Solving Abilitiess

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**ABSTRACT**

Despite the recognized benefits of creative project-based learning, research on problem-solving abilities remains largely focused on STEM disciplines, leaving a significant gap in the humanities. Furthermore, how motivation, mentorship, and peer dynamics collectively interact to drive creative problem-solving within the Indonesian educational context remains underexplored. To address this, this study investigates the impact of these psychosocial factors on students' problem-solving abilities during creative literature projects. Using structural equation modeling (SEM), we analyzed survey data from 100 elementary and junior high school students in Indonesia who actively participated in university-collaborated literature programs. The model evaluated motivation, mentorship, and peer relationships as independent variables; problem-solving abilities as a mediator; and project outcomes as the dependent variable. The findings reveal that motivation and mentorship significantly enhance problem-solving abilities, whereas peer relationships exert a comparatively lesser influence. Crucially, problem-solving abilities fully mediate the relationship between these psychosocial inputs and final project outcomes. In practice, educators should prioritize cultivating intrinsic motivation and active mentorship to enhance the success of creative problem-solving. Future research should explore these dynamics globally using a multi-level approach.

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## 1. INTRODUCTION

Educational institutions, encompassing schools and higher education, function not only as knowledge-enhancing spaces but also as pivotal platforms facilitating students' access to motivation, mentorship, and positive peer relationships. The collaboration

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between schools and universities harnesses diverse resources, including curriculum, human resources, classrooms, libraries, technology/networks, laboratories, and sports fields (Lavy & Nixon, 2017; Morton, 2016; Mwamwenda & Mwamwenda, 1987). Specifically, this partnership aims to establish creative learning environments that foster motivation among both teachers and students. Implementation involves using technology alongside Indonesian literature, emphasizing experiences and socio-cultural contexts across all subjects (Ra, 2019; Darling-Hammond et al., 2019; Vartiainen & Tedre, 2023).

The essential role of teachers and university stakeholders in motivating creative programs in primary and secondary schools is evident. In the Indonesian context, this collaboration often occurs through national educational initiatives, such as the Teaching Campus (*Kampus Mengajar*) program, or through university-led community service (*Pengabdian Kepada Masyarakat*). Through these avenues, university lecturers and university students work directly with school teachers to co-design and facilitate creative literature projects such as digital storytelling, poetry anthologies, or theatrical adaptations of local folklore. However, the accompanying processes, peer interactions, and problem-solving abilities are crucial components influencing the success of creative projects (Andrade, 2020; Bransen et al., 2022; Hanley, Symonds, & Horan, 2022; Huang, 2018), providing personal and group experiences, novel knowledge, and innovative problem-solving methods (Le & Wubbels, 2017; Poort, 2022). Previous research highlights the significant impact of creative project-based learning on students' problem-solving and solution-finding skills (Darling et al., 2019; Fuente et al., 2022; Voice et al., 2020).

However, to fully realize these problem-solving benefits within collaborative learning environments, a strong psychological driver is essential. Consequently, Motivation is identified as a foundational element for effective teamwork, necessitating mutual motivation among mentors, teachers, and students in both classroom and extracurricular interactions (Maehr & McInerney, 2004; Thoonen et al., 2010; Song, 2018). This emphasis on motivation's role extends to previous research, which underscores its importance in the creation of creative projects and its influence on students' problem-solving abilities, both individually and collaboratively (Fuente et al., 2022; Thoonen et al., 2010; Voice et al., 2020).

Despite the documented relationship between motivation and problem-solving abilities, empirical studies examining the interplay between independent motivations of teachers and students, mentoring processes in creative project creation over a semester, and positive peer interactions during creative product creation are limited (Broman, Bernholt & Parchmann, 2018; Khoboli & O'Toole, 2013; McLachlan & Tippett, 2024). This research aims to fill these gaps by broadening the understanding of motivation across various dimensions, including teacher and student motivation in implementing creative projects, mentoring processes, peer relationships, problem-solving abilities, and outcomes.

The study's objective is to assist students in identifying and understanding their problems, encouraging them to devise solutions through creative project challenges. A collaborative digital learning mentorship program that combines offline and online mentorship focuses on the Indonesian language as a medium for creative projects. In this context, Indonesian literature serves as the primary thematic source and inspiration; specifically, students analyze literary works, such as local folklore and short stories, using them as foundational narratives to develop creative problem-solving outputs, such as digital storytelling. The program extends to secondary school students, emphasizing mentorship in Indonesian language and literature learning. To clarify the roles within this collaborative

ecosystem, the program focuses on primary and secondary students as the core learners, with university students and local teachers serving as their mentors.

Additionally, the initiative provides these mentors access to diverse subjects beyond the school curriculum, enhancing learning motivation, broadening perspectives, and encouraging student development. The program also promotes universities as partners, offering core learning and one-to-several courses (Ansó et al., 2024; Erling et al., 2023). The creative program further aims to train primary school teachers and university mentors to gain diverse learning experiences (such as hands-on digital literacy training), expand their pedagogical knowledge in project-based learning, and develop their interests in modernizing traditional literature instruction (Darling-Hammond et al., 2019; Lancu-Haddad & Oplatka, 2009; Suti & Sari, 2023).

Building on previous research discussing various motivations in learning and problem-solving abilities, this study aims to answer the following research questions:

1. What factors contribute to influencing motivation (teacher and student) in creative project learning, specifically Indonesian literature?
2. Do motivation, mentorship, and peer roles have a positive effect on problem-solving abilities in creative project learning, Indonesian literature?
3. Does problem-solving ability positively impact problem-solving outcomes in creative project literature in Indonesia?

## 2. LITERATURE REVIEW

### 2.1 Motivation

Motivation is the impetus that drives individuals toward learning, effective work, and the realization of their full potential. It encompasses factors influencing activity choices, attraction, retention, and concentration (Dowson & McInerney, 2003; Maehr & McInerney, 2004; Thoonen et al., 2010). Teachers' role in providing motivation significantly impacts students' interest in expressing and addressing problems, showcasing resilience (Sinclair, 2008). The dimensions of motivation offered by teachers contribute to students' ability to learn, solve problems, and achieve positive problem-solving outcomes (Shamad et al., 2023; Song, 2018; Voice et al., 2020).

Teachers instil motivation through three components: the affective component involves students' emotional reactions in problem-solving, including completing tasks and managing anxiety (Peetsma et al., 2005; Pintrich & De Groot, 1990); the expectancy component focuses on students' motivation regarding their task performance, encompassing effort, endurance, and cognitive strategies (Zimmerman, 2000); the value component pertains to students' belief in the importance of problem-solving and their interest in addressing encountered challenges. These components are vital for effective problem-solving (Fuente et al., 2022; Thoonen et al., 2010; Voice et al., 2020). Understanding how student motivation influences problem-solving abilities and outcomes is crucial for designing effective educational strategies.

### 2.2 Mentoring

Mentoring students in the creative process within the classroom emerges as a critical factor influencing problem-solving abilities. This mentoring dynamic not only shapes students' creative development but also enhances the closeness between educators and

learners throughout the creative journey (Darling-Hammond et al., 2019; Khoboli & O'Toole, 2013; McCarthy & de Almeida, 2002). The quality of the student-teacher relationship hinges on their mutual willingness to collaborate in problem-solving during the creation of creative products.

Teachers engage in mentoring through two essential avenues: knowledge provision and operational guidance (Andrade, 2020; Sawyer, 2017; Weimer, 2012). Knowledge provision involves clear explanations and demonstrations related to creative product creation, such as writing poetry and short stories based on personal experiences. Operational guidance, on the other hand, entails practical directions and hands-on assistance. This multifaceted mentoring process is continuous, fostering the acquisition of technical skills, conceptual understanding, and self-confidence, thereby developing students' creative potential and contributing to their success in problem-solving (Blair, 2007; De Bruin, 2017; McLachlan & Tippett, 2023). Consequently, mentoring within the learning environment significantly influences students' problem-solving abilities and outcomes, as observed in the works of Andrade (2020), Broman, Bernholt, and Parchmann (2018), and Darling et al. (2019).

### 2.3 Peer Roles

Classmates, as companions in the educational journey, embody friends and partners in the collective experience of learning. Forming relationships within the same class or study group, these peers play a pivotal role in resolving learning challenges, fostering idea exchange during group tasks or assignments (Korobova & Starobin, 2015; Poort, 2020). The cooperative and positive interactions among classmates yield various benefits, including shared problem-solving during creative projects, mutual assistance in overcoming difficulties, and the ability to navigate the dynamics of creative group work (Le & Wubbels, 2017; Zhoc et al., 2019).

Engaged in discussions and collaborative problem-solving endeavors, classmates deepen their understanding of the ongoing creative project. The significance of having supportive classmates extends to social support, collaboration, and information exchange, creating a rich environment for shared learning experiences (Hanley, Symonds, & Horan, 2022; Pepler & Bierman, 2018; Suneeta, 2014; Wentzel & Watkins, 2002). Previous research highlights the intimate connection between classmates and problem-solving, underscoring the potential of collaborative learning environments. For instance, classmates contribute to each other's comprehension of material, elucidate concepts related to creative projects like poetry and short story writing, and offer motivation and emotional support amid the challenges encountered in the learning process (Reitz et al., 2014; Zhoc et al., 2019). However, there is a need for expanded research on classmates, motivation, and mentoring to comprehensively understand students' problem-solving abilities and outcomes across diverse contexts.

### 2.4 Problem-Solving Abilities

Acquiring effective problem-solving abilities is indispensable for students, as it involves identifying, analyzing, and resolving challenges proficiently. Cognitive skills and critical thinking form the foundation for students engaged in creative projects, necessitating an amalgamation of problem analysis, creativity, cooperation, and communication (Patterson et al., 2017; Le & Wubbels, 2017; Choi et al., 2017; Chowdhry, 2013; Saritepeci,

2019). Mastery of these skills empowers students to elucidate and comprehend the roots of problems, facilitating navigation and overcoming encountered challenges (Janssen et al., 2007; Le & Wubbels, 2017).

The cultivation of problem-solving skills is a holistic process that entails motivation, mentoring, peer interactions, and exposure to real-world experiences (Darling et al., 2019). In the classroom, creative project-based learning serves as a conduit for students to practice discerning and comprehending the underlying causes of problems. This experiential learning approach extends to various academic and everyday life contexts, contributing to the comprehensive development of students' problem-solving prowess.

Classroom interactions, encompassing mentoring, peer collaboration, and teacher motivation, serve as instrumental mechanisms that enhance students' problem-solving abilities, particularly in group work and individual tasks. Students endowed with robust problem-solving skills manifest enhanced adaptive abilities, effective collaboration, heightened independence and self-confidence, elevated academic performance, and heightened creativity (Bransen et al., 2022; Huang, 2018; Panadero & Järvelä, 2015).

### 2.5 Creative Project Problem-Solving Outcomes in Indonesian Literature

The collaborative creation of creative projects in Indonesian literature emerges as a potent strategy to foster problem-solving outcomes among students. This process, involving active teacher engagement, mentoring students, and peer interactions, serves as a crucible for addressing the challenges inherent in creative endeavors, such as crafting poetry and short stories inspired by personal experiences and societal contexts. Problem-solving outcomes, as exhibited by students, encompass the generation of inventive ideas, creative approaches, and practical strategies, demonstrating utility in resolving encountered issues (Firmansyah, 2018; Yu & Lin, 2014; Sari et al., 2023). The outcomes extend beyond singular solutions, with students adeptly producing multiple alternatives to the problems at hand (Chase & Klahr, 2017; Sari et al., 2023; Suti & Sari, 2021; Weaver et al., 2018).

Student ingenuity and innovation manifest in these diverse solutions, showcasing depth in their problem-solving approaches (Häkkinen et al., 2017; Zhang, 2017). Such problem-solving outcomes derive from students' cultivated abilities, characterized by a critical mindset and logical thinking, especially evident in literary composition, such as successfully crafting poetry rooted in personal experiences and societal contexts (Murniviyanti et al., 2022; Wahyuti et al., 2023). Feedback from teacher assessments significantly influences the attainment of desired problem-solving outcomes, reinforcing the positive impact of collaborative processes between teachers and students, including mentoring and motivational initiatives throughout the poetry and short story creation phases (Cáceres et al., 2019). This collaborative approach serves as a dynamic catalyst for nurturing students' problem-solving acumen within the realm of Indonesian literature.

### 2.6 Research Framework and Hypotheses

Figure 1 illustrates the conceptual framework and structural model of this study. It outlines the hypothesized pathways linking psychosocial inputs to the final educational outcomes in creative literature projects. Specifically, the model presents Motivation, Mentorship, and Peer Relationships as the independent variables. These factors are hypothesized to influence Problem-Solving Outcomes (the dependent variable) both directly and indirectly through Problem-Solving Abilities, which serves as the central mediating variable.

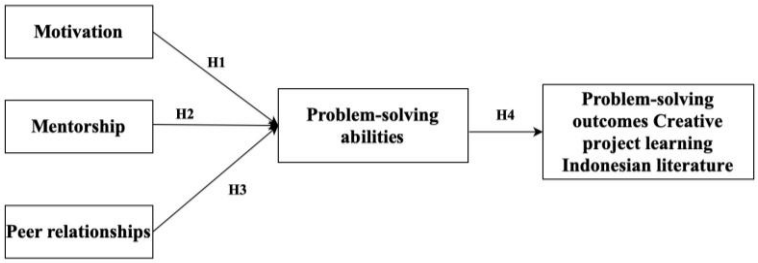


**Figure 1.** Research framework

### 2.6.1 Correlation between Motivation and Problem-Solving Skills

Motivation drives frequent social interactions and persistence in educational settings, playing a crucial role in decision-making and overcoming challenges (Peetsma et al., 2005; Song, 2018). In Indonesian creative literature projects, a highly motivated environment encourages students to actively exchange knowledge and skills with peers and teachers, which directly refines their problem-solving acumen (Sinclair, 2008; Thoonen et al., 2010). Strong relational bonds and collective motivation enable students to tackle challenges collaboratively (Bransen et al., 2022; Huang, 2018; Le & Wubbels, 2017; Mehrak & Samaneh, 2017). Therefore, this study posits: H1. Motivation has a positive and significant effect on students' problem-solving skills.

### 2.6.2 Correlation between Mentoring and Problem-Solving Skills

Mentoring processes establish shared goals and visions, fostering robust connections that contribute directly to students' collaborative and individual problem-solving capabilities (Andrade, 2020; Putri et al., 2023; Sawyer, 2017). Through meaningful guidance and reciprocal knowledge exchange, mentors help students navigate the various stages of creative literary projects, such as poetry and short story writing (Hasan, 2022; Pratiwi et al., 2016). This guided support equips students with practical pathways and solutions to complex tasks (Broman, Bernholt & Parchmann, 2018). Consequently, this study advances the hypothesis: H2. Mentoring has a positive and significant effect on students' problem-solving skills.

### 2.6.3 Correlation between Peer Relationships and Problem-Solving Skills

Peer relationships are pivotal for seamless communication and fundamental problem-solving during creative projects (Khoboli & O'Toole, 2013; Sari, 2020). Positive peer interactions elevate students' confidence, stimulating proactive collaboration. By relying on peer reviews and recommendations, students collectively identify and understand the causes of problems, building a supportive environment that enhances their analytical capabilities. This correlation is encapsulated in the hypothesis: H3. Peer relationships have a positive and significant effect on students' problem-solving skills.

### 2.6.4 Correlation between Problem-Solving Skills and Creative Literary Project Outcomes in Indonesian Literature

In creative literary projects, effective problem-solving skills are essential for generating ideas and applying methodologies to address project challenges. A collaborative synergy among mentors, teachers, and students enables continuous knowledge sharing,

which is critical for practical activities such as writing poetry and short stories (Cáceres et al., 2019; Salam et al., 2025; Patterson et al., 2017). The application of students' problem-solving capacities supported by collaborative endeavors and mutual assistance directly yields diverse and innovative literary outcomes (Bali et al., 2024; Chase & Klahr, 2017; Häkkinen et al., 2017; Lavy & Nixon, 2017; Le & Wubbels, 2017; Weaver et al., 2018). Hence, the posited hypothesis is: H4. Problem-solving skills have a positive and significant effect on students' problem-solving outcomes in creative literary projects in Indonesian literature.

## 3. METHOD

### 3.1 Questionnaire Design, Pilot Testing, and Pre-test

To ensure methodological rigor, the measurement instruments in this study were adapted from established and previously validated multi-item scales. Specifically, questionnaire items were drawn from Fuente et al. (2022), Thoonen et al. (2010), and Voice et al. (2020) for motivation; Andrade (2020) and Darling et al. (2019) for mentoring; Reitz et al. (2014), Song (2018), and Zhoc et al. (2019) for peer relationships; and Bransen et al. (2022) and Huang (2018) for problem-solving skills. While these antecedent studies confirmed the initial validity of the constructs, rigorous testing was also conducted within the current Indonesian context. A pretest with anonymous respondents and randomized item presentation preceded pilot testing to refine wording and avert common-method bias (Podsakoff et al., 2003). Subsequent Confirmatory Factor Analysis (CFA) demonstrated robust convergent validity, with Average Variance Extracted (AVE) values ranging from 0.544 to 0.826. Furthermore, internal consistency and reliability were explicitly confirmed within the sample, yielding Composite Reliability (CR) scores between 0.803 and 0.935, and Cronbach's alpha values ranging from 0.731 to 0.895 across all variables.

These adapted questionnaire items were carefully tailored to the research context and scrutinized by a panel of two independent experts to ensure cultural, linguistic, and pedagogical appropriateness. The selection of these experts was purposive, requiring at least 10 years of academic experience and doctoral-level expertise in either Indonesian literature or educational psychology. While expert panels can sometimes be larger, utilizing two highly specialized experts was deemed sufficient for the qualitative face and content validity stage of this study. This is because they addressed the instrument's specific dual-domain needs: one expert focused on linguistic accuracy and cultural nuance in translation. At the same time, the second evaluated the cognitive appropriateness of the phrasing for primary and secondary school students. The detailed demographic profiles and qualifications of the expert panel are presented in Table 1.

**Table 1**
Demographic Profile of the Expert Panel

| Expert | Age | Academic Affiliation | Field of Expertise | Years of Experience | Role in Instrument Validation |
|---|---|---|---|---|---|
| ***Expert 1*** | [45] | [State University of Makassar] | Indonesian Language and Literature | [15 Years] | Linguistic translation and cultural appropriateness |
| ***Expert 2*** | [52] | [National Dong Hwa University] | Educational Psychology and Pedagogy | [20 Years] | Cognitive suitability for primary/secondary students |

### 3.2 Sample and Data Collection

Offline surveys were administered to 109 randomly sampled students in Indonesia who had actively participated in the university-collaborated creative literature projects. This targeted sampling ensured that all respondents possessed direct, hands-on experience and familiarity with the program. Of these, 100 yielded valid responses, yielding a completion rate of 98.25%. Data collection transpired from February 20 to March 28, 2023, with Indonesia chosen as the research site. The study explored the structural nexus between five distinct variables. Specifically, the model tests motivation, mentoring, and peer relationships as independent (exogenous) variables; problem-solving skills as a mediating variable; and problem-solving outcomes in creative literary projects as the dependent (endogenous) variable. The participants were elementary and junior high school students to capture early-stage developmental dynamics in creative, project-based learning.

### 3.3 Procedures

A seven-point Likert scale gauging agreement levels (1, “strongly disagree," to 7, "strongly agree”) informed the measurement items used in the confirmatory factor analysis (CFA). These items were rooted in prior literature, encompassing motivation (Fuente et al., 2022; Thoonen et al., 2010; Voice et al., 2020), mentoring (Andrade, 2020; Darling et al., 2019), peer relationships (Reitz et al., 2014; Song, 2018; Zhoc et al., 2019), problem-solving skills (Bransen et al., 2022; Huang, 2018), and outcomes of problem-solving in creative literary projects in Indonesian literature (Azis, 2012; Balfas, 2008; Chase & Klahr, 2017; Hadiansah et al., 2021; Weaver et al., 2018; Yu & Lin, 2014).

### 3.4 Data Analysis

Data underwent scrutiny using SPSS 22 and AMOS 22 software, employing structural equation modeling (SEM) for hypothesis testing. SEM, bifurcated into the measurement model and structural model, facilitated an in-depth understanding of problem-solving outcomes. The analysis included Cronbach's coefficient, exploratory factor analysis, and confirmatory factor analysis for each research aspect, evaluating reliability and convergent effects. Discriminant validity was gauged to ensure a robust measurement model. In assessing the Structural Model, the reduction of measurement indicators was used to test path coefficient significance, aided by various fit indicators, thereby validating the proposed hypotheses in the study. The questionnaire’s reliability was assessed using the Cronbach coefficient and multivariate correlation squared, with validity analyzed through exploratory and confirmatory factor analysis (Anderson & Gerbing, 1988).

## 4. RESULTS

### 4.1 Validity Analysis

#### 4.1.1 Convergent Validity Analysis

Convergent validity was assessed using confirmatory factor analysis. In line with the recommendations of Hair Jr., Black, Babin, and Anderson (2010), this study utilized the individual item reliability, the composite reliability (CR), and the average variance extracted (AVE) from latent variables to measure convergent validity between observed and latent variables. Composite reliability (CR) is the reliability of observed variables with respect to

their latent variables, indicating the internal consistency of the measurement variables within the latent variables. The average variance extracted (AVE) measures the average strength of the explanation of variation from each measurement variable to its latent variable. The Composite Reliability (CR) for all aspects in the study exceeds 0.7 (as shown in Table 2), indicating that Confirmatory Factor Analysis (CFA) for each facet, suggesting that the measurement variables within the latent variables exhibit internal consistency (Hulland, 1999). Additionally, all Average Variance Extracted (AVE) values in this study are above 0.5 (as shown in Table 2), indicating good convergent validity for each facet.

**Table 2**
Confirmatory factor analysis (CFA) for each facet

| Variable | MLE Estimated parameters | | SMC | Balanced Extraction Varian (AVE) | Combined Reliability (CR) |
|---|---|---|---|---|---|
| | Factor Loadings (λx/λy) | Measure Error ()δ / ε | | | |
| **Motivation** | | | | 0.746 | 0.898 |
| After this class, I learned new skills or techniques in writing poetry and short stories. | 0.801 | 0.358 | 0.641 | | |
| After this class, I can learn new values or ideas. | 0.878 | 0.229 | 0.770 | | |
| After this class, you can use today's class content in your daily life. | 0.909 | 0.173 | 0.826 | | |
| **Peer Relationships** | | | | 0.544 | 0.836 |
| I can tell my classmates what I'm thinking and recount experiences that I put into poems or short stories. | 0.793 | 0.371 | 0.628 | | |
| When my classmates need help, I will help my classmates. | 0.623 | 0.611 | 0.388 | | |
| I can tell my classmates not to fight. | 0.740 | 0.452 | 0.547 | | |
| When my classmates were sad, I would find a way to make them happy. | 0.781 | 0.390 | 0.609 | | |
| **Problem-solving capability abilities** | | | | 0.826 | 0.935 |
| I was able to find my problem. | 0.909 | 0.173 | 0.826 | | |
| I can explain my problem to others. | 0.906 | 0.179 | 0.820 | | |
| I was able to find out the cause of my problem. | 0.912 | 0.168 | 0.831 | | |
| **Problem-solving outcomes creative project learning Indonesian literature** | | | | 0.723 | 0.885 |
| I can think of ways to solve problems, especially in poetry and short story writing. | 0.890 | 0.207 | 0.792 | | |
| I think the approach I made was very creative. | 0.716 | 0.487 | 0.512 | | |
| I think the method I created is useful. | 0.929 | 0.136 | 0.863 | | |

(*Continue on the next page*)

**Table 2** (*Continue*)

| | | | | | |
|---|---|---|---|---|---|
| **Mentorship** | | | | 0.587 | 0.803 |
| During the creative process of Indonesian literature, my university partners gave me a lot of guidance. | 0.952 | 0.334 | 0.665 | | |
| In my creation process, the university assisted me a lot in operational guidance. | 0.733 | 0.186 | 0.813 | | |
| In the process of creative projects, the university accompanies me a lot. | 0.564 | 0.382 | 0.617 | | |

Table 2 presents the assessment of discriminant validity using the Fornell-Larcker criterion. To establish discriminant validity, the square root of the Average Variance Extracted (AVE) for each construct represented by the bolded values on the diagonal must be strictly greater than its highest correlation with any other construct in the model (the off-diagonal values). As observed in the table, all diagonal values (e.g., 0.811 for Mentoring, 0.825 for Motivation) exceed the inter-construct correlations in their respective rows and columns. This confirms that each latent variable is statistically distinct from the others, establishing strong discriminant validity for the structural model.

### 4.1.2 Discriminant Validity Analysis

Following the recommendations of Fornell & Larcker (1981) and Gaski & Nevin (1985), this study encompasses three criteria for discriminant validity assessment: (1) The correlation coefficient between two facets should be less than 1, (2) The correlation coefficient between facets should be smaller than the Cronbach's α reliability coefficient of each facet. (3) Utilize the Average Variance Extracted (AVE) values for each measurement. If the square root of the AVE for any potential variable is greater than the correlation coefficient between any potential facets, it indicates good discriminant validity for the constructs. In this study, the correlation coefficients for each measurement variable were calculated using SPSS and SmartPLS software. The analysis and presentation of the data are illustrated in Table 3.

**Table 3**
Discriminant validity analysis and variable correlation coefficient table

| Facet | Accompany | Capability | Gain | Motivation | Peer | CR | AVE |
|---|---|---|---|---|---|---|---|
| Mentorship | **0.766** | | | | | 0.803 | 0.587 |
| Capability | 0.276** | **0.909** | | | | 0.935 | 0.826 |
| Gain | 0.464** | 0.677** | **0.850** | | | 0.885 | 0.723 |
| Motivation | 0.264** | 0.535** | 0.441** | **0.864** | | 0.898 | 0.746 |
| Peer | 0.242** | 0.461** | 0.521** | 0.411** | **0.738** | 0.826 | 0.544 |
| Cronbach's Alpha | 0.744 | 0.895 | 0.825 | 0.806 | 0.731 | NA | NA |

Note: (1) Accompany is companionship; Capability is problem-solving ability; Gain is the result of solving problems; Motivation is motivation; Peer is companionship. (2) The diagonal value is the square root of AVE; CR is the combination reliability; AVE is the average extraction variation. (3) The upper triangle is the relationship between the facets, and the lower triangle is the Pearson product-moment correlation. (4) *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$. (5) NA = Not Available.

Table 3 presents the reliability, convergent validity, and discriminant validity of the measurement model. Internal consistency is demonstrated, as all Cronbach's Alpha and Composite Reliability (CR) values exceed the recommended threshold of 0.7. Convergent validity is also established, with all Average Variance Extracted (AVE) values surpassing 0.5. Finally, discriminant validity is confirmed using the Fornell-Larcker criterion; the square root of the AVE for each construct (the bolded values on the diagonal) is greater than its highest correlation with any other construct. Additionally, the lower triangle shows that all variables are positively and significantly correlated ($p < 0.01$).

### 4.1.3 Confidence Level Analysis

The reliability analysis section of this study employs item reliability and facet reliability as measurement criteria. Item reliability is assessed through item factor loadings and Squared Multiple Correlation (SMC) as measurement indicators, while facet reliability is measured using α Cronbach. The analysis results demonstrate that the factor loadings of each item in this study range from 0.564 to 0.952, meeting the standard recommended by Hair Jr., Black, Babin, and Anderson (2010) that item factor loadings should exceed 0.5. The SMC values for each measurement variable range from 0.388 to 0.863, aligning with the recommendations of scholars such as Jöreskog & Sörbom (1993), who suggest that SMC values should exceed 0.2. These findings indicate that the items in this study exhibit sound reliability and a high level of internal consistency, as illustrated in Table 4 in the facet reliability analysis segment. The results reveal that the α Cronbach coefficient values for each facet range from 0.805 to 0.927, exceeding the 0.7 standard recommended by Nunnally (1978). This suggests that each facet within this study demonstrates commendable reliability, as presented in Table 4.

**Table 4**
Reliability analysis table for each facet

| Item | Item-Total Correlation | Alpha If Item Deleted | Cronbach's alpha |
|---|---|---|---|
| **Motivation (3 items)** | | | **0.806** |
| 1. After this class, I learned new skills or techniques in writing poetry and short stories. | 0.641 | 0.769 | |
| 2. After this class, I can learn new values or ideas. | 0.745 | 0.672 | |
| 3. After this class, you can use today's class content in your daily life. | 0.693 | 0.773 | |
| **Peer relationships (4 items)** | | | 0.731 |
| 4. I can tell my classmates what I'm thinking and recount experience that I put into poems or short stories. | 0.522 | 0.672 | |
| 5. When my classmates need help, I will help my classmates. | 0.509 | 0.681 | |
| 6. I can tell my classmates not to fight. | 0.469 | 0.701 | |
| 7. When my classmates were sad, I would find a way to make them happy. | 0.600 | 0.622 | |
| **Problem-solving abilities (3 items)** | | | 0.895 |
| 8. I can find my problem. | 0.784 | 0.837 | |
| 9. I can explain my problems to others. | 0.802 | 0.843 | |
| 10. I can understand the causes of my problems. | 0.769 | 0.849 | |

(*Continue on the next page*)

**Table 3** (*Continue*)

| | | | |
|---|---|---|---|
| **Problem-solving outcomes (Gain) (3 items)** | | | 0.825 |
| 11. I can think of ways to solve problems, especially in poetry and short story writing. | 0.675 | 0.767 | |
| 12. I think the approach I made was very creative. | 0.576 | 0.856 | |
| 13. I think the method I created is useful. | 0.817 | 0.610 | |
| **Mentorship (3 items)** | | | 0.744 |
| 14. During the creative process of Indonesian literature, my university partners gave me a lot of guidance. | 0.497 | 0.765 | |
| 15. In my creation process, the university assisted me a lot in operational guidance. | 0.650 | 0.568 | |
| 16. In the process of creative projects, the university accompanies me a lot. | 0.587 | 0.649 | |

Table 4 presents the reliability analysis for each facet of the measurement instrument. The internal consistency of all constructs is established, with overall Cronbach's alpha values ranging from 0.731 to 0.895, all of which comfortably exceed the standard acceptable threshold of 0.70. Furthermore, the item-total correlations for all individual items indicate strong alignment with their respective constructs (ranging from 0.469 to 0.817). A review of the 'Alpha if Item Deleted' column confirms that the current construct structures are reliable and no items need to be removed to achieve acceptable reliability thresholds

### 4.1.4 Structural Pattern Analysis

The theoretical model of this study is depicted in Figure 1, where each aspect is directly measured by items. Observable variables in the figures are represented by rectangles, latent variables are represented by ovals; exogenous variables are denoted by the symbol X, while potential exogenous variables are represented by the symbol; endogenous variables are indicated by the symbol Y, and potential endogenous variables are represented by the symbol; regression coefficients between potential exogenous and endogenous variables are symbolized by the symbol; regression coefficients between potential endogenous variables are represented by Measurement errors for observed variables Xi are denoted by the symbol i; measurement errors for observed variables Yi are symbolized by the symbol i; factor loadings from observed variable Xi to potential exogenous variable j are represented by the symbol Xij; Factor loadings for observed variable Yi on latent endogenous variable j are denoted by the symbol Yij.

Before analyzing the structural model, it is essential to assess whether there is multicollinearity among potential variables. If the correlation coefficient between potential variables is higher than the standard value of 0.8, there may be a multicollinearity issue (Hair Jr., Black, Babin & Anderson, 2010). From the correlation coefficient table in Table 3, discriminant validity analysis, and variable correlation coefficient, it can be observed that there are no correlation coefficients between potential variables exceeding the standard value of 0.8 in this study. Therefore, the study can conclude that there is no evident multicollinearity in the sample. The data exhibit no clear multicollinearity among various facets of the questionnaire.

Having established that the data meet the necessary assumptions, the complete theoretical model and its underlying parameter structure are illustrated in Figure 2.

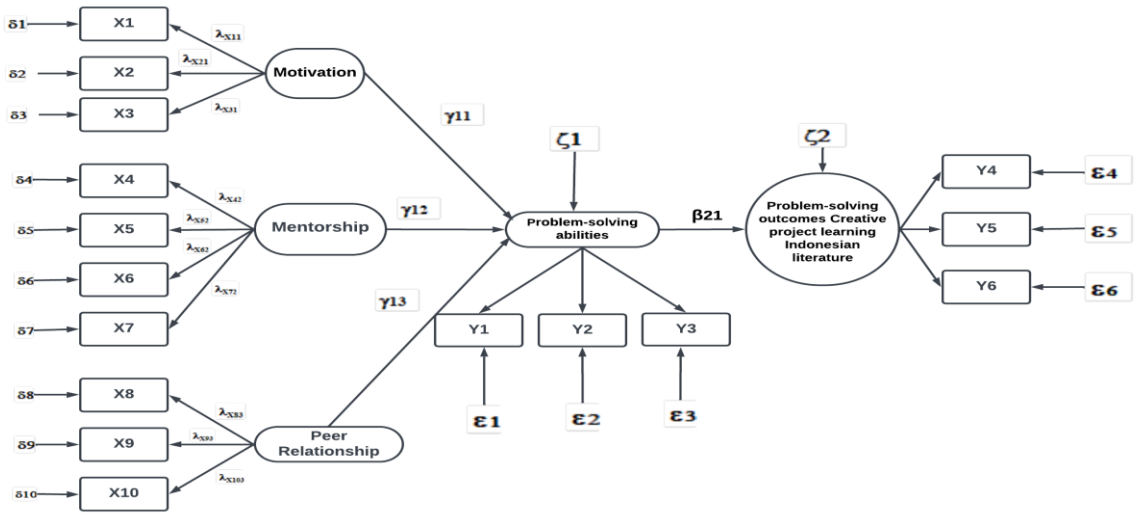


**Figure 2**. Theoretical model and parameter structure diagram
Source: Compiled by the researchers themselves

Figure 2 illustrates the complete structural equation model evaluated in this study, displaying both the measurement and structural components. On the left, the independent (exogenous) latent variables—Motivation, Mentorship, and Peer Relationships—are mapped to their respective observable survey indicators (X1 through X10). The directional arrows (labeled with γ) represent the hypothesized direct effects of these variables on 'Problem-solving abilities' (measured by indicators Y1-Y3). In turn, the model illustrates 'Problem-solving abilities' predicting the final dependent variable, 'Problem-solving outcomes' (measured by Y4-Y6), via the path labeled β. Additionally, the diagram accounts for all measurement loadings (λ) and residual error terms (δ, ε, ζ) incorporated into the analysis.

## 4.2 Research Model Path Analysis

To evaluate the proposed research hypotheses, an empirical test of the structural mode was conducted, the results of which are summarized in Figure 3.

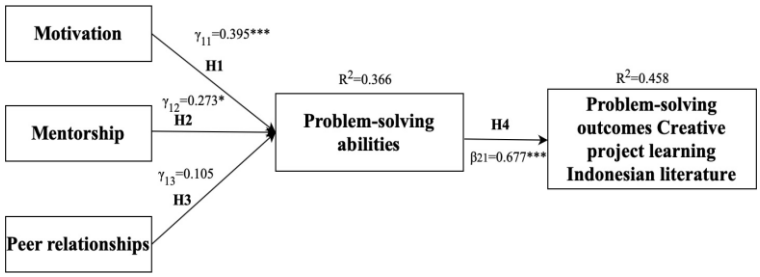


**Figure 3.** Overall model
Note: *: p < 0,05, **: p < 0,01, ***: p < 0,001
Source: Compiled by the researchers themselves

From Table 5, it can be observed that the research hypothesis H1: “Motivation” has a significantly positive effect on “Problem-solving Ability” (the path coefficient impact value is

0.359). Hypothesis H2: “Guidance” has a significantly negative effect on “Problem-solving Ability” (the path coefficient impact value is 0.273). Hypothesis H3: “Peer role” has a significantly negative effect on “Problem-solving Ability” (the path coefficient impact value is 0.105). Hypothesis H4: “Problem-solving Ability” has a significantly positive effect on “Problem-solving Achievement in Indonesian creative literary projects” (the path coefficient impact value is 0.677).

**Table 5**
Summary table of research model path coefficients and hypothesis verification

| Hypothesis | Parameters | Path | | | Path Coefficient | Test Results |
|---|---|---|---|---|---|---|
| H1 | $\gamma_{11}$ | Motivation | → | Problem-solving skills | 0.359*** | support |
| H2 | $\gamma_{12}$ | Mentorship | → | Problem-solving skills | 0.273* | support |
| H3 | $\gamma_{13}$ | Peer | → | Problem-solving skills | 0.105 | not support |
| H4 | $\beta_{21}$ | Problem-solving skills | → | Problem-solving results | 0.677*** | support |

Source: Compiled by the researchers themselves
Note: *: p < 0.05, **: p < 0.01, ***: p < 0.001

Table 5 presents the results of the path analysis used to verify the study's hypotheses. The findings demonstrate that Motivation (Path Coefficient = 0.359, p < 0.001) and Mentorship (Path Coefficient = 0.273, p < 0.05) have significant positive effects on Problem-solving skills, supporting H1 and H2. Furthermore, Problem-solving skills significantly and positively influence Problem-solving results (Path Coefficient = 0.677, p < 0.001), providing strong support for H4. In contrast, the relationship between Peer influence and Problem-solving skills was not statistically significant (Path Coefficient = 0.105), indicating that H3 is not supported by the data.

To assess the predictive power of the structural model, the proportion of variance explained for each endogenous variable was examined. The resulting Square Multiple Correlation (SMC) values are presented in Table 6.

**Table 6**
Test results of the variance explained by endogenous variables in the research model

| Endogenous Variable | Multivariate Correlation Squares (Square Multiple Correlation; SMC) |
|---|---|
| Problem-solving skills | 0.366 |
| Problem-solving results | 0.458 |

Source: Compiled by the researchers themselves
Note: *: p < 0.05, **: p < 0.01, ***: p < 0.001

Table 6 details the Squared Multiple Correlation (SMC) for the endogenous variables, indicating the predictive power of the research model. The results show an SMC of 0.366 for Problem-solving skills, meaning that the model's preceding variables (Motivation, Mentorship, and Peer relationships) collectively explain 36.6% of the variance in students' problem-solving skills. Additionally, the SMC for Problem-solving results is 0.458, demonstrating that problem-solving skills account for 45.8% of the variance in the final learning outcomes. These values indicate that the structural model has a moderate, acceptable level of explanatory power.

## 5. DISCUSSION

### 5.1 Key Findings

The study corroborates the hypotheses that motivation, guidance, and peer influence are precursors to problem-solving skills, which subsequently affect outcomes in Indonesian creative literary projects. Engaging projects, such as crafting poetry and short stories, foster teacher and student motivation, positive interaction, and problem-solving abilities. The significant positive effects of motivation, guidance, and peer roles on problem-solving skills align with previous studies (Fuente et al., 2022; Thoonen et al., 2010; Voice et al., 2020). The research underscores the importance of students diversifying their creative project-based learning to support comprehensive skill and knowledge assessments and foster positive interactions. Awareness among teachers and students about relevant skills and knowledge strengthens intra- and inter-classroom relationships. Active communication enhances problem-solving skills, which are crucial for devising appropriate writing approaches based on personal and social experiences. These implications advocate active collaboration between teachers and students in implementing diverse, creative, project-based learning, thereby transforming perspectives on community, interaction, and knowledge in Indonesian literature.

Having confirmed the robustness of the measurement model in terms of both reliability and discriminant validity, the subsequent step was to test the hypothesized relationships within the proposed structural model. An empirical path analysis was conducted to evaluate the proposed research framework. The standardized path coefficients, hypothesis test outcomes, and explained variance ($R^2$) for each endogenous construct are summarized graphically in the overall model depicted in Figure 4.

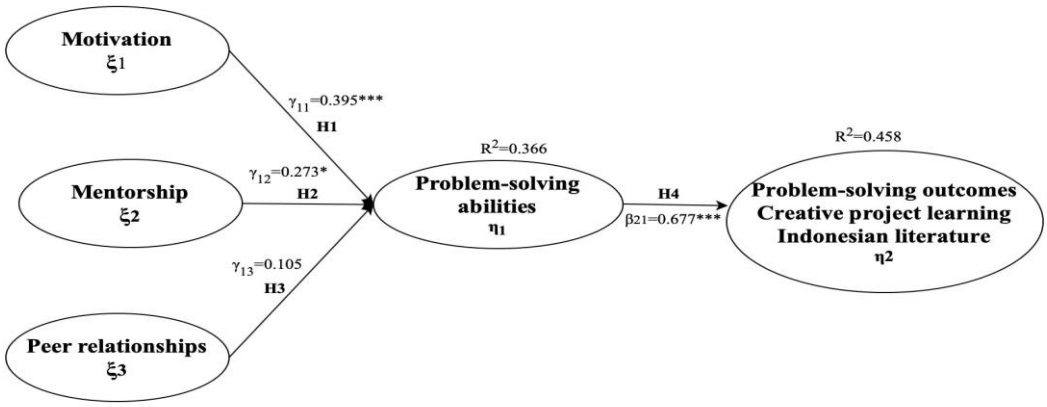


**Figure 4.** Overall Model
Note: *: p < 0.05, **: p < 0.01, ***: p < 0.001
Source: Compiled by the researchers

Figure 4 illustrates the empirical results of the structural model analysis, detailing the standardized path coefficients, hypothesis outcomes, and the variance explained for the endogenous variables. The visual data confirm that Motivation (γ11 = 0.395, p < 0.001) and Mentorship (γ12 = 0.273, p < 0.05) exert a significant positive influence on Problem-solving abilities, thereby supporting hypotheses H1 and H2. Conversely, the path from Peer relationships to Problem-solving abilities is not statistically significant (γ13 = 0.105),

indicating a lack of support for H3. Additionally, Problem-solving abilities demonstrate a strong, significant positive effect on final Problem-solving outcomes ($B_{21}$ = 0.677, p < 0.001), supporting H4. Finally, the model successfully explains 36.6% of the variance in Problem-solving abilities ($R^2$ = 0.366) and 45.8% of the variance in Problem-solving outcomes ($R^2$ = 0.458).

Guidance and positive peer interactions, with their substantial impact on problem-solving abilities, substantiate prior research by (Broman, Bernholt & Parchmann, 2018; Khoboli & O'Toole, 2013; Mclachlan & Tippett, 2023). This study underscores the critical role of guidance and positive interactions in augmenting problem-solving abilities, particularly when students encounter challenges in expressing experiences through literary forms. Motivation and guidance significantly influence students' problem-solving capabilities, especially during difficulties in literary expression. Collaboration between teachers and students in creative literary projects is crucial, emphasizing mutual support, peer discussions, and collective problem-solving. Such collaboration fosters a supportive environment, facilitating knowledge exchange and collective success in Indonesian creative literary projects. The findings highlight the significance of strong motivation, guidance, positive peer interaction, and students' problem-solving abilities for successful outcomes. Problem-solving abilities mediate the relationships among motivation, guidance, peer interaction, and outcomes, shaping methods, approaches, and success in writing Indonesian literature based on personal experiences. Students share skills and knowledge, fostering effective relationships and utilizing group work as a valuable tool.

### 5.2 Discussion and Theoretical Implications

The primary novel contribution of this study lies in mapping the precise drivers of problem-solving abilities within a non-STEM, creative literary context (Indonesian poetry and short stories). While existing literature has extensively documented the value of collaborative project-based learning, this study provides a new theoretical boundary condition: the nature of the creative task dictates the efficacy of peer influence. Specifically, our findings that intrinsic motivation and expert mentorship significantly drive problem-solving abilities align with Clark's (2009) argument that directed guidance is essential for novice learners navigating complex tasks. However, our results offer a critical departure from traditional collaborative learning theories (e.g., Hmelo-Silver et al., 2025) by revealing that peer relationships have no significant direct impact on problem-solving skills in this context. This suggests that the internal, highly individualized cognitive process of creative writing relies far more heavily on vertical knowledge transfer (expert university mentorship) than horizontal knowledge sharing (peer interaction). By bridging school literature curricula with university-led creative programs, this research establishes a new theoretical framework proving that early, actively mentored interventions, rather than mere peer grouping, are the true catalysts for student resilience and problem-solving success in the humanities.

### 5.3 Practical Implications

In practice, these findings require a paradigm shift for educators and institutions implementing creative, project-based learning. Because mentorship and motivation carry a substantially heavier impact than peer relationships, educators must pivot away from unstructured peer group work. Simply placing primary or secondary students in groups to write creatively is insufficient and yields negligible improvements in problem-solving skills.

Instead, stakeholders must prioritize establishing formalized university-school partnerships where experienced mentors provide direct, operational guidance. Classroom interventions should focus on cultivating a motivating environment and facilitating one-on-one or mentor-to-student interactions tailored to the students' developmental needs. By aligning these empirical insights with classroom practice, schools can ensure resources are spent on what actually works, expert feedback, and motivational scaffolding, rather than relying on peers who may lack the expertise to guide complex creative problem-solving.

### 5.4 Limitations and Future Research Directions

While this study offers robust insights, several methodological constraints must be critically reflected upon regarding how they may have influenced the results. First, the reliance on self-reported surveys introduces social desirability bias; students may have overestimated their own problem-solving abilities and the utility of their final outcomes, which could have artificially inflated the high explanatory power ($R^2$ = 0.458) observed in the final model.

Second, the cross-sectional nature of the data captures only a snapshot of the creative process. It is highly possible that the non-significant effect of peer relationships is a byproduct of this timeframe; peer trust and collaborative synergy often take longer to develop than mentor-student reliance. A longitudinal approach might reveal that peer influence becomes significant later in the academic year. Finally, this study measured students' *perceptions* of mentorship but did not account for the objective qualifications or varying instructional styles of the mentors themselves. Future research should utilize multilevel modeling to separate student-level variance from mentor-level variance, and incorporate qualitative teacher/mentor interviews to fully contextualize how specific mentoring techniques translate into student problem-solving gains.

## 6. CONCLUSION

This study empirically establishes a framework for optimizing creative project-based learning within Indonesian literature education. The synthesis of our findings reveals that intrinsic motivation and structured expert guidance are the primary drivers of students' problem-solving abilities, which, in turn, determine the success of final problem-solving outcomes (such as the creation of poetry and short stories). Crucially, the data indicate that peer interaction does not significantly influence these abilities in this specific creative context. Therefore, the main contribution of this research is to highlight a paradigm shift in literary education: achieving high-quality creative problem-solving outcomes fundamentally relies on cultivating student motivation and facilitating direct mentor-student feedback, rather than on horizontal peer-to-peer collaboration. While this study provides valuable insights, its reliance on cross-sectional, self-reported survey data limits the ability to establish causal relationships and may introduce response bias. Future research should employ longitudinal designs and incorporate more qualitative mentor perspectives to better understand the long-term development of students' problem-solving abilities. Additionally, expanding this research to diverse educational contexts beyond Indonesia would enhance the generalizability of these findings.

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**Authors' Contributions**
Harmita Sari and Ming Chou Liu formulated the research concept, designed the conceptual and analytical framework, conducted a comprehensive data analysis, and drafted and wrote the main text. Dedi Aco contributed to the data collection process, initial data processing, and participated in the linguistic analysis and interpretation. Anshari supported the data verification and validation process, conducted systematic lexical documentation, and organized and formatted tables and supporting appendices. Halim contributed to the critical review of the manuscript, checked grammar and spelling, and improved the article's overall quality. In addition, all authors were involved in discussing the research results, provided substantive input on the manuscript's content, and have read and approved the final version for publication.

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