

# The Effect of Collaborative Learning Models, Independent Learning, and Self-Confidence on IPAS Problem-Solving Skills

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**Abstract.** This study aims to analyse the effect of collaborative learning models, independent learning, and self-confidence on the problem-solving abilities of IPAS students at Pakel 2 Public Elementary School. Using an ex post facto quantitative approach, the research sample consisted of 52 students. Data analysis was conducted using multiple linear regression. The results showed that simultaneously, the three independent variables had a significant effect on problem-solving skills with a contribution ( $R^2$ ) of 83.4%. Partially, the collaborative learning model was the strongest predictor. These findings indicate the need to integrate collaborative strategies supported by strengthening students' internal character.

**Keywords:** collaborative learning, learning independence, self-confidence, problem solving, IPAS

## 1 Introduction

Problem-solving skills are fundamental competencies in 21st-century learning, especially in Natural and Social Sciences (IPAS) subjects. However, initial observations at SD Negeri 2 Pakel indicate low levels of these skills, which are thought to be due to the dominance of conventional learning methods and a lack of positive affective factors within students. Collaborative learning is considered capable of facilitating knowledge construction through social interaction. In addition, internal factors such as learning independence and self-confidence also play a vital role in the success of students in solving complex problems. This study aims to examine the influence of these three variables on IPAS problem-solving skills.

## 2 Method

This study used an ex post facto quantitative approach. The population and sample consisted of 52 students in grades 3-6 at Pakel 2 Public Elementary School (saturated sample). The instruments consisted of questionnaires (for the variables of collaboration, independence, and self-confidence) and descriptive tests (for problem-solving skills). The data were analysed using multiple linear regression with the help of SPSS after meeting the prerequisite tests (normality, linearity, multicollinearity, heteroscedasticity).

## 3 Results And Discussion

### 3.1 Research Results

Based on data analysis conducted on 52 respondents, comprehensive statistical descriptions and hypothesis testing results were obtained. Data on students' problem-solving abilities (Y) showed quite diverse variations, but tended to increase in line with the high intensity of collaborative learning implementation and internal student factors.

The results of multiple linear regression tests were used to answer the research hypothesis. A summary of the regression analysis results is presented in Table 1 below.

**Table 1.** Summary of Multiple Linear Regression Analysis Results

| Variable                      | Coefficient ( $\beta$ ) | t-count | Sig.  | Contribution Partial |
|-------------------------------|-------------------------|---------|-------|----------------------|
| (Constant)                    | 2,634                   |         |       |                      |
| Model Collaborative ( $X_1$ ) | 0,842                   | 10,613  | 0,000 | Dominant             |
| Independent Learning( $X_2$ ) | 0,577                   | 7,295   | 0,000 | Significant          |

|                           |       |       |       |             |
|---------------------------|-------|-------|-------|-------------|
| Self-Confidence ( $X_3$ ) | 0,619 | 7,482 | 0,000 | Significant |
|---------------------------|-------|-------|-------|-------------|

The regression equation formed is:

$$Y = 2.634 + 0.842X_1 + 0.577X_2 + 0.619X_3.$$

The constant of 2.634 indicates that if there is no influence from collaborative learning, independence, and self-confidence, then the students' problem-solving ability will remain at a fixed value of 2.634 units.

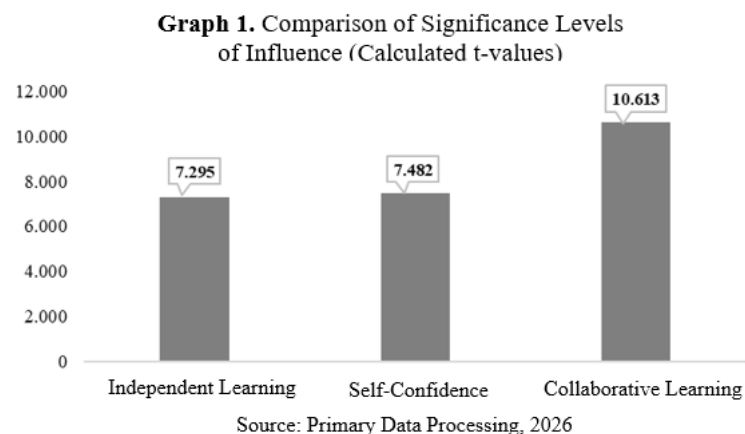
Partially, the effect of the Collaborative Learning Model variable ( $X_1$ ) on Y is very significant with a t-value of 10.613 > t-table (2.01) and a significance value of 0.000. The beta coefficient ( $\beta$ ) of 0.842 indicates that every one-unit increase in the quality of collaborative learning will increase problem-solving ability by 0.842 units. This makes variable  $X_1$  the factor with the greatest influence compared to other variables.

The Learning Independence variable ( $X_2$ ) also shows a significant positive effect with a t-value of 7.295 and a significance level of 0.000. Similarly, the Self-Confidence variable ( $X_3$ ) has a t-value of 7.482 and a significance level of 0.000.

For simultaneous testing (together), the ANOVA test results showed an F-value of 417.543 with a significance of 0.000. Because the significance value was < 0.05, the null hypothesis was rejected, which means that together, the collaborative learning model, independent learning, and self-confidence had a significant effect on IPAS problem-solving abilities. The magnitude of the contribution of the simultaneous effect is shown by the coefficient of determination (R Square) value of 0.834. This figure means that 83.4% of the variability in students' problem-solving abilities can be explained by these three independent variables, while the remaining 16.6% is explained by other factors outside this research model.

### 3.2 Discussion

The findings of this study emphasise the importance of integrating external factors (learning models) and internal factors (student psychology) in IPAS learning. The following is an in-depth discussion of the influence of each variable and its implications, visualised with a graph comparing the contribution of influence (t-count) between variables.



**Figure 1.** Graph Comparing the Significance Level of Influence (Calculated t-value)

Based on Figure 1, it is clear that the collaborative learning model has the strongest impact on problem-solving skills. This is in line with research conducted by Afifah et al. (2020), which states that a creative and innovative problem-solving approach in learning has been proven effective in improving students' understanding. In a collaborative context, interactions between students enable peer scaffolding, where students who understand better help their peers, thereby increasing the group's problem-solving abilities overall. Furthermore, Afifah & Setiani (2024) also found that creative self-efficacy built in the problem-solving process greatly helps students in formulating appropriate solution strategies. This explains why the collaborative model in this study has the highest regression coefficient; because this model not only teaches material, but also builds a social ecosystem that supports problem solving.

The significant effect of learning independence ( $t=7.295$ ) indicates that students who are able to regulate their own learning (self-regulated) tend to be more successful in problem solving. This independence includes the ability to plan, monitor, and evaluate their thinking processes. This is relevant to the findings of Asrori et al. (2023), which emphasise that a positive learning climate and human capital (student character) have a significant effect on learning outcomes, particularly in an independent curriculum that demands student autonomy. Independent students do not depend entirely on teachers but rather view teachers as facilitators, a key aspect of inquiry-based IPAS learning.

The self-confidence variable ( $t=7.482$ ) was also proven to be an important determinant. Self-confidence is not merely a feeling of 'being able to', but rather a belief in one's capacity to face academic challenges. Dirgantoro & Hamidiyah (2024) in their research highlighted that students' achievement motivation and self-confidence can be improved through problem-solving-based learning. When students are confident, their anxiety decreases, so that their working memory can be fully allocated to the problem analysis process, rather than to managing the fear of failure.

Furthermore, a study by Dirgantoro (2025) on the influence of the work environment and teachers' social competence provides the perspective that the successful implementation of the collaborative model also depends heavily on teachers' competence in managing classroom dynamics. Competent teachers are able to create a psychologically safe environment, allowing students' self-confidence to flourish.

From a character education perspective, Asrori (2024) adds that teachers' perceptions in strengthening the Pancasila student profile greatly determine the success of internalising character values, including independence and mutual cooperation (collaboration). Therefore, the synergy between collaborative learning models (cooperation), independent learning, and self-confidence is a tangible manifestation of strengthening the Pancasila student profile in IPAS learning.

Overall, the simultaneous contribution of 83.4% confirms that these three variables are the main pillars. Students' low problem-solving abilities are often caused by imbalances in one of these pillars. For example, the teaching method may be good (collaborative), but students lack confidence or independence. Therefore, educational interventions should not be partial. IPAS teachers at SD Negeri 2 Pakel are advised to: (1) Design worksheets that require positive interdependent teamwork; (2) Provide feedback that builds self-efficacy to increase confidence; and (3) Provide space for students to make their own learning decisions to foster independence.

## 4 Conclusion

This study concludes that collaborative learning models, independent learning, and self-confidence have a positive and significant influence on IPAS problem-solving abilities, both partially and simultaneously. The collaborative learning model has the greatest influence, followed by self-confidence and independent learning. These findings recommend the implementation of learning strategies that are not only cognitive but also affective-social in order to optimise students' potential.

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## References

- [1] Afifah, D. S. N., Putri, I. M., & Listiawan, T. (2020). Pirie-Kieren Theory: Layers of Understanding of Junior High School Students with High Mathematical Ability in Solving Spatial Problems. *Journal of Mathematics Education*.
- [2] Afifah, D. S. N., & Setiani, R. (2024). Creative Self-Efficacy in Solving Mathematical Problems. *Prismatika: Journal of Mathematics Education and Research*, 7(1), 126-140.
- [3] Agus, R. (2025). The Influence of Collaborative Learning Models, Independent Learning, and Self-Confidence on Problem-Solving Skills in IPAS Subjects for Students at SD Negeri 2 Pakel, Trenggalek Regency (Thesis). Bhinneka PGRI University, Tulungagung.
- [4] Asrori, M. A. R., & Sari, E. P. (2024). Teachers' Perceptions of Strengthening the Pancasila Student Profile in the Learning Process in Primary Schools. *Innovative: Journal of Social Science Research*, 4(4), 7969-7979.
- [5] Asrori, M. A. R., Setianingsih, D., & Kadeni. (2023). The Influence of Human Capital, Physical Capital, and Learning Climate on Learning Outcomes of the Merdeka Curriculum at SDN 1 Boyolangu. *Al-Mikraj: Journal of Islamic Studies and Humanities*, 4(1), 281-293.
- [6] Dirgantoro, A. (2025). The Effect of the Implementation of the Independent Curriculum and the Work Environment on Work Motivation with Social Competence as a Moderating Variable. *Journal of Social Studies Education*, 15(3).
- [7] Dirgantoro, A., & Hamidiyah, R. M. (2024). The Role of Teachers in Increasing Achievement Motivation Through Problem Solving-Based Civic Learning for Students. *Setia Pancasila Journal*, 4(1).
- [8] Sinaga, T. (2025). The Effectiveness of the Collaborative Learning Model in IPAS Subjects in Grade IV Elementary School. *Elementary School Pedagogy Journal*, 4(1), 12-20.