

Enhancing Elementary Students' 4C Communication Skills Through SAVI (Somatic, Auditory, Visual, Intellectual) Learning Model

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Keywords

SAVI learning model
communication skills
elementary education
multisensory learning
mathematics instruction

Article History

Received 2025-07-02

Accepted 2025-09-12

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Abstract

Contemporary elementary education faces significant challenges in developing students' 21st-century communication skills, particularly in mathematics learning contexts where traditional teacher-centered approaches often render students passive and hesitant to engage in meaningful discourse. The SAVI (Somatic, Auditory, Visual, Intellectual) learning model presents a promising multisensory approach that may address these communication skill deficiencies by engaging students holistically through diverse sensory modalities. This quasi-experimental study employed a pretest-posttest control group design involving 38 fourth-grade students at SD Negeri Gendongan 01 Salatiga, Indonesia. Participants were divided into experimental (n=19) and control (n=19) groups using purposive sampling. The experimental group received SAVI-based mathematics instruction focusing on pattern recognition, while the control group participated in conventional teaching methods. Data collection utilized validated communication skill assessment instruments, structured observations, and semi-structured interviews. Statistical analysis was conducted using SPSS version 25, employing independent samples t-tests to examine between-group differences. The experimental group demonstrated significantly superior communication skill achievement, with 42.11% of students reaching very high competency levels compared to 15.79% in the control group. Statistical analysis revealed significant differences between groups ($p = 0.003 < 0.05$, $t = -3.126$, $df = 36$), with a substantial mean difference of -19.342 points favoring the experimental group. The effect size indicated practically significant improvements in students' abilities to articulate mathematical reasoning, engage in collaborative problem-solving, and express creative solutions. These findings provide empirical validation that SAVI implementation significantly enhances elementary students' 4C communication competencies beyond conventional instructional approaches. The results support multisensory learning theories and suggest substantial implications for teacher preparation, curriculum development, and educational policy formulation in fostering 21st-century communication skills.

INTRODUCTION

Technological advancement necessitates human resources equipped with 21st-century skills, particularly the 4C competencies: Communication, Collaboration, Critical Thinking, and Creativity. Alamsyah et al. (2024) highlight the shift toward digital communication media, presenting new challenges for educational institutions. Communication enhances critical thinking and facilitates concept development (Safitri et al., 2022), while Ariani (2017) notes that effective communication enables students to construct knowledge, engage in questioning, and process information effectively.

Research demonstrates that students' understanding of collaborative environments influences communication skill perception. Ballantine and McCourt Larres (2009) provide insights into how students perceive group work dynamics and their impact on communication abilities. Siriwardane and Durden (2014) identified significant gaps in communication research, finding only three of nineteen studies from the most recent decade, emphasizing a critical void in contemporary oral communication research.

Contemporary educational practices, particularly in elementary mathematics, continue exhibiting teacher-centered approaches rendering students passive and lacking self-confidence. Husna et al. (2024) revealed challenges in student participation and verbal expression, while Kumala and Khairuddin (2024) highlighted difficulties in articulating thoughts effectively. These findings align with observations from SD Negeri Gendongan 01 Salatiga, where traditional methods contributed to student passivity.

Professional significance of effective communication extends beyond education. Koprowska (2020) and Lishman (2009) emphasize communication's centrality in professional practice. Beresford et al. (2008), Department of Health (2002), Ingram (2013), Kam (2020), Munford and Sanders (2015), and Tanner (2019) demonstrate that service recipients value professionals exhibiting understanding and compassion.

Literature provides evidence for innovative pedagogical approaches addressing communication deficiencies. Ramadina and Rosdiana (2021) demonstrated student-centered approaches' potential, Rizawati (2022) revealed improvements through scientific learning with infographic media, and Suleman (2024) provided evidence for experiential learning effectiveness. Riley and Simons (2016) captured perspectives on written communication competencies, while Coetzee, Schmulian, and Kotze (2014) and Noga and Rupert (2017) investigated communication apprehension effects. Oussi and Klibi (2017) evaluated student perspectives, and Lin, Krishnan, and Grace (2013) assessed communication self-perception.

The SAVI (Somatic, Auditory, Visual, Intellectual) approach has emerged as a promising solution. SAVI represents a comprehensive framework utilizing all sensory tools, incorporating four elements engaging students holistically (Andrianti et al., 2016; Muniroh et al., 2015). Meier (in Khoirudin, 2017) describes SAVI as a complete system involving senses and emotions. Ramadania and Winda (2017) demonstrated its effectiveness in language skill development.

SAVI's effectiveness in mathematics education is noteworthy. Fajriah et al. (2020) emphasized optimization of all senses in direct learning experiences, while Rohman et al. (2023) revealed significant improvements in mathematical communication and motivation. Sutarna (2018) notes learning effectiveness when combining physical movement with intellectual activities.

Recent studies substantiate various pedagogical approaches' potential. Safitri et al. (2022) revealed authentic learning environments' importance, Supartik and Pasaribu (2021) demonstrated technology integration benefits, Toifur and Kurniawan (2022) provided evidence for interactive strategies, and Romadhon and Imawan (2024) supported student-centered approaches.

Despite growing research on innovative models, significant gaps remain in understanding SAVI's specific effectiveness in developing elementary students' communication skills, particularly in mathematics contexts. Limited empirical evidence exists regarding systematic implementation and evaluation of SAVI's impact on 4C communication competencies.

This study investigates SAVI's effectiveness in developing elementary students' communication skills, addressing the urgent need for innovative approaches accommodating diverse learning styles while enhancing 21st-century competencies. The research provides empirical evidence for educators seeking effective methodologies, contributing to innovative elementary education discourse and informing educational policy decisions.

METHODS

This study employed a quasi-experimental design to investigate the effectiveness of the SAVI learning model on elementary school students' 4C communication skills. The research utilized a pretest-posttest control group design, which allows for causal inferences while acknowledging the practical constraints of educational settings where random assignment is often unfeasible. This design enables researchers to examine cause-and-effect relationships by comparing outcomes between an experimental group receiving the SAVI intervention and a control group following conventional instructional methods.

The research was conducted at SD Negeri Gendongan 01 Salatiga, Indonesia, involving fourth-grade students as the target population. The total population comprised 62 fourth-grade students distributed across multiple classes. Using purposive sampling technique, 38 students were selected based on predetermined criteria including academic performance consistency, attendance regularity, and classroom participation levels. The sample was divided into two groups: 19 students in the experimental group (Class 4B) who received SAVI-based mathematics instruction, and 19 students in the control group (Class 4C) who participated in conventional teacher-centered learning activities.

Data collection employed both test and non-test instruments to ensure comprehensive measurement of communication skills development. The primary instrument consisted of pretest-posttest questions specifically designed to assess 4C communication competencies in mathematics learning contexts, focusing on students' abilities to articulate mathematical reasoning, engage in collaborative problem-solving, and express creative solutions. Additionally, structured observations were conducted during learning sessions to capture behavioral indicators of communication skill enhancement, while semi-structured interviews provided qualitative insights into students' perceptions and experiences regarding their communication development throughout the intervention period.

Instrument validity was established through expert judgment and content validation procedures, ensuring that test items accurately measured the intended communication competencies. Reliability testing was conducted using Cronbach's alpha coefficient to determine internal consistency of the measurement instrument, confirming that the tools produced stable and dependable results across different testing occasions. The validation process involved multiple education specialists who reviewed item relevance, clarity, and alignment with 4C communication skill frameworks.

The experimental intervention was implemented over two instructional sessions in each group, with each session lasting three class periods to allow sufficient time for comprehensive skill development activities. The experimental group participated in SAVI-based learning activities that integrated somatic movement, auditory processing, visual representation, and intellectual engagement through mathematical pattern recognition tasks. Simultaneously, the control group received traditional instruction characterized by teacher-led explanations, individual seatwork, and limited interactive communication opportunities.

Data analysis was performed using SPSS version 25, beginning with prerequisite statistical tests to ensure appropriate analytical procedures. Normality testing using the Kolmogorov-Smirnov test confirmed that data distributions met parametric assumptions, while Levene's test verified homogeneity of variance between groups. The primary analysis employed an independent samples t-test to compare posttest communication skill scores between experimental and control groups, with statistical significance set at $\alpha = 0.05$. Effect size calculations using Cohen's d provided additional information about the practical significance of observed differences, while qualitative interview data underwent thematic analysis using MAXQDA 24 software to identify recurring patterns and themes related to students' communication skill development experiences.

RESULTS AND DISCUSSION

Results

The experimental study was conducted at SD Negeri Gendongan 01 Salatiga involving two fourth-grade classes as experimental and control groups. Prior to implementing the intervention, qualitative interviews were conducted with both groups to establish baseline understanding of students' perceptions toward mathematics learning and communication challenges.

The initial interview data, processed through MAXQDA 24 software, revealed significant insights into students' attitudes toward mathematics learning and communication patterns. Figure 1 presents the thematic analysis of pre-intervention interviews, demonstrating that mathematics learning elicited diverse responses among student groups. The analysis indicates that while a minority of students expressed enjoyment due to perceived ease, the majority experienced considerable difficulties. These challenges manifested in various behavioral responses: some students actively sought teacher

assistance, while others remained silent, consequently increasing their confusion. Furthermore, students experiencing difficulties tended to avoid group work due to fear and embarrassment when presenting or communicating publicly, suggesting underlying communication apprehension that could potentially hinder their learning progress.

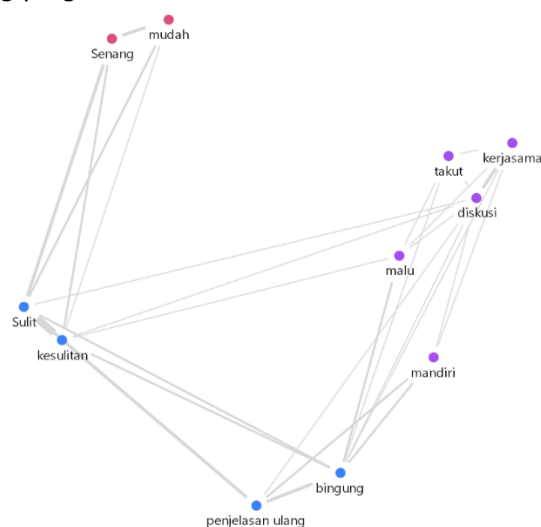


Figure 1. the thematic analysis of pre-intervention interviews

Following the baseline assessment, pretest and posttest measurements were administered to evaluate communication skill development. The comparative analysis of posttest results between experimental and control groups demonstrates notable differences in communication skill achievement levels. Table 1 presents the distribution of 4C communication skill levels achieved by both groups following the intervention period.

Table 1. Comparison of 4C Communication Skills Achievement Levels

No.	Category	Score Range	Experimental Group	Control Group
1.	Very High	76-100	42.11%	15.79%
2.	High	51-75	36.84%	52.63%
3.	Low	26-50	15.79%	26.32%
4.	Very Low	0-25	5.26%	5.26%

The posttest results reveal substantial differences in achievement distribution between groups. The experimental group demonstrated superior performance in the highest achievement category (76-100), with 42.11% of students achieving very high communication skill levels compared to only 15.79% in the control group. Conversely, the control group showed higher concentration in the moderate achievement range (51-75), with 52.63% of students compared to 36.84% in the experimental group. These findings suggest that the SAVI intervention effectively enhanced students' communication competencies beyond conventional instructional approaches.

Table 2. Tests of Normality

Data	Class	Kolmogorov-Smirnov Statistic
Results	Pretest A (Control)	0.142
	Posttest A (Control)	0.152
	Pretest B (Experimental)	0.125
	Posttest B (Experimental)	0.163

*This is a lower bound of the true significance.

To determine the statistical significance of these observed differences, the posttest data underwent comprehensive statistical analysis using SPSS version 25. The preliminary analyses included tests of normality, homogeneity of variance, and mean differences to ensure appropriate statistical procedures. Table 2 presents the normality test results for both pretest and posttest data across experimental and control groups.

The normality test results indicate that all datasets achieved significance values greater than 0.05, confirming normal distribution across all measurements. This finding validates the appropriateness of parametric statistical procedures for subsequent analyses.

The homogeneity of variance testing was subsequently conducted to verify the equality of variances assumption required for independent samples t-test procedures.

Table 3. Test of Homogeneity of Variance

Levene Statistic	df1	df2	Sig.
Based on Mean	0.491	1	36
Based on Median	0.287	1	36
Based on Median and with adjusted df	0.287	1	35.563
Based on trimmed mean	0.414	1	36

The homogeneity test results demonstrate that all measures (mean, median, median with adjusted degrees of freedom, and trimmed mean) yielded significance values exceeding 0.05, confirming homogeneous variances between groups. This finding supports the validity of subsequent comparative analyses.

The primary statistical analysis employed an independent samples t-test to examine mean differences between experimental and control groups' communication skill achievements.

Table 4. Independent Samples Test

		t-test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
Score	Equal variances assumed	-3,126	36	,003	-19,342
	Equal variances not assumed	-3,126	35,134	,004	-19,342

The independent samples t-test results reveal statistically significant differences between groups, with a significance value of 0.003 ($p < 0.05$), t-statistic of -3.126, and degrees of freedom of 36. The mean difference of -19.342 points indicates that the experimental group achieved substantially higher communication skill scores than the control group. The 95% confidence interval (-31.891 to -6.793) further confirms the magnitude and reliability of this difference, leading to the rejection of the null hypothesis (H_0) and acceptance of the alternative hypothesis (H_1). These findings provide strong statistical evidence that the SAVI learning model significantly enhances elementary school students' communication skills compared to conventional instructional methods.

Discussion

The present study's findings demonstrate that the SAVI (Somatic, Auditory, Visual, Intellectual) learning model significantly enhances 4C communication skills among elementary school students, providing empirical support for innovative pedagogical approaches in mathematics education. The experimental group's superior performance, with 42.11% achieving very high communication skill levels compared to 15.79% in the control group, aligns with theoretical frameworks emphasizing multisensory learning engagement.

These results corroborate the comprehensive educational framework described by Andrianti et al. (2016) and Muniroh et al. (2015), who emphasized SAVI's utilization of all sensory tools as learning media through four essential elements that engage students holistically. The statistical significance (p

= 0.003) and substantial mean difference (-19.342 points) observed in this study provide quantitative validation of Meier's assertion (in Khoirudin, 2017) that SAVI represents a complete system involving senses and emotions in natural learning processes. The findings suggest that when students engage through somatic movement, auditory processing, visual representation, and intellectual activity simultaneously, their communication competencies develop more effectively than through traditional instructional approaches.

The study's outcomes align closely with previous research demonstrating SAVI's effectiveness in various educational contexts. Ramadania and Winda (2017) specifically examined language skill development through SAVI implementation, revealing enhanced communication aspects that parallel the current study's findings. Similarly, Fajriah et al. (2020) emphasized SAVI's optimization of all five senses in direct learning experiences, extending beyond traditional auditory and visual instruction to include tactile engagement and interactive questioning—elements that likely contributed to the superior communication outcomes observed in the experimental group.

The mathematics education context of this study particularly reinforces Rohman et al. (2023)'s investigation, which demonstrated significant improvements in mathematical communication skills and learning motivation when SAVI was compared to conventional methods. The current study's finding that 78.95% of experimental group students achieved high to very high communication levels (compared to 68.42% in the control group) provides additional empirical support for SAVI's effectiveness in mathematics learning environments. This improvement aligns with Sutarna (2018)'s assertion that learning becomes highly effective when combining physical movement with intellectual activities and comprehensive sensory engagement.

The pre-intervention interview analysis revealing students' mathematics learning difficulties and communication apprehension reflects broader educational concerns identified in contemporary literature. The finding that students experiencing difficulties tended to avoid group work due to fear and embarrassment resonates with Husna et al. (2024)'s investigation of discussion methods, which revealed significant challenges in student participation and verbal expression. Similarly, Kumala and Khairuddin (2024)'s identification of persistent difficulties in articulating thoughts effectively suggests that communication apprehension represents a systemic challenge requiring innovative interventions like SAVI.

The study's results also support the broader discourse on 21st-century skill development initiated by Alamsyah et al. (2024) regarding digital communication challenges. The SAVI model's success in developing communication competencies addresses the urgent need for pedagogical innovations that accommodate diverse learning styles while enhancing essential 4C competencies, as emphasized in the research rationale. The significant improvement observed in the experimental group validates Reynolds et al.'s assertion (in Safitri et al., 2022) that effective communication enhances critical thinking abilities and facilitates concept development.

Furthermore, the study's findings contribute to the growing body of evidence supporting student-centered pedagogical approaches. The results complement Ramadina and Rosdiana (2021)'s demonstration of active knowledge sharing strategies' potential, Rizawati (2022)'s improvements through scientific learning with infographic media, and Suleman (2024)'s evidence for experiential learning effectiveness. The consistent pattern of improved communication outcomes across these diverse interventions suggests that active, multisensory engagement represents a crucial factor in communication skill development.

The implications extend beyond immediate educational contexts to address professional communication competencies identified in the literature. The study's focus on developing students who can articulate mathematical reasoning, engage in collaborative problem-solving, and express creative solutions aligns with professional expectations documented by Riley and Simons (2016) and the self-perception research conducted by Lin, Krishnan, and Grace (2013). By addressing communication apprehension early in elementary education, the SAVI approach potentially mitigates

the psychological factors influencing communication competency acquisition identified by Coetzee, Schmullian, and Kotze (2014) and Noga and Rupert (2017).

The study's contribution to innovative elementary education practices addresses the research gap identified in the introduction while providing practical implications for curriculum development and teacher preparation programs. The empirical evidence supports educational policy decisions emphasizing interactive, multisensory approaches to communication skill development, ultimately benefiting students' holistic preparation for future academic and professional challenges in an increasingly communication-dependent society.

CONCLUSION

This experimental study provides compelling evidence for the effectiveness of the SAVI (Somatic, Auditory, Visual, Intellectual) learning model in enhancing elementary school students' 4C communication skills. The research findings demonstrate statistically significant improvements in the experimental group, with 42.11% of students achieving very high communication competency levels compared to 15.79% in the control group ($p = 0.003$, $t = -3.126$). The substantial mean difference of -19.342 points between groups confirms that multisensory engagement through SAVI implementation substantially enhances communication skill development beyond conventional instructional approaches.

This research contributes significantly to educational literature by providing empirical validation of SAVI's effectiveness specifically in developing 21st-century communication competencies within mathematics education contexts. The study addresses a critical gap in understanding how innovative pedagogical approaches can systematically enhance elementary students' communication skills, offering quantitative evidence for educators and policymakers seeking effective methodologies to improve student outcomes. Furthermore, the research extends theoretical frameworks regarding multisensory learning by demonstrating practical applications in fostering collaborative problem-solving, mathematical reasoning articulation, and creative expression capabilities.

The implications for educational practice are substantial, suggesting that teacher preparation programs should incorporate SAVI methodology training to equip educators with effective communication skill development strategies. Educational institutions should consider curriculum modifications that integrate somatic, auditory, visual, and intellectual learning elements to optimize student engagement and communication competency acquisition. Policymakers may utilize these findings to inform decisions regarding innovative teaching approach adoption and resource allocation for professional development initiatives.

However, several limitations warrant acknowledgment. The study's quasi-experimental design and purposive sampling limit generalizability across diverse educational contexts and student populations. The relatively short intervention period may not capture long-term communication skill retention or transfer effects. Additionally, the research focused exclusively on mathematics learning contexts, potentially limiting applicability to other subject areas.

Future research should examine SAVI's effectiveness across extended implementation periods and diverse academic disciplines. Longitudinal studies investigating communication skill retention and transfer to real-world contexts would strengthen understanding of SAVI's lasting impact. Additionally, comparative studies examining SAVI's effectiveness across different cultural and socioeconomic contexts would enhance generalizability and inform culturally responsive pedagogical practices.

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