RafandhaPress

Bulletin of Educational Management and Innovation
DOI: https://journal.rafandhapress.com/BEMI/article/view/140
E-ISSN: 2986-8688 | https://journal.rafandhapress.com/BEMI

Effectiveness of Tri-N-based unplugged coding instruction cards for figurative language learning in elementary schools

Nurul Faikoh[1], Akbar Al Masjid[2]*, Anang Sudigdo[2], Siti Anafiah[2], Dwi Susanto[2], Suhailee Sohnui[3]

[1]SD Negeri Ngemplak 2, Umbulmartani Ngemplak Sleman Yogyakarta, Indonesia
[2]Universitas Sarjanawiyata Tamansiswa, Jl. Batikan, No.1043/UH.III, Yogyakarta, Indonesia
[3]Chiang Mai University, Huay Kaew Road Muang District, Chiang Mai 50200 Thailand, Thailand
*Correspondence: ✉ almasjida@ustjogja.ac.id

ABSTRACT

Background: Majas learning plays an important role in increasing students' imagination, interpretation skills, and appreciation of literary texts. Majas learning is not only a linguistic skill but also a cognitive process that requires a deeper conceptual understanding. Based on field data, many students tend to rely on memorization rather than understanding the meaning and function of figurative expressions so that learning activities have not effectively facilitated students' conceptual understanding.

Purpose: This study aims to examine the effectiveness of Tri-N-based unplugged coding instruction card media in improving students' understanding of figurative language.

Method: This study used a quantitative pre-experimental design with a one-group pretest–posttest model involving 75 fifth-grade students from three elementary schools. Data were collected through tests and analyzed using descriptive statistics, Shapiro–Wilk normality test, paired sample t-test, and N-Gain analysis.

Findings: The results show that the mean score increased from 72.35 to 86.43, with a gain of 14.08 points. The paired sample t-test indicated a significant difference ($p < 0.001$), and the N-Gain score was 0.51 (moderate). These findings indicate that the media is effective in improving students' conceptual understanding of figurative language.

Article History
Received: 9 May 2026
Revised: 30 June 2026
Accepted: 15 July 2026

Keyword
Unplugged coding, Tri-N approach, figurative language, learning effectiveness, elementary education.

How to cite:
Faikoh, N., Al Masjid, A., Sudigdo, A., Anafiah, S., Susanto, D., & Sohnui, S. (2026). Effectiveness of Tri-N-based unplugged coding instruction cards for figurative language learning in elementary schools. *Bulletin of Educational Management and Innovation*, *4*(1). 256-272. https://doi.org/10.56587/bemi.v4i1.140

INTRODUCTION

The implementation of the Merdeka Curriculum emphasizes meaningful, contextual, and student-centered learning, where students are encouraged to actively construct knowledge rather than passively receive information. In the context of Indonesian language learning, this paradigm shift requires instructional approaches that facilitate conceptual understanding and real-life application of language. Learning is expected to engage students in meaningful activities that support both cognitive and communicative

development, ensuring that language is understood not only as a system but also as a functional tool for expression (Kemendikbud, 2022).

At the elementary school level, Indonesian language learning plays a fundamental role in developing literacy and communication skills. Students are introduced to various language elements, including vocabulary, sentence structure, and literary features, which serve as the foundation for higher-level learning. Conceptual understanding in language learning is particularly important, as it enables students to interpret meaning, construct ideas, and communicate effectively in different contexts. Therefore, the effectiveness of instructional strategies becomes crucial in ensuring that learning objectives are achieved (Maritim, E. 2023).

One important component of language learning is figurative language, which involves the use of expressions that go beyond literal meanings. Figurative language plays a significant role in enhancing students' imagination, interpretation skills, and appreciation of literary texts. Through figurative expressions, students learn to understand implicit meanings, emotional nuances, and creative forms of communication. As such, mastering figurative language is not only a linguistic skill but also a cognitive process that requires deeper conceptual understanding (Thomas, D. P., et.al., 2025).

However, in practice, the teaching of figurative language in elementary schools often does not fully achieve these objectives. Based on the researchers' preliminary classroom observations conducted in the three participating elementary schools, many students tended to rely on memorization rather than understanding the meaning and function of figurative expressions. Students frequently experienced difficulties distinguishing among types of figurative language, particularly metaphor, personification, and hyperbole. These preliminary observations indicated that existing learning activities had not effectively facilitated students' conceptual understanding of figurative language.

Furthermore, the preliminary observations revealed that the limited use of instructional media contributed to the ineffectiveness of learning. Most teachers still relied on conventional teaching methods, such as lectures and textbook-based instruction, without integrating interactive and meaningful learning media. Although some teachers occasionally used visual materials or digital resources, these were generally not designed to support conceptual learning through structured and progressive learning activities. Consequently, students had limited opportunities to actively construct their understanding of figurative language concepts.

This condition is particularly problematic considering that elementary school students are in the concrete operational stage, where they require concrete representations to understand abstract concepts. Without appropriate instructional support, abstract materials such as figurative language become difficult to comprehend. Previous studies have shown

that the lack of concrete and contextual learning experiences can hinder students' ability to grasp deeper meanings in language learning (Tegeh, I. M, et.al., 2020).

Similar findings have been reported in other studies, which indicate that students often struggle to interpret figurative meanings due to the dominance of theoretical instruction over experiential learning. Teachers frequently face challenges in providing relevant examples that connect with students' daily experiences, resulting in learning that is less meaningful and less engaging (Wiejak, K. 2014). These findings highlight the need for instructional interventions that are not only innovative but also effective in improving learning outcomes.

In response to these challenges, the use of instructional media becomes essential in facilitating effective learning. Instructional media can enhance interaction, support engagement, and provide concrete representations of abstract concepts. Well-designed media can transform the learning process into an active and meaningful experience, thereby improving students' understanding and retention of knowledge (Devega, A. T., et.al. 2022; Aulia, H., et.al, 2024).

One promising approach is the use of unplugged coding, which introduces computational thinking concepts without relying on digital devices. This approach emphasizes structured, step-by-step activities that involve logic, sequencing, and problem-solving. By engaging students in physical and interactive activities, unplugged coding allows abstract thinking processes to be translated into concrete learning experiences, making it suitable for elementary school contexts (Threekunprapa, A., & Yasri, P., 2020; Chen, P., et al., 2023).

To further enhance its effectiveness, the integration of the Tri-N approach provides a pedagogical framework that supports gradual and meaningful learning. The Tri-N approach, consisting of Niteni, Nirokake, and Nambahi, emphasizes observation, imitation, and creation as sequential stages of learning. This approach aligns with the principles of active and constructivist learning, allowing students to build knowledge through experience and interaction (Setyawati, L., et.al. 2025; Rochmiyati, S., & Putro, D. B. W. 2020).

The combination of unplugged coding and the Tri-N approach offers a structured and activity-based learning model that has the potential to improve students' conceptual understanding. Through instruction cards, students engage in step-by-step activities that guide them in recognizing, applying, and creating figurative expressions. This process encourages active participation, collaboration, and creative thinking, which are essential components of effective learning.

Previous studies have demonstrated that innovative learning media, including game-based and interactive approaches, can significantly improve students' understanding of figurative language (Setiawan, R. B., & Cahyaningtyas, A. P. 2025; Azizah, S. N., & Triastuti, A.

2025; Yang, L. 2023). However, limited research has examined the effectiveness of integrating unplugged coding with the Tri-N approach in language learning contexts. This gap highlights the need for empirical studies that evaluate not only the development but also the effectiveness of such instructional innovations.

Therefore, this study aims to examine the effectiveness of Tri-N-based unplugged coding instruction card media in improving elementary students' understanding of figurative language. By focusing on learning outcomes, this study seeks to provide empirical evidence on whether the developed media can significantly enhance students' conceptual understanding and serve as an effective instructional alternative in elementary education.

METHODS

This study employed a quantitative approach using a pre-experimental design with a one-group pretest–posttest model to examine the effectiveness of Tri-N-based unplugged coding instruction card media in improving students' understanding of figurative language. This design was selected to measure changes in students' learning outcomes before and after the implementation of the instructional intervention, allowing for a direct assessment of its impact (Creswell & Creswell, 2018).

The study was conducted in three elementary schools, namely SDN Krawitan, SDN Ngemplak 2, and SDN Jaten. The participants consisted of 75 fifth-grade students selected through purposive sampling. Fifth-grade students were chosen because figurative language is part of the Indonesian language learning objectives at this grade level, making them directly relevant to the instructional intervention. The participating schools were selected based on several inclusion criteria: (1) they implemented the same national curriculum, (2) they had comparable learning objectives for Indonesian language instruction, (3) they had not previously implemented Tri-N-based unplugged coding instruction, and (4) they were willing to participate and provide access for the implementation of the study. These criteria ensured that the participants were appropriate for evaluating the effectiveness of the developed instructional media. The selection of multiple schools was intended to enhance the generalizability of the findings across different classroom contexts (Cohen, Manion, & Morrison, 2018).

Although the participants were recruited from three different elementary schools, all students were treated as a single experimental group because the purpose of this study was to evaluate the overall effectiveness of the Tri-N-based unplugged coding instruction cards rather than to compare learning outcomes across schools. The three schools shared similar characteristics, including the implementation of the same curriculum, comparable grade-level learning objectives, and similar educational contexts. Furthermore, the instructional procedures, learning materials, duration of the intervention, and assessment instruments

were standardized and implemented consistently across all participating schools. Therefore, combining participants into a single experimental group was considered appropriate for addressing the research objective.

The research procedure was carried out in three main stages: pretest, treatment, and posttest. In the pretest stage, students were given an initial assessment to measure their prior understanding of figurative language concepts, including metaphor, personification, and hyperbole. The treatment stage involved the implementation of the Tri-N-based unplugged coding instruction card media in classroom learning activities. Students engaged in structured learning processes based on the Tri-N approach, including observing examples (*Niteni*), imitating patterns (*Nirokake*), and creating new expressions (*Nambahi*). Finally, in the posttest stage, students completed an assessment equivalent to the pretest to evaluate their learning progress after the intervention.

The Tri-N-based unplugged coding instruction cards were designed to guide students through sequential problem-solving activities without using digital devices. Each instruction card contained a series of structured steps resembling a simple algorithm for identifying and constructing figurative language. During the Niteni stage, students observed example sentences and identified their characteristics. In the Nirokake stage, students followed guided procedures to classify figurative expressions based on explicit decision steps, such as identifying whether a non-human object was described with human actions to recognize personification. Finally, in the Nambahi stage, students modified or created their own figurative expressions by following similar sequential procedures. Through these activities, students practiced computational thinking skills, including sequencing, pattern recognition, logical decision-making, and rule-based reasoning, while learning figurative language concepts.

The instrument used in this study was a test designed to measure students' conceptual understanding of figurative language. The test consisted of items that required students to identify, classify, and construct figurative expressions. Prior to implementation, the instrument was reviewed to ensure content validity and alignment with learning objectives. The use of structured assessment instruments is essential in evaluating conceptual understanding in language learning contexts (Brookhart, 2017).

ability to identify, classify, and construct figurative language expressions. Each correct answer was awarded one point, while incorrect answers received zero points. The total raw score was subsequently converted to a scale of 0–100. Prior to implementation, the instrument underwent content validation by [jumlah validator] experts in Indonesian language education to ensure its relevance to the learning objectives. Instrument reliability was evaluated using KR-20 (or Cronbach's Alpha, sesuai jenis instrumen), yielding a coefficient of [nilai reliabilitas], indicating satisfactory internal consistency.

Data collection was conducted through tests, observations, and documentation. The test data were used to measure learning outcomes, while observations were conducted to monitor the implementation of the learning process. Documentation, including students' work and classroom activities, was used to support the validity of the findings.

Data analysis was carried out using descriptive and inferential statistical techniques. Descriptive analysis was used to calculate mean scores, minimum and maximum values, and gain scores. To determine whether the data met the assumptions for parametric testing, a normality test was conducted using the Shapiro–Wilk test. Since the data were normally distributed, a paired sample t-test was applied to examine the significance of the difference between pretest and posttest scores. In addition, the normalized gain (N-Gain) analysis was used to measure the effectiveness of the intervention by evaluating the magnitude of learning improvement (Field, 2018; Kim, 2019).

RESULT AND DISCUSSION

Result

To provide an initial overview of students' learning outcomes, descriptive statistical analysis was conducted on pretest and posttest scores across the three participating schools. This analysis aims to identify general patterns of improvement before proceeding to inferential statistical testing.

Descriptive Statistics of Learning Outcomes

Table 1.

Score Distribution (Minimum and Maximum)

School	Pretest Min	Posttest Min	Pretest Max	Posttest Max
SDN Krawitan	40	70	100	100
SDN Ngemplak 2	40	70	100	100
SDN Jaten	40	70	95	100

Descriptive statistical analysis was conducted to examine students' learning outcomes before and after the implementation of the Tri-N-based *unplugged coding* instruction card media. As presented in Table 1, all participating schools demonstrated an increase in mean scores from pretest to posttest.

At SDN Krawitan, the mean score increased from 75.88 to 88.82, with a gain of 12.94 points. SDN Ngemplak 2 showed an improvement from 72.10 to 86.94, resulting in a gain of 14.84 points. Similarly, SDN Jaten experienced an increase from 69.07 to 83.52, with a gain of 14.45 points. Overall, the average pretest score across all schools was 72.35, which increased to 86.43 in the posttest, indicating an overall gain of 14.08 points.

In addition, Table 2 shows that the minimum scores increased from 40 in the pretest to 70 in the posttest across all schools, while the maximum scores remained consistently high, reaching 100 in the posttest. This pattern indicates that not only did the average performance improve, but lower-achieving students also demonstrated substantial progress.

These findings suggest that the implementation of the developed learning media contributed to a consistent improvement in students' understanding of figurative language across different school contexts. However, further statistical analysis is required to determine the significance and effectiveness of this improvement.

Normality Test

Before conducting inferential statistical analysis, a normality test was performed to determine whether the data met the assumptions required for parametric testing. Since the total number of participants was 75 (n < 100), the Shapiro–Wilk test was selected as it is considered more appropriate and sensitive for small to moderate sample sizes.

The normality test was applied to both pretest and posttest scores to examine the distribution of the data. The results of the normality test are presented in Table 3.

Table 3.

Normality Test Results (Shapiro–Wilk)

Variable	N	Test	Sig. (p-value)	Interpretation
Pretest	75	Shapiro–Wilk	0.214	Normal
Posttest	75	Shapiro–Wilk	0.387	Normal

As shown in Table 3, both pretest and posttest scores have significance values greater than 0.05, indicating that the data are normally distributed. This result suggests that the assumption of normality has been met, allowing the use of parametric statistical tests for further analysis. Based on this finding, a paired sample t-test was deemed appropriate to examine the significance of the difference between pretest and posttest scores.

Hypothesis Testing (Paired Sample t-Test)

Following the confirmation of data normality, a paired sample t-test was conducted to determine whether there was a statistically significant difference between students' pretest and posttest scores. This test is suitable for comparing two related samples, particularly in a single-group pretest–posttest research design. The results of the paired sample t-test are presented in Table 4.

Table 4.

Paired Sample t-Test Results

Variable	Mean	N	Mean Difference	t	df	Sig. (2-tailed)
Pretest	72.35	75				
Posttest	86.43	75	14.08	**12.18**	**74**	**< 0.001**

As presented in Table 4, the mean score increased from 72.35 in the pretest to 86.43 in the posttest, resulting in a mean difference of 14.08 points. The paired-sample t-test revealed that this improvement was statistically significant ($t(74) = 12.18$, $p < .001$), indicating that students performed significantly better after the implementation of the Tri-N-based unplugged coding instruction card media.

These findings demonstrate that the instructional intervention effectively enhanced students' understanding of figurative language. The significant increase in learning outcomes suggests that the sequential and activity-based learning process facilitated by the Tri-N approach and unplugged coding enabled students to develop a deeper conceptual understanding of figurative language beyond their initial level of knowledge.

N-Gain Analysis

To further examine the effectiveness of the learning media, a normalized gain (N-Gain) analysis was conducted. This analysis aims to measure the magnitude of improvement in students' learning outcomes relative to their initial performance. N-Gain provides a more comprehensive understanding of effectiveness by considering both pretest and posttest scores.

The results of the N-Gain analysis are presented in Table 5.

Table 5.

N-Gain Analysis

School	N-Gain	Category
SDN Krawitan	0.54	Moderate
SDN Ngemplak 2	0.53	Moderate
SDN Jaten	0.47	Moderate
Average	0.51	Moderate

As shown in Table 5, the average N-Gain score across all schools is 0.51, which falls into the moderate category. Each school also demonstrated a consistent moderate level of improvement, indicating that the learning media was effective in facilitating meaningful learning gains. The moderate N-Gain category suggests that students were able to improve their understanding significantly, although there is still potential for further enhancement. Importantly, the consistency of N-Gain results across three different schools indicates that the effectiveness of the media is stable and not limited to a specific classroom context.

Summary of Statistical Findings

To provide a comprehensive interpretation, the results of the descriptive analysis, normality test, paired sample t-test, and N-Gain analysis are synthesized to evaluate the overall effectiveness of the developed learning media.

The findings indicate that students' learning outcomes improved significantly after the implementation of the Tri-N-based unplugged coding instruction card media. The normality test confirmed that the data met the assumptions for parametric testing. The paired sample t-test revealed a statistically significant improvement ($p < 0.001$), while the N-Gain analysis showed a moderate level of effectiveness.

Furthermore, the consistency of results across three different schools strengthens the reliability of the findings, suggesting that the developed media has a stable and positive impact on students' understanding of figurative language in diverse learning contexts.

Discussion

Improvement in Students' Learning Outcomes

The results of this study demonstrate a clear improvement in students' learning outcomes after the implementation of the Tri-N-based unplugged coding instruction card media. This improvement is reflected in the increase in mean scores from pretest to posttest, supported by statistically significant results ($p < 0.001$) and a moderate N-Gain score. The consistency of this improvement across three different schools indicates that the developed media has a stable and replicable impact in diverse classroom contexts. Such findings suggest that the intervention effectively enhanced students' understanding of figurative language rather than producing incidental or context-specific gains (Schneider & Preckel, 2017; Hattie, 2017).

The observed improvement also reflects a shift in students' learning processes, from rote memorization toward meaningful conceptual understanding. Initially, students tended to memorize types of figurative language without fully comprehending their meanings. However, after engaging with the developed media, students were able to interpret, differentiate, and construct figurative expressions more effectively. This shift aligns with contemporary perspectives on meaningful learning, which emphasize active cognitive engagement and the integration of new knowledge with prior understanding (Mayer, 2020; Fiorella & Mayer, 2016). As a result, students demonstrated deeper comprehension and improved ability to apply concepts in different contexts.

Furthermore, the improvement in learning outcomes can be interpreted as evidence of effective conceptual learning supported by active and structured instructional design. The integration of sequential learning activities within the media allowed students to gradually construct understanding through guided experiences. This approach is consistent with constructivist-oriented learning frameworks, which highlight the importance of interaction, scaffolding, and learner participation in knowledge construction (Darling-Hammond et al., 2020; OECD, 2019). The consistency of improvement across multiple schools suggests that the learning gains were influenced not only by individual student factors but also by the

effectiveness of the instructional design, reinforcing the role of well-structured learning media in promoting conceptual understanding.

Effectiveness of Unplugged Coding-Based Learning

The effectiveness of the Tri-N-based unplugged coding instruction card media observed in this study can be explained by the way the cards transform the identification of figurative language into a structured algorithmic reasoning process. The significant improvement in students' learning outcomes, reflected in the increase in the mean score from 72.35 to 86.43, indicates that students no longer relied solely on memorizing definitions of figurative language but instead applied explicit decision-making steps when analyzing sentences. Each instruction card guided students through a sequence of logical procedures resembling an algorithm, beginning with identifying the subject of a sentence, determining whether it referred to a human or a non-human entity, examining the type of action or description expressed, and finally matching these characteristics with the defining features of personification, metaphor, or hyperbole. This step-by-step reasoning reduced students' cognitive difficulty in distinguishing figurative language categories that are often perceived as conceptually similar.

The sequential logic embedded in the instruction cards also reflects the principles of computational thinking, particularly decomposition, pattern recognition, sequencing, and rule-based reasoning. Rather than asking students to recall abstract definitions, the cards encouraged them to decompose each sentence into smaller linguistic components and evaluate them systematically. For example, when students encountered a sentence describing an inanimate object performing a human action, the algorithm directed them to classify it as personification. Conversely, when the sentence contained deliberate exaggeration without attributing human characteristics to non-human objects, students identified it as hyperbole. This structured reasoning process minimized guesswork and enabled students to construct conceptual understanding through repeated analytical practice rather than rote memorization.

These findings suggest that the instructional effectiveness of the Tri-N-based unplugged coding media lies not merely in promoting active learning but in providing an explicit cognitive framework for stylistic decoding. The integration of the Tri-N stages with algorithmic thinking allowed students to observe language patterns (Niteni), apply guided classification procedures (Nirokake), and independently construct new figurative expressions (Nambahi). Consequently, the media supported deeper conceptual understanding by helping students internalize the logical characteristics of different figurative language forms, which is consistent with the significant improvement observed in the quantitative results of this study.

Role of the Tri-N Approach in Conceptual Learning

The Tri-N approach, consisting of Niteni (observing), Nirokake (imitating), and Nambahi (modifying or creating), plays a central role in supporting students' conceptual learning in this study. This approach provides a structured and sequential learning process that guides students from initial exposure to knowledge toward deeper understanding and independent application. In the Niteni stage, students observe examples of figurative language, allowing them to recognize patterns and build initial awareness. The Nirokake stage enables students to imitate these patterns, reinforcing understanding through guided practice. Finally, in the Nambahi stage, students develop their own expressions, encouraging creativity and knowledge construction. This progression reflects a form of natural scaffolding, where learners gradually move from supported learning to independent performance (Darling-Hammond et al., 2020; Hattie & Zierer, 2018).

Furthermore, the Tri-N approach supports constructivist learning by emphasizing active engagement and gradual knowledge construction. Through structured stages, students are not only exposed to concepts but are also encouraged to interact with, practice, and extend them in meaningful ways. This aligns with contemporary perspectives on learning that highlight the importance of scaffolding, guided instruction, and learner autonomy in achieving conceptual understanding (OECD, 2019; Schunk, 2020). The effectiveness of this approach lies in its ability to transform learning into a process rather than a one-time transfer of information. In this study, the integration of Tri-N within the learning media ensured that students progressed through observable, imitative, and creative stages, resulting in deeper comprehension and more sustainable learning outcomes.

The findings of this study can be interpreted through the lens of constructivist learning theory, which emphasizes that learners actively construct knowledge through interaction and experience rather than passively receiving information. The significant improvement in students' learning outcomes suggests that the Tri-N-based unplugged coding instruction card media facilitated an environment where students could engage meaningfully with learning materials. Through observation, imitation, and creation, students were able to build their understanding progressively, aligning with the principles of knowledge construction and learner-centered instruction. This is consistent with contemporary views on constructivist learning, which highlight the importance of active engagement, contextual learning, and interaction in promoting deeper understanding (Darling-Hammond et al., 2020; Schunk, 2020).

In addition, the effectiveness of the developed media can be explained through the integration of active learning and cognitive developmental theory. The activity-based nature of unplugged coding encourages students to participate actively in the learning process,

which has been shown to enhance engagement, retention, and conceptual understanding. Active learning environments enable students to process information more deeply through participation and collaboration (Freeman et al., 2017; Theobald et al., 2020). Furthermore, considering that elementary school students are generally in the concrete operational stage, they require learning experiences that involve tangible and structured representations of abstract concepts. The use of instruction cards and step-by-step activities provides concrete support that helps students bridge the gap between abstract figurative language concepts and their practical application. This alignment between instructional design and students' cognitive development contributes to the observed improvement in learning outcomes (OECD, 2019; Mayer, 2020).

The findings of this study are consistent with previous research highlighting the effectiveness of innovative instructional media in improving students' conceptual understanding. Numerous studies have shown that interactive, game-based, and activity-oriented learning media can significantly enhance students' engagement and comprehension, particularly in language and literacy learning contexts. For instance, digital and non-digital learning tools that incorporate active participation have been found to improve students' ability to understand abstract concepts by making learning more concrete and meaningful (Sailer & Homner, 2020; Anshari, Almunawar, Shahrill, Wicaksono, & Huda, 2017). Similarly, research on computational thinking and unplugged learning activities indicates that structured, hands-on approaches can support deeper cognitive processing and improve learning outcomes among elementary students (Brackmann et al., 2017; Rodríguez-Martínez et al., 2020). These findings reinforce the idea that instructional innovation plays a crucial role in facilitating meaningful learning.

However, this study offers a distinct contribution by integrating the unplugged coding approach with the Tri-N pedagogical framework, which has not been widely explored in previous research. While earlier studies tend to focus either on the use of innovative media or on computational thinking approaches independently, this study combines both within a structured learning process that emphasizes observation, imitation, and creation. This integration provides a more comprehensive instructional model that not only engages students but also supports gradual conceptual development through scaffolding. In this sense, the novelty of this study lies in its ability to bridge computational thinking and culturally rooted pedagogical approaches, resulting in a learning design that is both innovative and contextually relevant. Such integration contributes to the advancement of instructional design in elementary education by offering an alternative approach that is effective, adaptable, and theoretically grounded (Darling-Hammond et al., 2020; OECD, 2019).

CONCLUSION

This study demonstrates that the implementation of Tri-N-based unplugged coding instruction card media effectively improves elementary students' understanding of figurative language. The descriptive analysis shows an increase in mean scores from 72.35 (pretest) to 86.43 (posttest), with an average gain of 14.08 points. Statistical testing further confirms this improvement, as the paired sample t-test indicates a significant difference ($p < 0.001$). In addition, the N-Gain analysis resulted in an average score of 0.51, categorized as moderate, indicating meaningful learning improvement.

The effectiveness of the media can be attributed to its structured and activity-based design, which integrates the principles of unplugged coding and the Tri-N approach. This combination facilitates active engagement, sequential learning, and conceptual understanding, allowing students to move beyond rote memorization toward meaningful learning. The consistency of results across three schools further indicates that the developed media has a stable and adaptable impact in different classroom contexts.

In conclusion, the Tri-N-based unplugged coding instruction card media is empirically effective in enhancing students' conceptual understanding of figurative language and can serve as an innovative instructional alternative in elementary education.

From a practical perspective, the findings suggest that the Tri-N-based unplugged coding instruction card media can be implemented by elementary school teachers without requiring prior knowledge of computer science or programming. Because the learning activities rely on algorithmic reasoning through simple, paper-based instruction cards rather than digital technologies, teachers can readily integrate the media into regular Indonesian language lessons. This practicality makes the media particularly suitable for schools with limited technological resources while simultaneously introducing students to fundamental computational thinking skills in an accessible manner.

Despite these promising findings, this study employed a one-group pretest–posttest design without a control group, which limits the ability to establish strong causal inferences regarding the effectiveness of the instructional media. Therefore, future studies are encouraged to employ quasi-experimental or randomized controlled trial (RCT) designs involving control groups, larger and more diverse samples, and longer intervention periods to provide more robust evidence of the effectiveness and generalizability of the Tri-N-based unplugged coding instruction card media.

DECLARATIONS

Author Contribution

Faikoh, N., Conceptualization, Writing - Original Draft,; **Al Masjid, A**.,: Writing - Review & Editing and finalization manuscript; **Sudigdo, A**.,: Validation and Supervision; **Anafiah, S**.:

Formal analysis and Methodology; **Susanto, D**: Layouting and editing; **Sohnui, S**: Translating and proof reading.

Funding Statement

This research was supported by research funds from the UST Research and Community Service Institute.

Conflict of Interest

The authors declare no conflict of interest.

Declaration of AI Use

No generative AI tools were used in the preparation of this manuscript.

Additional Information

The data are available upon reasonable request.

REFERENCES

Anshari, M., Almunawar, M. N., Shahrill, M., Wicaksono, D. K., & Huda, M. (2017). Smartphones usage in the classrooms: Learning aid or interference? *Education and Information Technologies*, 22(6), 3063–3079. https://doi.org/10.1007/s10639-017-9572-7

Aulia, H., Hafeez, M., Mashwani, H. U., Careemdeen, J. D., Mirzapour, M., & Syaharuddin. (2024). The role of interactive learning media in enhancing student engagement and academic achievement. *Proceeding of International Seminar on Student Research in Education, Science, and Technology, 1*, 57–67

Azizah, S. N., & Triastuti, A. (2025). Implementing the Eclectic Blend of Genre-Based Instruction, Cooperative Learning, and Gamification to Improve Students' Knowledge of Songs. *Epistema*, 44-52. https://doi.org/10.21831/ep.v6i2.91884

Brackmann, C. P., Román-González, M., Robles, G., Moreno-León, J., Casali, A., & Barone, D. (2017). Development of computational thinking skills through unplugged activities in primary school. *Proceedings of the 12th Workshop on Primary and Secondary Computing Education*, 65–72. https://doi.org/10.1145/3137065.3137069

Brookhart, S. M. (2017). *How to use grading to improve learning*. ASCD.

Chen, P., Yang, D., Metwally, A. H. S., Lavonen, J., & Wang, X. (2023). Fostering computational thinking through unplugged activities: A systematic literature review and meta-analysis. *International Journal of STEM Education*, *10*(1), 47. https://doi.org/10.1186/s40594-023-00434-7

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge. https://doi.org/10.4324/9781315456539

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

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791

Devega, A. T., Ambiyar, A., Panyahuti, P., Adi, N. H., & Riyanda, A. R. (2022). The effectiveness of learning media on the outcome of computer and basic network of vocational students. *Jurnal Pendidikan Teknologi Kejuruan*, *5*(2), 47-52. https://doi.org/10.24036/jptk.v5i2.23123

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.

Fiorella, L., & Mayer, R. E. (2016). Eight ways to promote generative learning. *Educational Psychology Review*, 28(4), 717–741. https://doi.org/10.1007/s10648-015-9348-9

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2017). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 114(30), 8410–8415. https://doi.org/10.1073/pnas.1319030111

Hattie, J. (2017). *Visible learning for mathematics: What works best to optimize student learning*. Corwin. https://doi.org/10.4324/9781315206387-11

Hattie, J., & Zierer, K. (2018). *10 mindframes for visible learning: Teaching for success*. Routledge. https://doi.org/10.4324/9781315206387

Kemendikbud. (2022). *Kurikulum Merdeka: Capaian pembelajaran Bahasa Indonesia*. Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi.

Kim, S. (2019). Statistical notes for clinical researchers: Assessing normal distribution using skewness and kurtosis. *Restorative Dentistry & Endodontics*, 44(1), e6.

Maritim, E. (2023). The Essence And Curriculum Of Learning Indonesian Language In Elementary Schools. *International Journal of Education and Literature*, *2*(1), 49-57. https://doi.org/10.55606/ijel.v2i1.54

Mayer, R. E. (2020). *Multimedia learning* (3rd ed.). Cambridge University Press. https://doi.org/10.1017/9781108894333.003

OECD. (2019). *Future of education and skills 2030: OECD learning compass 2030*. OECD Publishing.

Rochmiyati, S., & Putro, D. B. W. (2020). The application of Tri-N in genre-based Indonesian textbook for junior high school. *Tamansiswa International Journal in Education and Science, 1*(2), 9-15. https://doi.org/10.30738/tijes.v1i2.7700

Rodríguez-Martínez, J. A., González-Calero, J. A., & Sáez-López, J. M. (2020). Computational thinking and mathematics using Scratch: An experiment with sixth-grade students.

Interactive Learning Environments, 28(3), 316–327. https://doi.org/10.1080/10494820.2019.1612448

Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. *Educational Psychology Review*, 32(1), 77–112. https://doi.org/10.1007/s10648-019-09498-w

Schneider, M., & Preckel, F. (2017). Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychological Bulletin*, 143(6), 565–600. https://doi.org/10.1037/bul0000098

Schunk, D. H. (2020). *Learning theories: An educational perspective* (8th ed.). Pearson.

Setiawan, R. B., & Cahyaningtyas, A. P. (2025). Development of Digital Comic KOMA (Komik Majas) for Teaching Personification in the Fourth Grade of Elementary School. *Jurnal Teknologi Pendidikan: Jurnal Penelitian dan Pengembangan Pembelajaran*, *10*(3), 373-385. https://doi.org/10.33394/jtp.v10i3.15697

Setyawati, L., Barriyah, I. Q., Al Masjid, A., & Wibawa, S. (2025). Strengthening Early Literacy through Collage Learning Based on Tri-N Local Wisdom: Case Study in Elementary Schools. *Jurnal Ilmiah Sekolah Dasar*, *9*(4), 721-732. https://doi.org/10.23887/jisd.v9i4.101012

Tegeh, I. M., Parwata, I. G. L. A., & Ostaviani, B. G. (2020). The observing learning activity assisted by concrete media improves student's conceptual knowledge. *JPI (Jurnal Pendidikan Indonesia)*, *9*(2), 182-192. https://doi.org/10.23887/jpi-undiksha.v9i2.25206

Theobald, E. J., Hill, M. J., Tran, E., Agrawal, S., Arroyo, E. N., Behling, S., et al. (2020). Active learning narrows achievement gaps for underrepresented students in STEM. *Proceedings of the National Academy of Sciences*, 117(12), 6476–6483. https://doi.org/10.1073/pnas.1916903117

Thomas, D. P., Walton, J., Tann, K., Shoecraft, K., Lowien, N., & Scott, A. (2025). Figurative language and narrative writing: insights from high-achieving primary school students. *The Australian Educational Researcher*, *52*(6), 4097-4126. https://doi.org/10.1007/s13384-025-00890-w

Threekunprapa, A., & Yasri, P. (2020). Unplugged Coding Using Flowblocks for Promoting Computational Thinking and Programming among Secondary School Students. *International Journal of Instruction*, *13*(3), 207-222. https://doi.org/10.29333/iji.2020.13314a

Wiejak, K. (2014). Recognition of figurative language and reading ability in Polish school children. *L1-Educational Studies in Language and Literature*, 1-14. https://doi.org/10.17239/L1ESLL-2014.01.12

Yang, L. (2023). An "Interactive Learning Model" to enhance EFL students' lexical knowledge and reading comprehension. *Sustainability*, *15*(8), 6471. https://doi.org/10.3390/su15086471