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Enhancing Creative Thinking Skills Through Infographic-Based Instruction in Grade 4 Araling Panlipunan

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Abstract— This study examined the effectiveness of infographic-based instruction in enhancing the creative thinking skills of Grade 4 learners in Araling Panlipunan. Local assessment data showed that learners struggled with analysis, synthesis, and creative application, with baseline scores falling below the Division of Quezon standard of 75.0. Grounded in Cognitive Load Theory, Dual Coding Theory, and the Four C Model of Creative Thinking, the study posited that infographics can manage cognitive load while providing structured opportunities for creative expression. A one-group pretest-posttest quasi-experimental design was used with 28 Grade 4 pupils at Rosendo Algenio Elementary School over four to six weeks. Creative thinking was operationalized across three dimensions: analytical, innovative, and collaborative thinking. Pretest scores placed students at the Average Mastery level across all dimensions (overall MPS = 40.13%). Following the intervention, posttest results showed marked improvement: Analytical Thinking reached Closely Approximating Mastery (MPS = 91.40%), Innovative Thinking similarly improved (MPS = 89.30%), and Collaborative Thinking posted the highest gain (MPS = 92.90%). These gains were statistically significant ($t = -25.922$, $p < 0.001$), leading to rejection of the null hypothesis. The findings demonstrate that infographic-based instruction is an effective and accessible strategy for developing creative competencies in elementary settings, providing an empirical basis for integrating visual literacy into the Revised K to 12 Curriculum.

Keywords— Creative Thinking Skills, Infographic-Based Instruction, Araling Panlipunan, Analytical Thinking, Innovative Thinking, Collaborative Thinking.

I. INTRODUCTION

Today's educational demands call for pedagogical innovation, as traditional teaching approaches are no longer sufficient to address the complex learning needs of 21st-century students. In the Philippine context, the Revised K to 12 Curriculum explicitly calls for the development of critical thinking, creativity, and collaboration — competencies that require instructional strategies capable of transforming passive knowledge reception into active cognitive engagement (Department of Education, 2023; OECD, 2024).

Among emerging pedagogical tools, infographics — visual representations that combine text, images, data visualizations, and design features — have received substantial attention in educational research. Grounded in Dual Coding Theory (Clark & Paivio, 1991), infographics engage both verbal and visual information-processing systems simultaneously, enabling learners to create richer mental representations and stronger retrieval pathways. Recent meta-analyses support a considerable positive impact of infographic-based instruction on

academic achievement across disciplines and educational levels, with effect sizes ranging from moderate to large (Machingambi et al., 2024).

Beyond improving comprehension, infographic-based instruction shows great potential for developing creative thinking — the ability to generate new ideas, analyze information critically, and collaborate effectively in problem-solving (Paz-Baruch et al., 2025). The Araling Panlipunan curriculum, with its inherent visual content (maps, timelines, cultural diagrams), is a natural setting for systematic infographic integration.

However, student-centered infographic activities at the elementary level remain underexplored, with most Philippine research concentrated at secondary and tertiary levels (Jaleniauskiene & Kasperiuniene, 2024).

This gap is practically significant at Rosendo Algenio Elementary School in Dolores, Quezon, where Grade 4 Araling Panlipunan learners achieved a Mean Percentage Score (MPS) of 45.4 on the First Quarter Examination — 29.6 points below the Division of Quezon standard of 75.0.

Classroom observations confirmed that while students can retain basic information, they struggle with higher-order tasks requiring analysis, synthesis, and creative application. This study therefore examined the effects of systematically integrating infographic-based instruction on the creative thinking skills of Grade 4 learners across three dimensions: analytical, innovative, and collaborative thinking.

II. METHODOLOGY

A. Research Design

A one-group pretest-posttest quasi-experimental design was employed. This design measures the dependent variable (creative thinking skills) before and after the intervention, with the effectiveness of the intervention assessed by observing changes between the two measurement points (Creswell & Creswell, 2018). A quasi-experimental design was chosen for practical and ethical reasons: random assignment in intact classroom settings is logistically disruptive and ethically problematic, as it would require withholding potentially beneficial instruction from some learners (Gopalan et al., 2020). The short intervention period (four to six weeks) and the specificity of the construct measured limit concerns about maturation or history effects as alternative explanations for observed gains.

B. Participants and Setting

The study involved 28 Grade 4 learners (11 male, 60.7% female) from the Sunflower section of Rosendo Algenio Elementary School, Municipality of Dolores, Division of Quezon, for the school year 2025–2026. Total population sampling was employed, including all pupils from the identified section. Inclusion criteria required official enrollment, submission of signed parental and child consent/assent, attendance at both pretest and posttest sessions, and at least 80% attendance during the intervention. All 28 participants met the inclusion criteria with zero attrition.

C. Intervention

The infographic-based instructional intervention was implemented over four to six weeks during regular Araling Panlipunan classes, aligned with the fourth-quarter competencies on Filipino Identity and Citizenship. The intervention included four components: (1) teacher-presented infographics for content scaffolding; (2) guided student analysis of professionally designed infographics; (3) collaborative interpretation and group discussion activities; and (4) learner-generated infographic projects demonstrating synthesis and creative application. Infographics were designed using locally available materials — manila paper, markers, templates, and printed visuals — ensuring accessibility in a resource-constrained public school setting.

D. Research Instrument

The Creative Thinking Skills Test (CTST) is a researcher-developed, criterion-referenced assessment comprising 30 multiple-choice items distributed across three dimensions: Analytical Thinking (10 items, pattern recognition and critical evaluation), Innovative Thinking (10 items, idea generation and novel synthesis), and Collaborative Thinking (10 items, peer cooperation and perspective integration). Items were designed with contexts familiar to 9–10-year-old Filipino learners to ensure cognitive resources were directed toward higher-order reasoning rather than language interpretation. The instrument underwent content validation by subject specialists and ALS experts, face validation by experienced practitioners, and pilot testing for item difficulty and internal consistency.

E. Statistical Treatment

Descriptive statistics — mean, standard deviation, and Mean Percentage Score (MPS) — were computed for pretest and posttest scores on each dimension and overall. MPS values were interpreted using DepEd Division of Quezon performance-level descriptors. A paired-samples t-test was used to test the significance of differences between pretest and posttest scores, with significance set at $\alpha = 0.05$.

III. RESULTS AND DISCUSSION

A. Pretest Creative Thinking Skills

Table 1. Pretest Creative Thinking Skills of Grade 4 Pupils

Creative Thinking Skills	Mean	SD	MPS (%)	Verbal Interpretation
Analytical Thinking	4.00	1.25	40.00	Average Mastery
Innovative Thinking	4.00	1.36	40.00	Average Mastery
Collaborative Thinking	4.07	1.36	40.70	Average Mastery
Overall	12.04	3.14	40.13	Average Mastery

Note. MPS = (Mean / Maximum Score) × 100.

Legend: Mastered (96–100%), Closely Approximating Mastery (86–95%), Moving Toward Mastery (66–85%), Average Mastery (35–65%), Low Mastery (15–34%), Very Low Mastery (5–14%), Absolutely No Mastery (0–4%)

Table 1 shows that prior to the intervention, Grade 4 learners scored at the Average Mastery level across all three dimensions of creative thinking, with an overall MPS of 40.13% (M = 12.04, SD = 3.14). Analytical Thinking and

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Innovative Thinking both obtained mean scores of 4.00 with MPS values of 40.00%, while Collaborative Thinking was marginally higher (M = 4.07, MPS = 40.70%). The relatively uniform clustering of scores around the 40% mark and the low standard deviations — particularly for Analytical Thinking (SD = 1.25) — indicate a homogeneous baseline of limited creative thinking capacity.

Qualitatively, the pretest results indicate that learners could identify obvious facts and simple cause-and-effect relationships but struggled to read between the lines, generate novel solutions, or execute collaborative reasoning beyond basic task-splitting. These findings are consistent with national assessment patterns documented in the SEA-PLM (UNICEF, 2019), where Filipino Grade 4 students showed particular difficulty with higher-order tasks, and with Echavez et al. (2024), who noted that many Philippine classrooms remain focused on lower-level cognitive skills despite policy imperatives for deeper learning. From the perspective of Cognitive Load Theory (Sweller, 2020), the baseline results reflect the cognitive inefficiency of text-heavy, teacher-centered instruction, which creates extraneous cognitive load that reduces available mental resources for germane, creative processing.

B. Posttest Creative Thinking Skills

Table 2. Posttest Creative Thinking Skills of Grade 4 Pupils

Creative Thinking Skills	Mean	SD	MPS (%)	Verbal Interpretation
Analytical Thinking	9.14	1.01	91.40	Closely Approximating Mastery
Innovative Thinking	8.93	1.02	89.30	Closely Approximating Mastery
Collaborative Thinking	9.29	1.01	92.90	Closely Approximating Mastery
Overall	27.36	2.20	91.20	Closely Approximating Mastery

Note. MPS = (Mean / Maximum Score) × 100.

Legend: Mastered (96–100%), Closely Approximating Mastery (86–95%), Moving Toward Mastery (66–85%), Average Mastery (35–65%), Low Mastery (15–34%), Very Low Mastery (5–14%), Absolutely No Mastery (0–4%)

Table 2 reveals a dramatic improvement across all dimensions following the infographic-based instructional intervention. The overall posttest MPS rose to 91.20% (M = 27.36, SD = 2.20), elevating learners from Average Mastery to Closely Approximating Mastery. Analytical Thinking reached an MPS of 91.40% (M = 9.14, SD = 1.01), Innovative Thinking achieved 89.30% (M = 8.93, SD = 1.02), and Collaborative Thinking posted the highest posttest performance at 92.90% (M = 9.29, SD = 1.01).

The posttest data indicate that learners transformed from passive information consumers to active interpreters of ideas. Students demonstrated the capacity to independently deconstruct complex visual layouts, cross-reference historical information, generate original civic solutions, and engage in deliberative peer discussions. The lower standard deviations in the posttest relative to pretest reflect greater consistency of performance across the class, suggesting that infographic-based instruction was effective for learners across the ability spectrum.

Collaborative Thinking emerged as the highest-performing dimension (MPS = 92.90%), likely because the infographic-based activities — group analysis, joint brainstorming, and co-created visual projects — provided repeated, structured opportunities for perspective-taking and collective problem-solving. This finding aligns with Ismaeel (2021), who documented that collaborative infographic projects enhance peer interaction and cooperative reasoning. Innovative Thinking had the lowest posttest MPS (89.30%), consistent with the Four C Model's (Kaufman & Beghetto, 2023) recognition that creative expression develops incrementally through supported engagement, and that originality and synthesis require more sustained practice to reach consistently mastered levels.

C. Paired-Samples t-Test: Creative Thinking Before and After Intervention

Table 3. Paired Samples t-Test Results: Creative Thinking Skills Before and After Implementation

Creative Thinking Skills	Mean Diff.	SD	SEM	95% CI Lower	95% CI Upper	t	df	p-value
Analytical Thinking	-5.143	1.580	0.299	-5.756	-4.530	-17.220	27	0.000
Innovative Thinking	-4.929	1.720	0.325	-5.595	-4.262	-15.164	27	0.000
Collaborative Thinking	-5.214	1.287	0.243	-5.713	-4.715	-21.440	27	0.000
Overall	-15.321	3.128	0.591	-16.534	-14.109	-25.922	27	0.000

Note. Significance level set at α = 0.05. SEM = Standard Error of the Mean; CI = Confidence Interval. p < 0.001 for all pairs.

Table 3 presents conclusive statistical evidence of the effectiveness of infographic-based instruction. The null hypothesis — that there is no significant difference in overall creative thinking skills before and after the intervention — is rejected at $p < 0.001$ across all dimensions and the overall construct. The overall mean difference of −15.321 and t-value of −25.922 ($df = 27$, $p < 0.001$) confirm that the leap from baseline Average Mastery (MPS = 40.13%) to Closely Approximating Mastery (MPS = 91.20%) is statistically significant and substantively meaningful.

For Analytical Thinking, the significant mean difference of −5.143 ($t = -17.220$, $p < 0.001$) is explained by infographics' visual chunking and hierarchical spatial organization, which pre-organized complex historical content into clear, manageable structures. This reduced extraneous cognitive load (Sweller, 2023) and freed mental resources for pattern recognition, cross-referencing, and evidence-based interpretation. For Innovative Thinking (M diff = −4.929, $t = -15.164$, $p < 0.001$), the dual-coding effect of combining text with kid-friendly cultural symbols and visual metaphors provided the psychological safety and conceptual freedom for learners to generate original, nontraditional ideas beyond memorized responses (Paivio & Clark, 2018).

The most statistically significant change was in Collaborative Thinking (M diff = −5.214, $t = -21.440$, $p < 0.001$). Infographics served as highly scannable shared visual anchors during group work — providing an instant, common reference point that leveled participation, reduced comprehension barriers, and transformed task-splitting into deliberative peer discussions. These results align with Caña and Brion (2023), who found that infographics reduce cognitive overload and allow elementary students to allocate mental resources to higher-

order and collaborative tasks, and with Kilaton and Ranoa (2023), who documented that collaborative visual anchors facilitate more equitable peer interaction.

IV. CONCLUSIONS

The study demonstrates a substantial and statistically significant difference in creative thinking skills of Grade 4 learners before and after infographic-based instruction across all dimensions and the overall construct. The consistent rejection of the null hypothesis confirms that the dramatic shift from Average Mastery (MPS = 40.13%) to Closely Approximating Mastery (MPS = 91.20%) in four to six weeks is attributable to the visual intervention and not to chance.

Infographic-based instruction proves to be an effective and accessible pedagogical scaffold for elementary social studies, operating through three complementary mechanisms: reducing extraneous cognitive load (Cognitive Load Theory), activating dual representational systems that strengthen encoding and creative flexibility (Dual Coding Theory), and providing developmentally appropriate mini-c and little-c creative opportunities that build gradually toward mastery (Four C Model). Together, these theoretical mechanisms explain how infographics simultaneously improved comprehension, analytical reasoning, innovative synthesis, and collaborative problem-solving in a resource-constrained Philippine public school setting.

The findings add empirical support to the growing Philippine literature on visual pedagogy (Caña & Brion, 2023; Kilaton & Ranoa, 2023; Quijano, 2022) while broadening the evidence base down to the elementary level and outward from comprehension outcomes to the wider domain of creative thinking — addressing a significant gap in existing research.

V. RECOMMENDATIONS

Araling Panlipunan teachers should transition from text-heavy lectures to visual scaffolding by systematically replacing dense textual materials with localized infographics aligned to quarterly learning competencies. When designing group activities, teachers should place infographics at the center as shared visual anchors, providing equitable entry points that encourage peer argumentation and collaborative problem-solving rather than simple task-splitting.

School administrators and principals should schedule Learning Action Cell (LAC) sessions focused on visual literacy design, enabling Master Teachers to facilitate workshops on transforming Araling Panlipunan competencies into visually organized, learner-friendly infographics. Schools should also create a shared digital Infographic Bank linked to quarterly competencies to reduce teachers' preparation burden and ensure consistency across grade levels.

Curriculum developers should institutionalize infographic-based analysis in division-wide assessments and quarterly examinations — moving beyond recall-based items to include visual summaries and graphics requiring

higher-order analytical and innovative reasoning, consistent with DepEd Order No. 10, s. 2024 and the Matatag Curriculum framework.

Future researchers are encouraged to replicate this study with a control group design to strengthen causal inference, and to employ validated instruments such as the Torrance Tests of Creative Thinking (TTCT) to capture open-ended divergent thinking beyond multiple-choice formats. Longitudinal designs examining whether creative thinking gains are sustained over time, and comparative studies across different subject areas and grade levels, would further enrich the evidence base for visual pedagogy in Philippine elementary education.

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REFERENCES

[1] Adolfo, J. H., & Sinang, A. J. (2025). Meaningful learning in social studies: An exploratory factor analysis. European Journal of Social Sciences Studies, 10(5), 1–15.

[2] Aguilar, L. A., & Panoy, M. T. (2022). Development and validation of contextualized infographic materials in science for Grade 7 modular distance learners. Philippine Journal of Science Education, 15(2), 89–104.

[3] Aldalalah, M. A. (2021). The effect of infographic designs on creative thinking skills among students with visual literacy. International Journal of Learning, Teaching and Educational Research, 20(5), 224–242.

[4] Beghetto, R. A. (2020). Creativity in the classroom. In M. A. Runco & S. R. Pritzker (Eds.), Encyclopedia of creativity (3rd ed., pp. 313–318). Academic Press.

[5] Beghetto, R. A., & Kaufman, J. C. (2007). Toward a broader conception of creativity: A case for 'mini-c' creativity. Psychology of Aesthetics, Creativity, and the Arts, 1(2), 73–79.

[6] Caña, M. L., & Brion, J. F. (2023). Use of infographics in student's comprehension level in Araling Panlipunan 10. International Journal of Social Science and Education Research Studies, 3(2), 45–58.

[7] Castro-Alonso, J. C., Wong, M., Adesope, O. O., Ayres, P., & Paas, F. (2024). Gender imbalance in instructional dynamic versus static visualizations: A meta-analysis. Educational Psychology Review, 36, Article 9.

[8] Chen, O., Paas, F., & Sweller, J. (2024). Cognitive load theory and multimedia learning. In R. E. Mayer & L. Fiorella (Eds.), The Cambridge handbook of multimedia learning (3rd ed., pp. 103–111). Cambridge University Press.

[9] Clark, J. M., & Paivio, A. (1991). Dual coding theory and education. Educational Psychology Review, 3(3), 149–210.

[10] Clinton-Lisell, V., & Litzinger, C. (2024). Is it really a neuromyth? A meta-analysis of the learning styles matching hypothesis. Frontiers in Psychology, 15, Article 1428732.

[11] Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.

[12] Cuevas, J., & Dawson, B. L. (2018). A test of two alternative cognitive processing models: Learning styles and dual coding. Theory and Research in Education, 16(1), 40–64.

[13] De Castro, J. L. (2021). Enhancing geographical literacy in Grade 4 Araling Panlipunan through infographic-integrated instruction. Journal of Localized Educational Research, 5(1), 32–47.

[14] Department of Education. (2023). Matatag curriculum framework. Republic of the Philippines.

[15] Dunlap, J. C., & Lowenthal, P. R. (2016). Getting graphic about infographics: Design lessons learned from popular infographics. Journal of Visual Literacy, 35(1), 42–59.

[16] Echavez, R., Echavez, A., Jr., Comaling, M. C., Obiasada, V., Baquiran, M., & Kilag, O. K. (2024). Literacy disparities and educational challenges in the Philippines: A systematic review. International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence, 1(2), 164–169.

[17] Er, H., & Yilmaz, A. (2023). The effect of dual-coded instruction on vocabulary acquisition and comprehension in elementary social studies. Elementary Education Online, 22(3), 1245–1260.

[18] Gopalan, M., Rosinger, A., & Ahn, J. B. (2020). Use of quasi-experimental designs in education research: Growth, promise, and challenges. Review of Research in Education, 44(1), 218–243.

[19] Hameed, A., & Jabeen, S. (2022). Visualizing imagination: The role of infographics in fostering original thought and idea development in creative writing. Journal of Creative Behavior in Education, 18(3), 214–229.

[20] Ismaeel, D. (2021). The effectiveness of infographic-based collaborative activities on student engagement and problem-solving skills. Educational Technology & Society, 24(2), 89–103.

[21] Jaleniauskiene, E., & Kasperiuniene, J. (2024). Integration of infographics in higher education: Challenges faced by novice creators. Journal of Visual Literacy, 43(2), 234–256.

[22] Kates, A. W. (2023). Infographic creation as a vehicle for developing creative thinking in digital environments. Journal of Visual Literacy, 42(3), 412–429.

[23] Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The Four C model of creativity. Review of General Psychology, 13(1), 1–12.

[24] Kaufman, J. C., & Beghetto, R. A. (2023). Where is the when of creativity? Specifying the temporal dimension of the Four Cs of creativity. Review of General Psychology, 27(1), 102–111.

[25] Kaufman, J. C., Beghetto, R. A., & Roberts, A. M. (2022). Creativity in the schools: Creativity models and new directions. In M. J. Furlong, D. Vella-Brodrick, & K. Allen (Eds.), Handbook of positive psychology in schools (3rd ed., pp. 287–302). Routledge.

[26] Kennedy, M. J., & Romig, J. E. (2021). Cognitive load theory: An applied reintroduction for special and general educators. Intervention in School and Clinic, 57(2), 105–114.

[27] Kilaton, L. J., & Ranoa, C. A. (2023). Impact of infographics on Filipino literature comprehension among senior high school students. Philippine Journal of Education and Literacy, 8(1), 112–127.

[28] Machingambi, S., Ndlovu, M., & Maphosa, C. (2024). The effectiveness of using infographics on academic achievement: A meta-analysis. Journal of Pedagogical Research, 8(2), 89–106.

[29] Nurjanah, N. E., Yetti, E., & Sumantri, M. S. (2024). Developing creative thinking in preschool children: A comprehensive review of innovative approaches. European Journal of Educational Research, 13(3), 1303–1319.

[30] OECD. (2024). Teaching, learning and assessing creative and critical thinking skills in education. Organisation for Economic Co-operation and Development.

[31] Paas, F., & van Merriënboer, J. J. G. (2020). Cognitive-load theory: Methods to manage working memory load in the learning of complex tasks. Current Directions in Psychological Science, 29(4), 394–398.

[32] Paivio, A., & Clark, J. M. (2018). Dual coding theory and education: A new chapter. In R. E. Mayer (Ed.), The Cambridge handbook of multimedia learning (pp. 13–36). Cambridge University Press.

[33] Paz-Baruch, N., Leikin, M., & Leikin, R. (2025). Creative thinking skills: Review of the concept and its assessment. Thinking Skills and Creativity, 55, 101–117.

[34] Philippine Institute for Development Studies (PIDS). (2023). Review of the K to 12 curriculum implementation. PIDS Discussion Paper.

[35] Quijano, M. B. (2022). Development and validation of infographic-based learning package in Araling Panlipunan for secondary students. Philippine Journal of Social Studies Education, 10(1), 34–49.

[36] Sweller, J. (2020). Cognitive load theory and educational technology. Educational Technology Research and Development, 68, 1–16.

[37] Sweller, J. (2023). The development of cognitive load theory: Replication crises and incorporation into broader theory. Educational Psychology Review, 35, 95.

[38] UNICEF. (2019). Southeast Asia Primary Learning Metrics (SEA-PLM). UNICEF Regional Office for East Asia and the Pacific.

[39] Willemsen, R. H., Sijthoff, J., & Kroesbergen, E. H. (2024). Analytical thinking and creative problem-solving in elementary learners. Creativity Research Journal, 36(1), 12–28.