



Faith Integrated Learning and Intelligence: Analyzing the Interaction Effect on Christian Students Mathematics Learning Outcomes

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ABSTRACT

Objective: This study aimed to examine the interaction effect between instructional strategies and levels of intelligence on students' mathematics learning outcomes at SMP Kristen GMIM Tomohon. The strategies compared included faith-integrated learning and conventional instruction, while students' intelligence levels were categorized as high or low. **Method:** A quantitative approach with a 2x2 factorial experimental design (treatment by level) was employed. A total of 42 students were assigned to either the experimental (faith-integrated) or control (conventional) group. Data were analyzed using two-way ANOVA with SPSS version 29. **Results:** The findings revealed a significant interaction between instructional strategies and intelligence levels on mathematics learning outcomes (significance = $0.009 < 0.05$). This indicates that instructional effectiveness is influenced by students' intellectual capacities, highlighting the need to align teaching methods with learners' characteristics. **Novelty:** This study uniquely examines the interaction between faith-integrated instruction and students' intelligence levels in mathematics learning. It also introduces "thinking in the heart", a reflective faith-based approach that links mathematical understanding with spiritual values to foster holistic learning.

INTRODUCTION

Education plays a strategic role in the holistic development of human potential, encompassing cognitive, affective, and spiritual dimensions. More than a mere process of knowledge transmission, education functions as a medium for character formation, value internalization, and the cultivation of attitudes that enable learners to become whole and balanced individuals. In the face of global challenges and rapid advances in science and technology, learners are expected to develop critical thinking skills, make rational decisions, and demonstrate high moral awareness to positively contribute to society (Indriani, A., & Suryana, 2020); (Permana, M. A., & Rukayah, 2022).

As a national education policy initiative, the Indonesian Ministry of Education, Culture, Research, and Technology has introduced the *Profil Pelajar Pancasila* (Pancasila Student Profile) as a guideline for shaping students' character. Its six dimensions faith in and devotion to God Almighty, global diversity, mutual cooperation, independence, critical reasoning, and creativity affirm that education must go beyond academic achievement to include value formation and spirituality (Kemendikbud, 2022). Within this framework, Christian schools, as part of the national education system, bear a dual mandate: to nurture academically excellent students and to foster spiritual growth grounded in Christian faith.

However, many Christian schools have yet to effectively integrate faith based values into the learning process, particularly in exact sciences such as mathematics. In several GMIM Christian junior high schools in Tomohon City, for example, mathematics instruction tends to focus on technical and cognitive aspects, with minimal integration of meaningful spiritual reflection (Yoteni, Y. R., & Suparman, 2021);

(Bongga, S. Van, & Listiani, 2020). This creates a dichotomy between academic mastery and spiritual formation, which ultimately weakens the overarching goals of Christian education (Tanasyah, T., Wulandari, N., & Saputra, 2022) ; (Rasyid, R., Sari, N., & Yusuf, 2021).

In fact, mathematics as a discipline rooted in order and logic holds substantial potential for spiritual contextualization. The concept of order in mathematics, for instance, can be interpreted as a reflection of divine order in creation. Likewise, the values of honesty and perseverance in problem-solving can serve as means of Christian character development (Mackay, 2012); (Staley, 2015). Nevertheless, international studies such as PISA and TIMSS continue to report low levels of mathematical literacy among Indonesian students (Napitupulu, 2023); (Kandaga, T. R., Sutrisno, & Yuliati, 2024), with one of the main contributing factors being the misalignment between instructional strategies and student characteristics (Fauziah, S., Mulyadi, A., & Hasanah, 2020); (Rahman, F., Wahyuni, D., & Taufik, 2021).

Within the context of Christian education, this issue becomes even more complex due to the insufficient effort to integrate faith-based values into mathematics instruction. Consequently, teachers are expected to design instructional strategies that not only align with academic content and student needs but also foster holistic spiritual development. According to Suyanto and Hisyam (2010), instructional strategies encompass key components such as objectives, methods, media, teaching materials, learner characteristics, and evaluation. An effective instructional design must accommodate students' intelligence types and learning styles to ensure that the learning process is active, reflective, and meaningful (Fahrudin, F., Ansari, A., & Ichsan, 2021); (Kristiana, L., Widiarti, D., & Nugroho, 2021).

One emerging approach in modern Christian education is the faith integrated learning strategy a pedagogical framework that unifies academic concepts and Christian values through narrative, spiritual reflection, and ethical practices in learning activities (Pannen, P., Hutapea, A., & Hartati, 2021); (Adhi, Y. K., Pramono, H., & Kristanti, 2018). This strategy has shown promise in enhancing student engagement and promoting a holistic understanding of knowledge (Wolhuter, C. C., & Van der Walt, 2022).

In this study, faith-integrated learning is operationally defined as an instructional approach that systematically links mathematics content with Christian values through three key elements: (1) short reflective narratives and questions that invite students to relate mathematical concepts to biblical principles, (2) classroom discussions that encourage critical and spiritual reflection, and (3) guided personal application, such as journaling or prayer, which helps students internalize values derived from the lesson. These structured steps ensure that faith integration is not incidental but becomes an intentional part of the learning process.

However, the implementation of this strategy remains suboptimal. Many teachers still rely on traditional lecture-based methods that position students as passive recipients, without considering variations in student intelligence or spiritual potential (Handoyono, N. A., Rabiman, R., & Kristovan, 2020); (Fahrudin, F., Ansari, A., & Ichsan, 2021). Such a uniform approach fails to address the diverse intelligences of learners, which significantly influence learning effectiveness (Putri, A. R., Sari, M. A., & Wahyuni, 2023) ; (Magdalena, I., Nashrullah, A. A., Rahmayani, L. N., Sri, & Pamungkas, 2020). Recent studies emphasize that successful learning outcomes largely

depend on teachers' ability to adapt instructional methods to students' levels of intelligence and personal characteristics (Nasution, M. A., Hidayat, D., & Wulandari, 2023)

To address this issue, the present study proposes a conceptual framework called "*thinking in the heart*," which is understood as a reflective-spiritual process whereby learners interpret knowledge through the lens of Christian faith. This concept is inspired by personal reflection in faith education (Wells, J., & Cooper, 2018), the strengthening of spirituality through learning processes (Holmes, 2015), and differentiated instruction based on multiple intelligences (Gardner, 2019); (Slavin, 2016). By integrating spiritual and intellectual dimensions, "*thinking in the heart*" encourages learners not only to seek correct answers but also to uncover deeper meaning in knowledge illuminated by faith.

Based on this background, the current study aims to examine the interaction effect between instructional strategies namely, faith-integrated and conventional strategies and levels of intelligence on students' mathematics learning outcomes at GMIM Christian Junior High Schools in Tomohon. This research is expected to offer both theoretical and practical contributions to the development of contextual and transformative instructional strategies that support optimal learning outcomes both academically and spiritually.

RESEARCH METHOD

This study used a quantitative approach to assess the interaction effects between instructional strategies and intelligence on mathematics learning outcomes. A 2x2 factorial experimental design (treatment by level) was employed to simultaneously analyze the independent effects of instructional strategy and intelligence, as well as their interaction. This design offers a more comprehensive evaluation than single-variable experiments.

The study population consisted of all Grade VII students at SMP Kristen GMIM in Tomohon, chosen for its Christian context. Grade VII was selected as students are transitioning from elementary to junior high school a formative stage for developing learning attitudes.

A sample of 42 students was divided into two groups: 22 in the experimental group (faith-integrated learning) and 20 in the control group (conventional learning). Groups were matched for baseline characteristics to ensure treatment validity. However, the total sample size of 42 participants further divided into four subgroups based on intelligence levels (approximately 6–7 students per cell) is recognized as a limitation of this study. While sufficient for preliminary analysis using a 2x2 factorial design, this relatively small sample may reduce statistical power and restrict the generalizability of the findings. The number of participants was determined by the total population available in the research site and by the need to maintain internal control within a homogeneous school context. Future studies involving larger and more diverse samples from multiple Christian schools are recommended to enhance the external validity and confirm the robustness of these findings.

Independent variables were instructional strategy (faith-integrated vs. conventional) and intelligence level (high vs. low). The categorization of students into *high* and *low intelligence* levels in this study was based on standardized psychological testing. The intelligence scores were obtained through the Culture Fair

Intelligence Test (CFIT), administered and interpreted by a licensed psychologist. To enhance validity, the results were further interpreted using the Stanford–Binet Intelligence Scale norms to align with internationally recognized benchmarks of cognitive ability. Following data collection, all students' scores were arranged in a frequency distribution. Based on the distribution, the classification adopted Naga's (2010, p. 210) grouping method, which divides the sample into three strata: (1). The top 33% of students were categorized as the high-intelligence group (MT = 33%), (2). The bottom 33% were categorized as the low-intelligence group (MR = 33%), (3) The middle 34% were not included in the factorial analysis but still participated in classroom learning activities. Intelligence levels were determined by standardized intelligence tests, with scores categorized above or below average. The dependent variable was students' mathematics learning outcomes, measured by a post-test consisting of multiple-choice items aligned with Bloom's taxonomy.

The test underwent content validation and reliability testing using KR-20 or Cronbach's Alpha. Data were analyzed using two-way ANOVA, preceded by normality (Shapiro-Wilk) and homogeneity (Levene's test) checks to ensure statistical appropriateness. The analysis evaluated main effects and interaction effects between the variables.

RESULTS AND DISCUSSION

Results

Mathematics learning outcomes data were obtained from students' scores after all treatments were implemented according to their respective groups. The summary of mathematics learning outcomes scores is presented in Tabel 1 below.

Table 1. Summary of Mathematics Learning Outcomes Scores Based on Descriptive Statistics for Each Group

Intelligence	Statistik	Instructional Strategy (A)	
		Faith Integrated (A ₁)	convensional (A ₂)
High (B₁)	Max	92	81
	Min	85	75
	SD	2,410	2,074
	Mean	88,86	77,50
	N	7	6
Low (B₂)	Max	80	73
	Min	73	68
	SD	2,38	1,941
	Mean	76,14	69,83
	N	7	6
Total	Max	92	81
	Min	73	68
	SD	6,992	4.438
	Mean	82,50	73,67
	N	14	12

Descriptive statistics showed that students with high intelligence in the faith-integrated group scored an average of 88.86 (SD = 2.410), compared to 77.50 (SD = 2.074) in the conventional group. For low-intelligence students, the faith-integrated group averaged 76.14 (SD = 2.38), while the conventional group averaged 69.83 (SD = 1.941).

Hypothesis testing in this study was conducted using Analysis of Variance (ANOVA). The results of the two-way ANOVA calculation are presented in Table 4.2 below.

Table 2. Results of Two-Way ANOVA

Source of variation	df	Sum of squares	Mean square	F _{value}	Sig.
Corrected model	3	1246.299 ^a	415,433	83,051	,000
Intercept	1	157584,179	157584,179	31503,198	,000
Intelligence (B)	1	671,004	671,004	134,143	,000
Strategy (A)	1	504,179	504,179	100,792	,000
Intelligence *	1	41,158	41,158	8,228	,009
Strategy (AB)					
Residual	22	110,048	5,002		
Total	26	161261,000			
Corrected Total	25	1356,346			

The results shown in Table 4.13 indicate that there is a statistically significant interaction between instructional strategies and intelligence levels on students' mathematics learning outcomes at SMP Kristen GMIM in Tomohon. Two-way ANOVA results revealed a significant interaction effect between instructional strategy and intelligence ($F = 8.228$; $p = 0.009 < 0.05$). This supports the hypothesis that teaching strategy effectiveness depends on students' intelligence levels.

To clarify the pattern of interaction, Figure 1 is presented below, illustrating the relationship between instructional strategies and intelligence levels on students' mathematics learning outcomes.

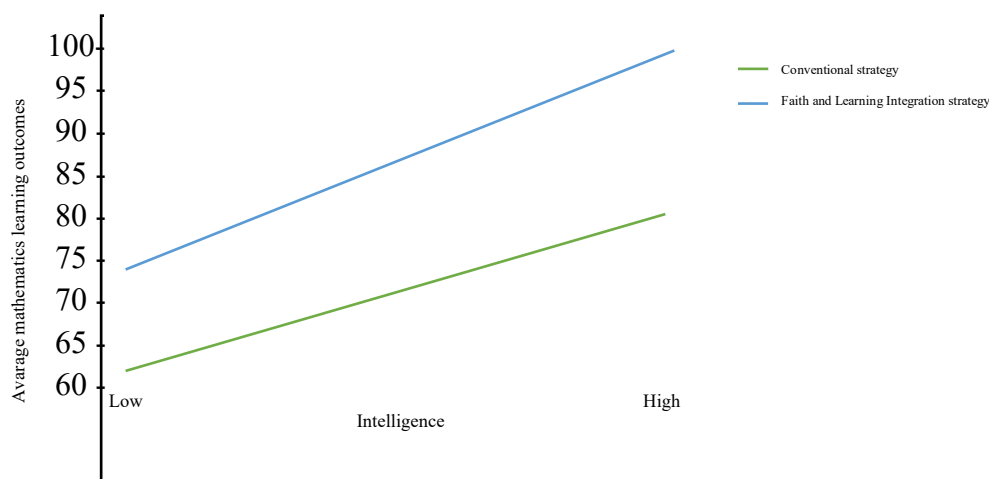


Figure 1. Interaction graph between instructional strategies and intelligence levels on students' mathematics learning outcomes.

Graphical representation showed non-parallel lines, confirming an interaction. The faith-integrated strategy was particularly beneficial for high-intelligence students but also showed advantages for those with lower intelligence.

Discussion

The findings of this study reveal a significant interaction between instructional strategies and levels of intelligence on students' mathematics learning outcomes at GMIM Christian Junior High Schools in Tomohon City. The significance value of the interaction (Sig. AB = 0.009 < 0.05) confirms that the selection of instructional strategies cannot be uniform, but must take into account students' internal characteristics, particularly intellectual capacity. The faith-integrated strategy applied in the experimental group yielded higher learning outcomes compared to the conventional strategy, especially among students with high intelligence. This reinforces previous findings that aligning instructional approaches with students' cognitive profiles is essential for effective learning (Rosyidah, N., Hasanah, R. N., & Prasetya, 2022) ; (Rachmawati, R., & Yuniarti, 2021).

Students with high intelligence generally possess more developed abstract and reflective thinking abilities. When engaged in instructional strategies that integrate faith, they are not only capable of mastering mathematical concepts logically but also of interpreting them more deeply and spiritually. This approach creates space for reflection, contemplation, and emotional engagement, which enrich their cognitive processes. This aligns with the notion that Christian education must provide opportunities for students to experience faith-based meaning within each learning process (Saragih, J., & Siregar, 2020) ; (Rukmana, 2021) ; (Yulianti, L., & Hadi, 2023).

As an original contribution of this study, the concept of "*thinking in the heart*" is introduced as a reflective learning approach that involves students' spiritual awareness and emotional engagement in understanding academic content. In contemporary psychopedagogical perspectives, the heart is understood not only as the center of emotion but also as the locus of values, will, and spiritual connection with God (Iskandar, D., Putra, M. H., & Hadi, 2020). This concept encourages students to process knowledge not only through the intellect but also through a profound inner dimension. In the context of mathematics, for example, the concepts of order, certainty, and logical structure can be seen as a reflection of God's divine order in creation. Thus, learning becomes not only cognitive but also transformative.

Furthermore, when students are invited to "think in the heart," the learning process becomes more meaningful. Learning is no longer a mere transmission of information, but a spiritual experience that connects knowledge with faith. When students perceive that what they are learning is relevant to their lives and spiritual beliefs, their emotional engagement, intrinsic motivation, and sense of responsibility toward learning significantly increase. This strategy has proven effective in harmonizing the cognitive and affective dimensions of learning (Mulyani, R., & Widodo, 2022); (Setiawan, 2021).

Interestingly, an increase in learning outcomes was also observed among students with lower intelligence levels who participated in the faith-integrated strategy. This indicates that the strategy is not only inclusive but also capable of addressing diverse student intelligences. This approach engages the often-overlooked affective and intrapersonal dimensions of students in conventional instruction. These findings are supported by contemporary views on multiple intelligences, which suggest that

intelligence encompasses not only logical aspects but also self-awareness, empathy, and spirituality (Gunawan, I., & Yulianto, 2021) ; (Widyastuti, R., Syahputra, A., & Ramadhani, 2020). When students feel that the learning process reflects their values and identity, they are more motivated to learn and achieve better outcomes.

Therefore, the concept of "*thinking in the heart*" can be considered a vital bridge in integrative instructional strategies. Students with high intelligence use it to deepen their understanding of subject matter meaningfully, while students with lower intelligence gain emotional and spiritual support to engage more fully in learning. As such, this internal process serves as a connector between faith and knowledge, affection and cognition, reason and the heart. In its implementation, this approach demonstrates that true Christian education does not merely aim to cultivate intellectual competence but seeks to form whole persons—those who think logically, feel with awareness, and live in healthy relationships with God and others.

CONCLUSION

Fundamental Finding : This study found a significant interaction between instructional strategy and intelligence level on students' math learning outcomes. Faith-integrated learning was more effective than conventional methods, especially for high-intelligence students. However, it also positively impacted students with lower intelligence by engaging their affective and spiritual dimensions. The "*thinking in the heart*" concept emerged as a key mechanism in facilitating this integration. **Implication :** First, educators must consider students' intelligence profiles when selecting instructional strategies. One-size-fits-all approaches are insufficient. Second, integrating faith into math education enhances learning motivation and meaning by addressing spiritual dimensions. Third, Christian schools should adopt reflective, faith-based curriculum designs rather than symbolic religious content additions. **Limitation :** This study's implementation period for the faith-integrated strategy was limited, so long term effects remain unknown. Moreover, this study did not directly measure the construct of "*thinking in the heart*" due to the absence of a standardized instrument. **Future Research :** Future studies should include larger, more diverse samples and examine variables such as intrinsic motivation, spiritual intelligence, and learning styles. Additionally, tools should be developed to measure the internal process of "*thinking in the heart*." Advancing this theory may pave the way for transformative educational practices rooted in Christian values.

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