

Fostering reading literacy and communication skills in elementary learners: The quasi-experimental study of design thinking model integrated with neuro-linguistic programming

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Abstract

Conventional language instruction often emphasizes mechanical comprehension and teacher-centered learning, which may limit learner engagement and communicative confidence. This study examined the effect of a Design Thinking model integrated with Neuro-Linguistic Programming (NLP) on elementary students' literacy and communication skills. A quasi-experimental, nonequivalent posttest-only control-group design involved 60 fourth-grade students from public elementary schools in Denpasar, Bali, Indonesia, selected through cluster random sampling. Data were collected using literacy tests, communication-skill scales, and expert-validated classroom observation sheets, then analyzed using multivariate analysis of variance (MANOVA). Results showed a significant multivariate effect, $F = 18.09$, $p < 0.001$, Wilks' $\Lambda = 0.612$, partial $\eta^2 = 0.38$. The experimental group achieved higher literacy scores ($M = 86.47$, $SD = 6.18$) than the control group ($M = 78.83$, $SD = 7.02$), as well as higher communication scores ($M = 88.10$, $SD = 5.62$ vs. $M = 80.37$, $SD = 6.15$). These findings indicate that integrating Design Thinking and NLP can support active inquiry, reflective learning, emotional regulation, and communicative engagement in elementary language learning.

Keywords: Communication skills, Design thinking, Elementary education, Literacy skills, Neuro-Linguistic Programming, Reading literacy, Student engagement, Language learning.

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Contents

1. Introduction	232
2. Methodology	233
3. Findings and Results	234
4. Discussion.....	236
5. Conclusion	237
References	237

Contribution of this paper to the literature

This study contributes an integrated pedagogical framework that combines Design Thinking with Neuro-Linguistic Programming to simultaneously strengthen elementary students’ literacy and communication skills. It extends prior research by linking cognitive inquiry, creative problem-solving, emotional regulation, and communicative confidence within one classroom-based model, offering theoretical and practical value for language education.

1. Introduction

Literacy and communication skills are foundational competencies that enable elementary learners to interpret information, construct meaning, express ideas, and participate effectively in social and academic interactions (Eschenauer et al., 2023; Sutriyanti, Widian, Windayani, & Antara, 2026). Contemporary literacy extends beyond decoding written symbols and includes the capacity to analyze, synthesize, evaluate, and communicate information across different contexts and modes (Akmalia, Alaziz, & Zuraida, 2024; Angganing, Budiningsih, & Haryanto, 2022). Communication competence similarly involves verbal clarity, responsiveness, empathy, confidence, and reflective interaction, all of which support collaborative learning and active participation in twenty-first-century classrooms (Li, Kang, & Shao, 2023; Satria, 2025).

Indonesian elementary education continues to face substantial challenges in developing these competencies. The Programme for International Student Assessment 2022 reported an average Indonesian reading score of 359, considerably below the OECD average, indicating persistent difficulties in comprehension, interpretation, and reasoning from written texts (OECD, 2023; Puger et al., 2024; Wijaya, Hidayat, Hermita, Alim, & Talib, 2024). Classroom-based evidence also suggests that many elementary learners experience difficulty articulating ideas, constructing arguments, responding to peers, and participating confidently in literacy activities (Antara & Dewantara, 2022; Pujawan, Rediani, Antara, Putri, & Bayu, 2022). These difficulties are often reinforced by instructional practices dominated by teacher explanation, mechanical comprehension exercises, memorization, and limited opportunities for authentic dialogue. Although multiliteracy programs, reading strategies, and thematic instruction have improved particular aspects of literacy achievement, they do not always address communicative confidence, emotional engagement, and learner autonomy simultaneously (Susiani et al., 2025; Yusmaneli, Fathurrahmad, & Raihani, 2025).

Design Thinking offers a learner-centered structure for addressing these limitations through the stages of empathizing, defining problems, generating ideas, developing prototypes, and testing possible solutions (Juniantari, Ulfa, & Praherdhiono, 2023; Tsai, Song, Lo, & Lo, 2023). These iterative processes encourage learners to examine authentic situations, interpret information from multiple perspectives, negotiate ideas collaboratively, and revise their understanding through feedback (Kangas & Rasi, 2021; Rasi, Kangas, & Ruokamo, 2019). Previous studies have demonstrated that Design Thinking can strengthen creativity, problem-solving, engagement, and reflective learning, particularly within STEM, innovation, and project-based contexts (Luo, Geng, Pei, Chen, & Zou, 2021; Yalçın & Erden, 2021). Evidence regarding its application to elementary language education remains limited, however, especially in relation to reading comprehension, verbal expression, and communication confidence.

Neuro-Linguistic Programming-based classroom strategies provide a complementary emphasis on learners’ affective readiness and communicative self-regulation (Amar, 2020; Mufliharsi & Candra, 2018). Reframing can help students reinterpret difficult learning experiences more constructively, anchoring can associate communication activities with supportive emotional states, positive language reinforcement can strengthen self-efficacy, and guided visualization can prepare learners for speaking and interaction tasks (Kristiantari et al., 2025; Mufliharsi & Candra, 2018). Previous research has associated such strategies with improved motivation, emotional regulation, communication confidence, and language-learning participation (Kristiantari et al., 2025; Zahro, 2017). Nevertheless, NLP has commonly been applied as a stand-alone motivational or psychological technique rather than embedded within a systematic instructional sequence that guides learners from problem exploration to communicative production.

The theoretical advancement proposed in this study lies in connecting the complementary mechanisms of Design Thinking and NLP-based strategies within a unified pedagogical framework. Design Thinking primarily organizes outward-oriented cognitive and social activity by guiding learners to investigate problems, construct meaning, generate solutions, and evaluate ideas collaboratively. NLP-based strategies support inward-oriented affective and communicative processes by helping learners regulate hesitation, develop positive self-perceptions, and express ideas more confidently. Their integration, therefore, extends beyond combining two instructional techniques. It connects constructivist inquiry with affective self-regulation and communicative participation, suggesting that literacy development is strengthened when students are simultaneously supported in understanding texts, producing ideas, managing emotional responses, and interacting meaningfully with others.

Previous studies have generally examined Design Thinking, literacy, communication, or NLP-related strategies as separate areas of investigation. Limited empirical evidence explains how an integrated model may influence literacy and communication outcomes simultaneously among elementary learners. This study addresses that gap by examining a Design Thinking model integrated with NLP-based strategies in authentic language-learning activities. The study aimed to analyze differences in literacy and communication skills between students participating in the integrated instructional model and those receiving conventional instruction. The findings are expected to contribute

to the development of a more coherent human-centered pedagogical framework that combines cognitive inquiry, emotional readiness, and communicative engagement in elementary language education.

2. Methodology

2.1. Research Design

This study employed a quasi-experimental research design using a non-equivalent posttest-only control group structure to examine the effect of the Design Thinking model integrated with Neuro-Linguistic Programming (NLP) on elementary students' literacy and communication skills. Quasi-experimental approaches are considered appropriate for educational settings where random assignment at the individual level is difficult to implement because intact classroom structures must be maintained to preserve ecological validity and instructional continuity (Creswell, 2012; Johnson & Christensen, 2024). Educational interventions were conducted within authentic classroom environments to ensure that the instructional treatment reflected natural learning conditions encountered in elementary schools. The independent variable consisted of the Design Thinking model integrated with NLP strategies, whereas literacy and communication skills functioned as dependent variables.

The intervention was conducted over six consecutive weeks, with two instructional meetings per week, resulting in 12 sessions. Treatment standardization was supported through lesson plans and instructional scenarios that specified the learning objectives, literacy materials, instructional sequence, time allocation, student activities, and assessment procedures for each session. The experimental-group activities followed the five Design Thinking stages of empathize, define, ideate, prototype, and test. NLP-based strategies, including reframing, anchoring, positive language reinforcement, and guided visualization, were embedded across these stages to support students' emotional readiness, reflective awareness, and confidence in communicating ideas. The control group covered comparable curriculum competencies and literacy topics over the same instructional period but followed the conventional instructional procedures routinely used at the school.

Teacher orientation was conducted before the intervention to establish a shared understanding of the learning objectives, treatment procedures, session sequence, and expected classroom activities. The teachers were provided with the instructional materials and implementation guidelines relevant to their respective conditions. This procedure was intended to reduce variation arising from differences in instructional preparation and to ensure that the experimental treatment was implemented consistently throughout the study.

Implementation fidelity was monitored using structured classroom observation sheets. The observation indicators documented the completion of the planned Design Thinking stages, the application of NLP-based strategies, adherence to the instructional sequence, student participation, collaborative interaction, and any deviations from the lesson plan. Observation records were reviewed across the 12 sessions to determine whether the intervention was delivered consistently. These procedures provided descriptive evidence that the instructional activities implemented in the experimental classroom corresponded with the intended treatment framework.

Several procedures were applied to improve comparability between the groups. Both groups followed the same grade-level curriculum competencies, addressed comparable literacy content, received the same number of instructional sessions, and completed the outcome assessments according to the same schedule. Posttests were administered using equivalent instructions, time allocation, and classroom conditions. Student responses were assessed using predetermined scoring criteria and expert-validated instruments to reduce subjective judgment during data collection and scoring.

Potential researcher bias was further minimized through the use of standardized instructional documents, predefined observation indicators, validated measurement instruments, and consistent posttest administration procedures. Three experts in language education and educational assessment evaluated the instruments for content relevance, linguistic clarity, and construct alignment. The communication rubric and literacy-scoring criteria were established before the outcome data were analyzed. Nevertheless, complete control of teacher effects was not possible because the experimental and control groups were taught in different school settings. Differences in teacher characteristics, classroom climate, school context, and other unmeasured factors may therefore have influenced the observed outcomes. The original manuscript already described the six-week intervention, teacher orientation, instructional scenarios, and classroom observation instruments; the revision makes their role in standardization and fidelity monitoring explicit.

2.2. Sample and Data Collection

Participants consisted of 60 fourth-grade students enrolled in two public elementary schools in Denpasar, Bali, Indonesia. The experimental group comprised 30 students from SD Negeri 2 Sesetan, whereas the control group comprised 30 students from SD Negeri 6 Sesetan. Both schools implemented the same national curriculum and had relatively comparable instructional characteristics.

Cluster random sampling was employed because the study involved intact classroom groups. One fourth-grade class from SD Negeri 2 Sesetan was assigned as the experimental group and received the Design Thinking model integrated with Neuro-Linguistic Programming strategies. One fourth-grade class from SD Negeri 6 Sesetan was assigned as the control group and received conventional language instruction. Preliminary classroom assessment records provided by the teachers indicated that the two groups had relatively comparable literacy and communication abilities before the intervention, although no formal pretest was administered.

Sample adequacy fulfilled the minimum requirement for multivariate statistical analysis, particularly MANOVA procedures requiring at least twenty participants per group to ensure statistical stability and adequate power estimation (Stevens, 2009; Tabachnick & Fidell, 2019). Ethical approval for the study was obtained from the institutional research authority, while permissions were secured from school principals, classroom teachers, and parents before data collection was conducted.

Data collection employed multiple instruments to capture literacy and communication outcomes comprehensively. Literacy skills were measured using reading comprehension and written expression tests developed based on elementary language curriculum indicators. Communication skills were assessed through performance-

based communication scales and classroom interaction observations. Instrument specifications are presented in Table 1.

Table 1. Instrument Blueprint.

Variables	Aspect
Literacy Skills	Understanding messages and information in daily-life texts, narratives, and children’s poetry
	Reading fluency for new words with familiar letter patterns
	Understanding main ideas and supporting details in informational texts
	Explaining characters’ problems and events in narrative texts
	Interpreting new vocabulary in context
Communication Skills	Verbal fluency and clarity
	Interactive and empathetic communication
	Expressive written communication
	Confidence and self-expression

Development of the literacy instrument involved constructing reading passages, comprehension questions, and written response tasks aligned with national curriculum competencies for elementary language learning. Three experts in language education and educational assessment evaluated the instruments to ensure content relevance, linguistic clarity, and construct appropriateness. Content validity analysis demonstrated satisfactory validity indices across all indicators. Communication skills were assessed using a four-point Likert-scale rubric measuring fluency, clarity, empathy, responsiveness, and self-expression during interactive classroom activities. Content Validity Index (CVI) analysis produced a coefficient of 0.88, indicating strong agreement among expert validators regarding item relevance and representativeness (Aiken, 1985). Classroom observation sheets were additionally utilized to document students’ engagement, collaborative interaction, participation during design-thinking activities, and implementation of NLP-based reflective strategies. Reliability testing using Cronbach’s alpha demonstrated acceptable internal consistency across all instrument dimensions ($\alpha = 0.82$), indicating that the instruments were sufficiently reliable for educational research purposes (Hair, Hult, Ringle, & Sarstedt, 2017; Taber, 2018).

2.3. Analysis of Data

Data analysis was performed using Multivariate Analysis of Variance (MANOVA) to examine the simultaneous effect of the integrated Design Thinking–NLP instructional model on literacy and communication skills. MANOVA was selected because the study involved one independent variable and two conceptually related dependent variables analyzed concurrently to minimize Type I error and identify multivariate treatment effects (Pallant, 2020; Tabachnick & Fidell, 2019). Preliminary assumption testing was conducted prior to hypothesis testing, including normality testing using the Kolmogorov–Smirnov procedure, homogeneity of variance–covariance matrices using Box’s M test, and multicollinearity diagnostics through tolerance and Variance Inflation Factor (VIF) values. Descriptive statistical analysis was additionally conducted to compare group means and standard deviations for each dependent variable. Qualitative classroom observation data were analyzed interpretively to support quantitative findings and provide contextual insights into students’ literacy engagement, collaborative participation, and communicative behaviors during implementation of the Design Thinking–NLP learning model.

3. Findings and Results

3.1. Descriptive Analysis

Descriptive analysis was conducted to compare students’ literacy and communication performance between the experimental and control groups following the implementation of the instructional treatment. Students who participated in the Design Thinking model integrated with Neuro-Linguistic Programming (NLP) demonstrated consistently higher achievement across both dependent variables than students who received conventional instruction. Statistical tendencies presented in Table 2 indicate that the integrated learning model contributed positively to students’ literacy comprehension and communicative performance. Mean score differences between groups further suggest that the intervention produced observable educational effects at the classroom level.

Table 2. Descriptive Statistics of Literacy and Communication Skills by Group.

Variables	Group	N	Min.	Max.	Mean	Std. Deviation
Literacy Skills	Experimental	30	72	95	86.47	6.18
Literacy Skills	Control	30	65	91	78.83	7.02
Communication Skills	Experimental	30	76	96	88.10	5.62
Communication Skills	Control	30	67	90	80.37	6.15

The results in Table 2 indicate that students in the experimental group achieved a higher average literacy score ($M = 86.47$, $SD = 6.18$) than those in the control group ($M = 78.83$, $SD = 7.02$). Similar differences were identified in communication skills, where the experimental group obtained a mean score of 88.10 ($SD = 5.62$), while the control group achieved a mean score of 80.37 ($SD = 6.15$). These descriptive findings indicate that integrating Design Thinking and NLP strategies may strengthen students’ comprehension, expressive communication, and classroom interaction abilities more effectively than conventional learning approaches.

3.2. Assumptions Testing

Several prerequisite analyses were conducted before performing MANOVA to ensure that the dataset fulfilled multivariate statistical assumptions. Assumption testing included normality distribution, homogeneity of variance–covariance matrices, and multicollinearity diagnostics between dependent variables. Satisfactory results from these preliminary analyses confirmed the appropriateness of conducting multivariate hypothesis testing.

The Kolmogorov–Smirnov test was applied to determine whether literacy and communication scores were normally distributed across both groups. Results presented in Table 3 demonstrate that all significance values exceeded the threshold of 0.05, indicating that the data were normally distributed.

Table 3. Normality Test Results (Kolmogorov–Smirnov).

Variables	Group	Statistic	df	Sig.
Literacy Skills	Experimental	0.091	30	0.200
Literacy Skills	Control	0.128	30	0.187
Communication Skills	Experimental	0.087	30	0.200
Communication Skills	Control	0.116	30	0.168

Based on Table 3, significance values ranging from 0.168 to 0.200 indicate that all variables met the assumption of normality. Distribution patterns therefore demonstrated adequate statistical properties for multivariate analysis procedures.

The Box’s M test was conducted to verify whether the covariance matrices were equal across groups. The result, displayed in Table 4, shows that the significance value exceeded 0.05, indicating that the homogeneity assumption was met.

Table 4. Box’s M Test for Homogeneity of Variance–Covariance Matrices.

Test	Box’s M	F	df1	df2	Sig.
Box’s M Test	5.21	1.07	3	20976.4	0.390

The Box’s M value of 5.21 with $p = 0.390$ (> 0.05) confirms that the variance–covariance matrices are homogeneous between the experimental and control groups. This result validates the equality assumption required for MANOVA analysis.

Multicollinearity was tested using Tolerance and Variance Inflation Factor (VIF) values derived from regression diagnostics. The test assesses whether the dependent variables are excessively correlated, which could bias multivariate estimates. The results are shown in Table 5.

Table 5. Multicollinearity Test Results (Tolerance and VIF).

Dependent Variable	Tolerance	VIF	Interpretation
Literacy Skills	0.627	1.595	No multicollinearity (VIF < 10; Tolerance > 0.10)
Communication Skills			

Tolerance values (0.627) are well above 0.10, and the VIF values (1.595) are below the threshold of 10, indicating no multicollinearity between the two dependent variables. This suggests that literacy and communication skills are related but statistically independent enough to be analyzed together in MANOVA.

3.3. Hypothesis Testing

Multivariate Analysis of Variance (MANOVA) was conducted to determine the effect of the Design Thinking model integrated with Neuro-Linguistic Programming (NLP) on students’ literacy and communication skills. The independent variable was the instructional model, while the two dependent variables were literacy and communication post-test scores. The MANOVA results revealed a statistically significant multivariate effect of the instructional treatment on the combined dependent variables. Table 6 summarizes the multivariate test results using Wilks’ Lambda, Pillai’s Trace, Hotelling’s Trace, and Roy’s Largest Root criteria.

Table 6. Multivariate Test Results (MANOVA).

Effect	Multivariate Test	Value	F	Hypothesis df	Error df	Sig.	Partial η^2
Instructional Model	Pillai’s Trace	0.388	18.09	2	57	0.001	0.38
	Wilks’ Lambda	0.612	18.09	2	57	0.001	0.38
	Hotelling’s Trace	0.634	18.09	2	57	0.001	0.38
	Roy’s Largest Root	0.634	18.09	2	57	0.001	0.38

The results of the multivariate tests show that the instructional model had a significant multivariate effect on the combined dependent variables, $F = 18.09$, $p < 0.001$, Wilks’ $\Lambda = 0.612$, $\eta^2 = 0.38$, indicating a large effect size. These findings suggest that the integrated Design Thinking–NLP model produced significant improvements in students’ overall literacy and communication performance compared to conventional teaching. Therefore, Tests of Between-Subjects Effects were performed to determine the individual contribution of each dependent variable to the overall multivariate effect. The results are displayed in Table 7.

Table 7. Tests of Between-Subjects Effects.

Dependent Variable	Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial η^2
Literacy Skills	Model	812.46	1	812.46	22.47	< 0.001	0.28
	Error	2098.35	58	36.18			
	Total	2910.81	59				
Communication Skills	Model	875.62	1	875.62	24.83	< 0.001	0.30
	Error	2044.21	58	35.25			
	Total	2919.83	59				

Univariate analysis demonstrated that the integrated instructional model significantly affected literacy skills, $F(1,58) = 22.47$, $p < 0.001$, partial $\eta^2 = 0.28$, and communication skills, $F(1,58) = 24.83$, $p < 0.001$, partial $\eta^2 = 0.30$. Effect size values exceeding 0.14 indicate strong practical effects for both dependent variables. Communication skills

exhibited slightly higher effect magnitude than literacy skills, suggesting that the integration of NLP strategies within Design Thinking activities particularly strengthened students' expressive interaction, verbal confidence, and communicative engagement during learning activities.

4. Discussion

The findings revealed statistically significant differences in the combined reading literacy and communication outcomes between students who participated in the Design Thinking model integrated with Neuro-Linguistic Programming and those who received conventional instruction. The multivariate analysis indicated a substantial difference between the two instructional groups within the present sample. Separate analyses also showed higher post-test performance among the experimental group in reading literacy and communication skills. Mean differences were consistent with these results, as the experimental group obtained higher reading literacy scores than the control group and demonstrated a similar advantage in communication performance. These outcomes suggest that participation in the integrated instructional model was associated with stronger cognitive and communicative performance under the conditions of the study. Such an interpretation is consistent with research emphasizing that learner-centered, collaborative, and reflective environments can support literacy engagement and communicative participation simultaneously (Colognesi, Coppe, & Lucchini, 2023; Eschenauer et al., 2023). Comparable evidence also indicates that active meaning construction and collaborative expression may strengthen students' ability to interpret information and communicate ideas more effectively (Anwar, Asari, Husniah, & Asmara, 2021; Sever & Akyol, 2022).

Higher reading literacy performance in the experimental group may be explained partly by the cognitive and iterative structure of Design Thinking. The empathize and define stages required students to identify contextual problems, interpret information, and consider the perspectives represented in texts, whereas the ideate, prototype, and test stages encouraged them to formulate, communicate, evaluate, and revise possible responses. These processes likely created more opportunities for students to connect textual information with authentic situations rather than merely recall predetermined answers. Previous empirical studies have shown that Design Thinking can strengthen reflective inquiry, problem framing, creativity, and learner engagement because students actively develop and refine ideas through repeated feedback (Bender-Salazar, 2023; Kristiantari et al., 2025). Research on Design Thinking in educational contexts also suggests that iterative problem-solving promotes conceptual elaboration and deeper engagement, although most previous applications have focused on STEM, innovation, or early-childhood creativity rather than elementary reading literacy (Solano et al., 2021; Zhang, Davarpanah, & Izadpanah, 2023). The present results therefore extend this literature by indicating that Design Thinking processes may also be relevant to language learning tasks that require students to identify main ideas, interpret vocabulary, understand narrative events, and produce written responses. This interpretation nevertheless remains provisional because the study did not directly measure the cognitive processes through which the five Design Thinking stages were related to literacy outcomes.

Communication scores demonstrated a slightly larger effect-size estimate than reading literacy scores, suggesting a comparatively stronger statistical association between instructional condition and communicative performance. NLP-based strategies embedded throughout the Design Thinking sequence may have supported students' readiness to speak, respond to peers, and express ideas during collaborative activities. Reframing was used to encourage more constructive interpretations of challenging tasks, anchoring was intended to associate participation with supportive emotional states, positive language reinforcement supported self-belief, and guided visualization prepared students for discussion and presentation activities. Previous studies have associated emotionally supportive and language-focused strategies with greater confidence, participation, and self-regulation during communication tasks (Fakhriddinova, 2025; Ismagulova, Ozhikenova, & Zhumabayeva, 2022). Related research also shows that learners' oral performance and classroom interaction improve when instructional environments provide repeated opportunities for expression, feedback, and psychologically safe participation (Almukhanbet, Moldabek, Orynbassarova, Yesnazar, & Zhorabekova, 2025; Angganing et al., 2022). The higher communication scores observed in this study are therefore consistent with the possibility that affective support and repeated interaction complemented the cognitive demands of Design Thinking. Definitive conclusions regarding this mechanism cannot be drawn, however, because emotional regulation, speaking anxiety, and communicative self-efficacy were not measured as mediating variables.

The principal theoretical contribution of the study lies in conceptualizing Design Thinking and NLP-based strategies as complementary rather than parallel instructional components. Design Thinking served as the cognitive and collaborative architecture through which students explored problems, interpreted information, generated ideas, developed responses, and evaluated outcomes. NLP-based strategies functioned as affective and communicative scaffolds intended to support participation throughout those stages. This integration advances approaches that address literacy, problem-solving, emotional readiness, or communication as separate instructional outcomes. Constructivist perspectives emphasize that learners develop understanding through active engagement, social interaction, and revision of ideas, whereas communicative perspectives view language as a medium through which meaning is articulated and negotiated (Akmalia et al., 2024; Chookhampaeng, Chantararat, & Chookhampaeng, 2024). Human-centered learning further recognizes that students' willingness to engage depends partly on whether instructional conditions acknowledge their experiences, emotions, and confidence (Atmaja, Jampel, Parmiti, Widiartini, & Ulak, 2025; Fauziyyah & Iswara, 2024). The integrated model connects these perspectives by proposing that literacy comprehension provides content for meaningful communication, while dialogue, feedback, and reflection help learners reconsider and refine their comprehension. Such reciprocity represents a more specific theoretical contribution than simply combining two instructional techniques.

The findings also provide practical implications for elementary language instruction. Teachers may use authentic problems, perspective-taking tasks, collaborative idea generation, prototype development, and peer feedback to transform reading activities from mechanical comprehension exercises into participatory meaning-making experiences. Affective and communicative scaffolds may be embedded at different instructional stages to encourage hesitant learners to participate, articulate interpretations, and respond constructively to their peers. Previous

evidence suggests that collaborative and performance-oriented language activities can strengthen both expressive competence and learner engagement when students receive structured opportunities to practice and reflect (Akmalia et al., 2024; Chookhampaeng et al., 2024). Multiliteracy research similarly indicates that meaningful interaction with diverse forms of information becomes more effective when learners are positioned as active interpreters and producers rather than passive recipients (Colognesi et al., 2023; Eschenauer et al., 2023). Curriculum developers and teacher education institutions may therefore consider integrating cognitive inquiry, iterative production, emotional support, and communicative interaction within elementary literacy programs. Successful implementation would require clear lesson scenarios, teacher preparation, age-appropriate problems, consistent facilitation, and fidelity monitoring rather than the unstructured use of isolated Design Thinking or NLP techniques.

Several alternative explanations should be considered before attributing the observed differences to the instructional model. The experimental and control groups consisted of intact classes from two different schools, which means that teacher characteristics, classroom climate, school culture, peer relationships, and prior instructional experiences may have differed between the groups. The novelty of the experimental activities may also have increased students' temporary motivation and participation independently of the specific theoretical components of the model. Teacher expectations, communication style, classroom management, and familiarity with learner-centered instruction may have influenced how students responded during the intervention. Educational research consistently demonstrates that instructional outcomes are shaped not only by the formal model but also by implementation quality, teacher mediation, and contextual conditions (Anwar et al., 2021; Sever & Akyol, 2022). Studies of learner-centered and collaborative approaches also indicate that peer dynamics and classroom support can affect participation, confidence, and achievement (Akmalia et al., 2024; Chookhampaeng et al., 2024). Standardized lesson plans, common curricular competencies, comparable instructional duration, structured observations, and validated scoring procedures reduced some sources of variation, but they could not eliminate all potential confounding factors.

The posttest-only design constitutes the most important methodological limitation. Standardized pretest measures were not administered, preventing direct statistical verification of baseline equivalence in reading literacy and communication skills. Preliminary classroom records suggested broadly comparable prior performance, but such records cannot substitute for equivalent pre-intervention assessments. Individual random assignment was also not possible because intact classes were retained, limiting the internal validity of causal claims. The relatively small sample of 60 fourth-grade students from two public elementary schools in Denpasar further restricts generalizability to other grade levels, school types, geographic areas, and cultural contexts. The six-week intervention may have been sufficient to identify short-term group differences but was not designed to determine whether the outcomes remained stable over time. Classroom observation and performance-based assessment provided useful contextual evidence, although deeper affective and metacognitive processes were not examined directly. Measurement scholarship also emphasizes the importance of multiple data sources and repeated assessment when evaluating complex constructs such as communication, engagement, and self-regulation.

Future research should employ pretest–posttest control-group designs, matched-group procedures, or randomized allocation where ethically and practically feasible. Larger multisite studies involving several teachers and schools would help distinguish instructional effects from teacher-level and school-level influences. Longitudinal follow-up assessments could determine whether differences in reading literacy and communication persist after the intervention ends. Mixed-method designs incorporating interviews, reflective journals, discourse analysis, video-based interaction analysis, and student work could clarify how learners experience the integrated model and how their meaning-making develops across instructional stages. Mediation analyses should also examine whether engagement, emotional regulation, communication confidence, collaborative interaction, or self-regulated learning explain the relationship between instructional participation and academic outcomes.

5. Conclusion

This study found that fourth-grade students who participated in the Design Thinking model integrated with NLP-based strategies achieved significantly higher posttest scores in reading literacy and communication skills than students who received conventional instruction. The findings indicate a meaningful association between participation in the integrated model and students' literacy and communication performance. However, the quasi-experimental, posttest-only design, absence of standardized baseline measures, and possible teacher- and school-level differences prevent definitive causal conclusions. The results therefore provide preliminary evidence supporting further investigation of an instructional framework that connects cognitive inquiry, collaborative meaning-making, emotional regulation, and communicative engagement in elementary language education.

References

- Aiken, L. R. (1985). Three coefficients for analyzing the reliability and validity of ratings. *Educational and Psychological Measurement*, 45(1), 131-142. <https://doi.org/10.1177/0013164485451012>
- Akmalia, P., Alaziz, F., & Zuraida. (2024). Reading literacy: How is it implemented at the elementary school level? *Journal of Indonesian Primary School*, 1(1), 11-18. <https://doi.org/10.62945/jips.v1i1.9>
- Almukhanbet, S., Moldabek, K., Orynassarova, G., Yesnazar, A., & Zhorabekova, A. (2025). Developing primary school students' language skills from a critical thinking perspective: A methodological system. *Frontiers in Education*, 10, 1565783. <https://doi.org/10.3389/educ.2025.1565783>
- Amar, M. Z. (2020). The development of story methods in learning Islamic education based on NLP (neuro-linguistic programming) in elementary schools. *Pedagogik Journal of Islamic Elementary School*, 3(1), 33-46. <https://doi.org/10.24256/pijies.v3i1.1248>
- Angganing, P., Budiningsih, C. A., & Haryanto. (2022). The profile of students' communication skills on science learning in elementary schools. *Pegem Journal of Education and Instruction*, 13(1), 117-124. <https://doi.org/10.47750/peggegog.13.01.14>
- Antara, I. G. W. S., & Dewantara, K. A. K. (2022). E-scrabbook: The needs of HOTS oriented digital learning media in elementary schools. *Journal for Lesson and Learning Studies*, 5(1), 71-76. <https://doi.org/10.23887/jlls.v5i1.48533>
- Anwar, K., Asari, S., Husniah, R., & Asmara, C. H. (2021). Students' perceptions of collaborative team teaching and student achievement motivation. *International Journal of Instruction*, 14(1), 325-344. <https://doi.org/10.29333/iji.2021.14119a>
- Atmaja, M. P. D., Jampel, N., Parmiti, D. P., Widiartini, N. K., & Ulak, N. (2025). Integrating Balinese local wisdom in culinary art program: Enhancing students' food literacy and culinary skills through discovery learning. *The New Educational Review*, 79, 112-130. <https://doi.org/10.15804/tner.2025.79.1.08>
- Bender-Salazar, R. (2023). Design thinking as an effective method for problem-setting and needfinding for entrepreneurial teams addressing wicked problems. *Journal of Innovation and Entrepreneurship*, 12(1), 24. <https://doi.org/10.1186/s13731-023-00291-2>

- Chookhampaeng, C., Chantararat, T., & Chookhampaeng, S. (2024). The outcomes of competency-based program about language for communication for early primary school students. *Journal of Education and Learning*, 13(5), 199-207. <https://doi.org/10.5539/jel.v13n5p199>
- Colognesi, S., Coppe, T., & Lucchini, S. (2023). Improving the oral language skills of elementary school students through video-recorded performances. *Teaching and Teacher Education*, 128, 104141. <https://doi.org/10.1016/j.tate.2023.104141>
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston, MA: Pearson.
- Eschenauer, S., Tsao, R., Legou, T., Tellier, M., André, C., Brugnoli, I., . . . Pasquier, A. (2023). Performing for better communication: Creativity, cognitive-emotional skills and embodied language in primary schools. *Journal of Intelligence*, 11(7), 140. <https://doi.org/10.3390/jintelligence11070140>
- Fakhriddinovna, A. S. (2025). Developing communicative skills in primary school students through inclusive education: A methodological approach. *ASEAN Journal of Community and Special Needs Education*, 4(2), 95-104.
- Fauziyyah, H. M., & Iswara, P. D. (2024). Transformation of reading literacy in elementary school students during the COVID-19 pandemic: A literature review. *Sekolah Dasar: Kajian Teori dan Praktik Pendidikan*, 33(2), 256-269. <https://doi.org/10.17977/um009v33i22024p256-269>
- Hair, J. F. J., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Thousand Oaks, CA: SAGE Publications, Inc.
- Ismagulova, R. S., Ozhikenova, A. K., & Zhumabayeva, A. E. (2022). Development of communicative skills among Kazakhstan primary school students. *International Journal of Education and Practice*, 10(2), 84-95. <https://doi.org/10.18488/61.v10i2.2946>
- Johnson, R. B., & Christensen, L. B. (2024). *Educational research: Quantitative, qualitative, and mixed approaches* (8th ed.). Thousand Oaks, CA: SAGE Publications, Inc.
- Juniantari, M., Ulfa, S., & Praherdhiono, H. (2023). Design thinking approach in the development of Cirgeo's world media. *Jurnal Nasional Pendidikan Teknik Informatika: JANAPATI*, 12(1), 42-55. <https://doi.org/10.23887/janapati.v12i1.55203>
- Kangas, M., & Rasi, P. (2021). Phenomenon-based learning of multiliteracy in a Finnish upper secondary school. *Media Practice and Education*, 22(4), 342-359. <https://doi.org/10.1080/25741136.2021.1977769>
- Kristiantari, M. G. R., Purnami, I. G. A. L., Trisiantari, N. K. D., Bayu, G. W., Dewantara, K. A. K., & Dewi, N. P. U. (2025). Design thinking learning with a neuro-linguistic programming (NLP) approach to enhance autonomous learning in early writing and reading. *International Journal of Language Education*, 9(3), 701-719. <https://doi.org/10.26858/ijole.v1i1.77406>
- Li, W., Kang, S., & Shao, Y. (2023). Development of the reading literacy questionnaire for EFL learners at primary schools. *Frontiers in Psychology*, 14, 1154076. <https://doi.org/10.3389/fpsyg.2023.1154076>
- Luo, Y., Geng, C., Pei, X., Chen, X., & Zou, Z. (2021). The evaluation of the distance learning combining webinars and virtual simulations for senior nursing students during the COVID-19 period. *Clinical Simulation in Nursing*, 57, 31-40. <https://doi.org/10.1016/j.jecns.2021.04.022>
- Mufliharsi, R., & Candra, E. N. (2018). The exploring participation in neuro-linguistic programming: Teacher and senior high school students' perceptions. *Proceeding of Community Development*, 2, 788-798.
- OECD. (2023). *PISA 2022 results (Volume I): The state of learning and equity in education*. Paris, France: OECD Publishing. <https://doi.org/10.1787/53f23881-en>
- Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (7th ed.). London, England: Routledge.
- Puger, I. G. N., Deng, J.-B., Antara, I. G. W. S., Dewantara, K. A. K., Sugiarta, M., Veliz, L., . . . Sudarma, I. K. (2024). Metacognition-based learning model: Improving agile innovation and critical thinking skills of students in science learning at elementary schools. *Jurnal Pendidikan IPA Indonesia*, 13(2), 255-264.
- Pujawan, I. G. N., Rediani, N. N., Antara, I. G. W. S., Putri, N. N. C. A., & Bayu, G. W. (2022). Revised Bloom taxonomy-oriented learning activities to develop scientific literacy and creative thinking skills. *Jurnal Pendidikan IPA Indonesia*, 11(1), 47-60. <https://doi.org/10.15294/jpii.v11i1.34628>
- Rasi, P., Kangas, M., & Ruokamo, H. (2019). Promoting multiliteracy in the Finnish educational system. In M. Paksuniemi & P. Keskitalo (Eds.), *Introduction to the Finnish educational system* (pp. 97-111). Leiden, the Netherlands: Brill.
- Satria, O. (2025). Theoretical and empirical review of reading literacy among elementary school students. *Indonesian Journal of Education and Science*, 1(5), 254-263.
- Sever, E., & Akyol, H. (2022). The impact of collaborative learning techniques on written expression, self-regulation and writing motivation. *International Electronic Journal of Elementary Education*, 14(5), 587-603. <https://doi.org/10.26822/iejee.2022.265>
- Solano, Q. P., Hayward, L., Chopra, Z., Quanstrom, K., Kendrick, D., Abbott, K. L., . . . George, B. C. (2021). Natural language processing and assessment of resident feedback quality. *Journal of Surgical Education*, 78(6), e72-e77. <https://doi.org/10.1016/j.j Surg.2021.05.012>
- Stevens, J. P. (2009). *Applied multivariate statistics for the social sciences* (5th ed.). New York, NY: Routledge.
- Susiani, K., Suranata, K., Suartama, I. K., Satyawan, I. M., Apriliana, I. P. A., & Bakar, A. Y. A. (2025). Development and initial psychometric properties of digital literacy and resilience scale among university students. *International Journal of Information and Education Technology*, 15(7), 1377-1383. <https://doi.org/10.18178/ijiet.2025.15.7.2339>
- Sutriyanti, N. K., Widiana, I. W., Windayani, N. L. I., & Antara, I. G. W. S. (2026). Enhancing academic and religious values through literacy: An ethnographic qualitative study in a Hindu student community. *The Qualitative Report*, 31(3), 5372-5399.
- Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Boston, MA: Pearson.
- Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273-1296. <https://doi.org/10.1007/s11165-016-9602-2>
- Tsai, C.-A., Song, M.-Y. W., Lo, Y.-F., & Lo, C.-C. (2023). Design thinking with constructivist learning increases the learning motivation and wicked problem-solving capability—An empirical research in Taiwan. *Thinking Skills and Creativity*, 50, 101385. <https://doi.org/10.1016/j.tsc.2023.101385>
- Wijaya, T. T., Hidayat, W., Hermita, N., Alim, J. A., & Talib, C. A. (2024). Exploring contributing factors to PISA 2022 mathematics achievement: Insights from Indonesian teachers. *Infinity Journal*, 13(1), 139-156. <https://doi.org/10.22460/infinity.v13i1.p139-156>
- Yalçın, V., & Erden, Ş. (2021). The effect of STEM activities prepared according to the design thinking model on preschool children's creativity and problem-solving skills. *Thinking Skills and Creativity*, 41, 100864. <https://doi.org/10.1016/j.tsc.2021.100864>
- Yusmaneli, Y., Fathurrahmad, F., & Raihani, A. (2025). A hybrid "probabilistic scaffold" model for enhancing reading literacy, numeracy, and AI literacy among Indonesian primary school students. *Design Journal*, 3(2), 78-98. <https://doi.org/10.58477/dj.v3i2.320>
- Zahro, N. K. (2017). Neuro-linguistic programming (NLP) training to boost self-confidence. *Persona: Jurnal Psikologi Indonesia*, 6(1), 40-51. <https://doi.org/10.30996/persona.v6i1.1629>
- Zhang, X., Davarpanah, N., & Izadpanah, S. (2023). The effect of neurolinguistic programming on academic achievement, emotional intelligence, and critical thinking of EFL learners. *Frontiers in Psychology*, 13, 888797. <https://doi.org/10.3389/fpsyg.2022.888797>