

Digitized AGONSA Method: Its Effectiveness on the Word Problem Skill Involving Addition of Grade 1 Learners

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ABSTRACT: *Mathematical word problem-solving is an important skill in early education however, many learners still struggle with numerical reasoning and reading comprehension. This study examined the effectiveness of the Digitized AGONSA Method in improving the addition word problem-solving skills of Grade 1 learners during the School Year 2025–2026. Using a single-experimental research design, thirty (30) purposively selected learners from Pedro Acharon Sr. Central Elementary School participated in the study. Findings revealed that learners improved from an “Emerging (Low Proficient)” level before the intervention to a “Transitioning (Proficient)” level after using the Digitized AGONSA Method. Statistical analysis also showed a significant difference between the pretest and posttest results, confirming the effectiveness of the intervention. The study concluded that the Digitized AGONSA Method effectively enhanced learners’ addition word problem-solving skills and may be integrated into classroom instruction. Hence, the study recommends integrating the Digitized AGONSA Method into classroom instruction with the support of administrators, teachers, and coordinators, as well as exploring its application in other mathematical topics, grade levels, and comparative studies.*

Keywords: *digitized learning, AGONSA Method, word problem-solving skills, addition, Grade 1 learners*

I. INTRODUCTION

Mathematical proficiency, particularly in basic operations such as addition, is widely recognized as a fundamental skill that supports learners’ cognitive development and future success in

problem-solving tasks (Verschaffel et al., 2014). However, despite its importance, many learners experience difficulty in solving mathematical word problems due to the combined demands of numerical reasoning and language comprehension (Koehler & Sammon, 2023). In response to this challenge, the Department of Education (DepEd, 2016) introduced the AGONSA strategy—Analyze, Given, Operation, Number Sentence, Solution, and Answer—which provides a structured step-by-step guide for solving word problems systematically.

In the Philippines, national and international large-scale assessments such as PISA (2018) and TIMSS (2019) reported low mathematics performance among Filipino learners, particularly in tasks involving reasoning and problem-solving. Only a small percentage of students reached the minimum proficiency level, placing the country among the lowest-performing nations in mathematical literacy (DepEd, 2019). These findings emphasize the urgent need for innovative and effective teaching interventions that can strengthen foundational numeracy skills among young learners.

In response to this challenge, the Digitized AGONSA Method offers a promising approach by converting the traditional AGONSA process into an interactive digital tool with visual prompts, animations, immediate feedback, and guided activities. Studies show that technology-based interventions enhance learners' mathematical understanding and problem-solving skills (Santos-Trigo et al., 2021; Liang & She, 2023), while in the Philippine context, studies also supports the positive impact of technology integration in mathematics instruction (Sasota et al., 2021). Locally, in Pedro Acharon Sr. Central Elementary School, 30% of the 108 Grade 1 learners were identified as having low proficiency in solving addition problems up to 100 without regrouping, based on recent competency tracking results. This highlights the need for targeted, engaging, and technology-enhanced interventions such as the Digitized AGONSA Method to improve learners' foundational problem-solving skills in addition.

Although digital learning tools and the AGONSA strategy have been studied separately, there is still limited research on the Digitized AGONSA Method. Existing studies suggest that structured, technology-based interventions benefit early grade learners (Bang et al., 2023; Mera et al., 2022), but a gap remains in determining its effectiveness in improving Grade 1 learners' addition word problem-solving skills.

Hence, this study aimed to determine the effectiveness of a Digitized AGONSA Method in improving Grade 1 learners' performance in solving addition problems up to 100 without regrouping. Conducted at Pedro Acharon Sr. Central Elementary School in General Santos City, the study may provide insights for enhancing mathematics instruction through interactive and technology-based approaches

II. METHOD

The researchers employed a single-experimental design to determine the effectiveness of the Digitized AGONSA Method on word problem-solving skills involving addition among Grade 1 learners of Pedro Acharon Sr. Central Elementary School. Single-case experimental design measures behavior repeatedly over time to determine the effectiveness of an intervention (Enders et al., 2024). The research involved administering both a pre-test and a post-test to ensure consistency in the testing conditions.

A pre-test was administered to measure learners' prior knowledge using researcher-made questions. This was followed by a 10-day intervention using the Digitized AGONSA Method, with

45 minutes per session focused on developing problem-solving skills in addition. After the intervention, a similar post-test was given, and the results were compared to determine if there was a significant difference and to evaluate the effectiveness of the Digitized AGONSA Method among Grade 1 learners of Pedro Acharon Sr. Central Elementary School.

III. RESULT AND DISCUSSION

RESULT

Table 1 *The level of word problem skill involving addition of the learners before the intervention of Digitized AGONSA Method*

Score Range	Grade I		Description	Interpretation
	<i>f</i>	%		
18-20	0	0	At Grade Level (Highly Proficient)	Very High
15-17	0	0	Transitioning (Proficient)	High
10-14	5	17	Developing (Nearly Proficient)	Moderate
5-9	21	70%	Emerging (Low proficient)	Low
0-4	4	13%	Emerging (Not proficient)	Very Low
Mean Score	7.03 (35%)		Emerging (Low proficient)	Low
SD	2.17			

Table 1 presents the level of word problem-solving skills involving addition among Grade 1 learners before the implementation of the Digitized AGONSA Method. Most learners, or 21 (70%), scored within the 5–9 range, classified as “Emerging (Low Proficient)” with a Low interpretation. Meanwhile, 5 (17%) pupils were categorized as “Developing (Nearly Proficient)” or Moderate, while 4 (13%) pupils fell under “Emerging (Not Proficient)” or Very Low. No learners reached the “Transitioning (Proficient)” or “At Grade Level (Highly Proficient)” categories.

Overall, the learners obtained a mean score of 7.03 (35%), described as “Emerging (Low Proficient)” with a Low interpretation. The standard deviation of 2.17 indicated slight variation in the learners’ scores.

The item analysis of the 20 pre-test items revealed that Items 1–6 were relatively easier, Items 7–13 were more challenging, and Items 14–20 were the most difficult for the learners.

Table 2 *The level of word problem skill involving addition of the learners after the intervention of Digitized AGONSA Method*

Score Range	Grade III		Description	Interpretation
	<i>f</i>	%		
18-20	9	30%	At Grade Level (Highly Proficient)	Very High

15-17	13	43%	Transitioning (Proficient)	High
10-14	8	27%	Developing (Nearly Proficient)	Moderate
5-9	0	0	Emerging (Not proficient)	Low
0-4	0	0	Emerging (Low proficient)	Very Low
Mean	15.87(70.35%)		Transitioning (Proficient)	High
Score				
SD	2.87			

Table 2 presents the level of word problem-solving skills involving addition among the learners after the implementation of the Digitized AGONSA Method. Most learners, 13 (43%), scored within the 15–17 range, classified as “Transitioning (Proficient)” with a High interpretation. Meanwhile, 9 learners (30%) were categorized as “At Grade Level (Highly Proficient)” or Very High, while 8 learners (27%) fell under “Developing (Nearly Proficient)” or Moderate. No learners were classified under the low or very low categories.

Overall, the learners obtained a mean score of 15.87 (79.35%), described as “Transitioning (Proficient)” with a High interpretation. The standard deviation of 2.87 indicated moderate variation in the learners’ scores.

The item analysis showed that Items 2 and 4 were the easiest and had marginal discrimination, while Items 8, 11, 12, 13, 15, 16, 17, and 18 showed average difficulty and very good discrimination indices. In contrast, Item 10 showed poor discrimination and was rejected.

The results showed that most learners were classified under the proficient and highly proficient levels after the intervention.

Table 3 Significant *difference in learner’s word problem skill involving addition before and after using the intervention*

Group	Mean	SD	t	p-value	Remark	Decision	Effect size (Cohen’s D)	Remarks
Pretest	7.03	2.17	-21.4	0.000		Reject H0	3.91	

Posttest	15.87	2.87	Significan	Very
			t	Large
				Effect

Table 3 presents the difference between the pretest and posttest scores of Grade 1 learners in determining the effectiveness of the Digitized AGONSA Method in improving word problem-solving skills involving addition. A normality test confirmed that the data met the normality assumption; therefore, a paired-samples t-test was employed.

The results revealed a pretest mean score of 7.03 (SD = 2.17) and a posttest mean score of 15.87 (SD = 2.87). The computed t-value was -21.40 with a corresponding p-value of 0.000. Since the p-value was lower than the 0.05 level of significance, the null hypothesis was rejected. This indicates a statistically significant improvement in the learners' word problem-solving skills involving addition after the implementation of the Digitized AGONSA Method.

Furthermore, the magnitude of the intervention's effect was assessed using Cohen's d. The computed effect size was 3.91, which is interpreted as a very large effect, indicating that the Digitized AGONSA Method had a substantial influence on improving the learners' performance in solving addition word problems.

Overall, the findings suggest that the Digitized AGONSA Method was effective in enhancing the word problem-solving skills involving addition among Grade 1 learners.

Discussion

This study aimed to determine the effectiveness of the Digitized AGONSA Method in improving the word problem-solving skills involving addition among Grade 1 learners.

Before the implementation of the intervention, the learners obtained a mean score of 7.03, which was interpreted as Emerging (Low Proficient). Most learners were classified within the low proficiency levels, indicating that they had limited skills in solving addition word problems. The item analysis further revealed that learners found the more complex items difficult, particularly those requiring deeper interpretation of picture-based situations. These findings suggest that learners experienced challenges in understanding problem situations, identifying relevant information, and applying appropriate addition strategies.

The low level of performance observed during the pretest supports the findings of Catador and Fernando (2024), who reported that many learners demonstrate weak foundational numeracy skills, particularly in counting and addition. Likewise, OECD (2023) emphasized that learners with poor numeracy skills often struggle with problem-solving tasks and tend to rely on guessing rather than applying systematic strategies.

Following the implementation of the Digitized AGONSA Method, the learners' performance improved considerably, obtaining a mean score of 15.87, interpreted as Transitioning (Proficient). The majority of learners moved from the emerging level to the proficient and highly proficient

levels. The posttest item analysis also showed improvements in item difficulty and discrimination, indicating that learners were able to answer more items correctly and that the assessment more effectively distinguished varying levels of learner performance. These findings suggest that the intervention enhanced learners' ability to interpret, analyze, and solve addition word problems.

The improvement in learners' performance is consistent with the findings of Bernardo et al. (2022), who found that learners with stronger comprehension and problem-solving skills tend to achieve higher proficiency levels in mathematics. Similarly, De Villa et al. (2019) reported that structured problem-solving activities contribute significantly to learners' mathematical achievement and development.

The significant difference between the pretest and posttest scores ($t = -21.40$, $p = 0.000$) indicates that the Digitized AGONSA Method was effective in improving learners' word problem-solving skills involving addition. The substantial increase in scores suggests that the intervention provided meaningful learning experiences that strengthened learners' mathematical understanding and problem-solving abilities.

This finding supports Foster (2023), who found that computer-assisted instruction improved numeracy skills among kindergarten and Grade 1 learners. Likewise, Xin et al. (2023) reported that web-based and model-centered instructional approaches enhanced learners' word problem-solving skills through structured instruction, visual supports, and guided practice. These instructional features are similar to those incorporated in the Digitized AGONSA Method.

The positive outcomes may also be explained by the increased engagement and participation of learners during the intervention. Volioti et al. (2023) found that interactive and technology-based learning tools improve learner motivation, participation, and mathematics achievement. In the same way, the Digitized AGONSA Method incorporated interactive features, visual aids, and contextualized activities that may have contributed to learners' improved performance.

Furthermore, the findings are consistent with Aleño et al. (2025), who reported significant improvement in learners' word problem-solving skills after using the AGONSA Chart. While their study focused on the traditional AGONSA strategy, the present study demonstrates that the Digitized AGONSA Method can effectively enhance learners' mathematical performance while increasing engagement and participation.

Overall, the findings indicate that the Digitized AGONSA Method is an effective instructional strategy for improving Grade 1 learners' word problem-solving skills involving addition. The results suggest that integrating structured, interactive, and technology-based approaches in mathematics instruction can enhance learners' numeracy skills, conceptual understanding, and problem-solving abilities.

IV. CONCLUSION

Based on the summary of the findings, hereunder are the conclusions:

1. The learners have a low level of word problem skill involving addition before the implementation of the Digitized AGONSA Method.
2. The learners have a high level of word problem skill involving addition after the implementation of the Digitized AGONSA Method.

3. There was a significant difference in the learners' word problem-solving skills before and after the use of the Digitized AGONSA Method, which confirmed that the improvement in scores was attributed to the intervention, indicating that the Digitized AGONSA Method was an effective instructional strategy.

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VI. REFERENCES

- [1]Verschaffel, L., Depaepe, F., & Van Dooren, W. (2014). Word problems in mathematics education. In S. Lerman (Ed.), *Encyclopedia of mathematics education*. Springer. https://doi.org/10.1007/978-94-007-4978-8_163
- [2]Koehler, T. (2023, March 1). A math word problem framework that fosters conceptual thinking. Edutopia. <https://www.edutopia.org/article/strategy-teaching-math-word-problems/>
- [3]Department of Education. (2016). *K to 12 mathematics curriculum guide*. <https://www.deped.gov.ph/k-to-12/curriculum-guides/>
- [4]OECD. (2023). *PISA 2022 results*. <https://www.oecd.org/pisa/>
- [5]Department of Education. (2020). *Philippine participation in the Trends in International Mathematics and Science Study (TIMSS) 2019*. Department of Education. <https://www.deped.gov.ph/>

- [6]Santos-Trigo, M., Barrera-Mora, F., & Camacho-Machín, M. (2021). Teachers' use of technology affordances to contextualize and dynamically enrich mathematical problem-solving strategies. *Mathematics*, 9(8), Article 793. <https://doi.org/10.3390/math9080793>
- [7]Liang, C.-P., & She, H.-C. (2023). Investigating the effectiveness of representational scaffolds on mathematics problem solving: Evidence from eye-tracking. *Interactive Learning Environments*, 31(6), 3882–3897. <https://doi.org/10.1080/10494820.2021.1943692>
- [8]Sasota, R. S., Cristobal, R. R., Sario, I. S., Biyo, J. T., & Magadia, J. C. (2021). Will–skill–tool model of technology integration in teaching science and mathematics in the Philippines. *Journal of Computers in Education*, 8, 443–464. <https://doi.org/10.1007/s40692-021-00185-w>
- [9]Bang, H. J., Li, L., & Flynn, K. (2023). Efficacy of an adaptive game-based math learning app to support personalized learning and improve early elementary school students' learning. *Early Childhood Education Journal*, 51, 717–732. <https://doi.org/10.1007/s10643-022-01332-3>
- [10]Catador, J. A., Jr., & Fernando, H. G. (2024). Assessing the numeracy gaps among junior high school students through Project PEMDAS. *International Journal of Research in Applied Sciences*, 9(9), 644–653. <https://doi.org/10.51584/IJRIAS.24.09.09.123>
- [11]OECD. (2023). *PISA 2022 results*. <https://www.oecd.org/pisa/>
- [12]Bernardo, A. B. I., Lapinid, M. R. C., Cordel II, M. O., Teves, J. M. M., Yap, S. A., & Chua, U. C. (2022). *Which Filipino students are being left behind in mathematics? Testing machine learning models to differentiate lowest-performing Filipino students in public and private schools in the 2018 PISA mathematics test* (DLSU-AKI Working Paper Series No. 2022-09-085). Angelo King Institute for Economic and Business Studies, De La Salle University. https://animorepository.dlsu.edu.ph/res_aki/4/
- [13]De Villa, A. A., Beladas, H. A., & Beladas, J. P. (2019). Status of Grade Six pupils' skills in solving mathematics word problems in San Cristobal Elementary School. *Ascendens Asia Journal of Multidisciplinary Research Abstracts*, 3(2N). <https://ojs.aaresearchindex.com/index.php/AAJMRA/article/view/11426>
- [15]Volioti, C., Orovas, C., Sapounidis, T., Trachanas, G., & Keramopoulos, E. (2023). Augmented reality in primary education: An active learning approach in mathematics. *Computers*, 12(10), Article 207. <https://doi.org/10.3390/computers12100207>
- [16]Aleño, N., Mustapha, H., & Dimatanday, K. (2025). Effectiveness of AGONSA chart in improving student mathematical problem-solving skills. *Psychology and Education: A Multidisciplinary Journal*, 31(4), 370–375. <https://doi.org/10.5281/zenodo.14750321>