Advancing Learner's Academic Performance and Interest in Science 7 via Localized Graphic Organizer

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.903SEDU0436

Received: 19 July 2025; Accepted: 28 July 2025; Published: 27 August 2025

ABSTRACT

This quasi-experimental research investigated the effect of localized graphic organizers on the Grade 7 learners' academic performance and interest. It was conducted at Valencia National High School, school year 2023-2024. The study used a set of developed and validated Science lessons, a validated researcher-made 60-item academic performance test, and a validated adapted students' interest questionnaire. Mean and standard deviation of the data gathered were computed. The finding ANCOVA and One-Way Independent t-test at 0.05 level of significance were employed. The findings revealed that students were satisfactory for those exposed to Localized Graphic Organizers (LGOs) compared to the learners exposed to NLGO with a fairly satisfactory level. Furthermore, there was a significant difference in the academic performance of Grade 7 learners between the use of LGOs. The study showed that learners exposed to LGO are extremely interested while learners exposed to NLGO were highly interested in Science. Also, there is no significant difference in the learners' interest between the groups exposed to LGO and NLGO.

Keywords: Localized Graphic Organizer, Academic Performance, Learner Interest, Quasi-Experimental Research, Statistical Analysis

INTRODUCTION

The use of Localized Graphic Organizers in Science Education can be particularly effective in promoting a deeper understanding of scientific concepts across cultures and languages. From an international perspective, Localized Graphic Organizers may support academic performance and foster interest in scientific subjects. However, the impact and significance of their influence may vary based on individual learning experiences, instructional methods, and the specific context in which they are utilized.

Localized Graphic Organizers are visual tools that help to organize and represent information (Souisa, 2020). They are commonly used in education as instructional strategies to facilitate understanding, comprehension, and critical thinking skills. Learners who engage with Localized Graphic Organizers can visually organize and connect key concepts and ideas, making them easier to comprehend and remember. Additional studies, like those on using Localized Graphic Organizers to support reading comprehension, often report positive impacts on learners' academic performance, suggesting that these tools would benefit the Philippine educational context (Ciullo et al., 2014).

However, according to the latest report of the Programme for International Learner Assessment (PISA) results in the Philippines 2022 in Science, the Philippines ranked third to last globally, or 78th place out of 81 countries. Based on the PISA 2022 results released last December 5, 2023, some 23 % of learners in the Philippines attained Level 2 or higher in Science (OECD average: 76 %). At a minimum, these learners can recognize the correct explanation for familiar scientific phenomena. In this country, almost no learners were top performers in science, meaning they were proficient at Level 5 or 6.

During the PISA 2022 National Forum held at the DepEd Central Office in Pasig City, Secretary Duterte highlighted the valuable insights gained from the international assessment regarding the strengths and weaknesses of the Philippine education system. Secretary Duterte emphasized the various initiatives

undertaken to address these challenges. These include the introduction of the MATATAG Curriculum, the implementation of national reading, math, and science programs, the initiation of Catch-up Fridays for learners and teachers, the expansion of teacher career progression, the advocacy for transparent educational programs and practices, and the start of digitalization efforts in schools.

This system aims to improve learning outcomes, prioritize the well-being of learners and teachers, and promote accountability to address the remaining disparities. To address the country's low education performance, the Department of Education issued Memorandum No. 55, s. 2013, which promotes the use of learner-centered approaches in teaching. It encourages teachers to incorporate active learning, cooperative learning, and problem-solving activities in their lessons to enhance learner engagement and understanding.

At Valencia National High School, teachers use PowerPoint presentations, videos, audio, and even activities to enrich the learning experience for learners. However, upon examination of the 1st quarter scholastic performance of Grade 7, it appears to have room for improvement. Out of 1180 learners across all programs, 15 failed to meet expectations (60-74), 190 achieved reasonably satisfactory (75-79), 464 attained satisfactory (80-84), 304 performed very satisfactorily (85-89), and 270 excelled with outstanding (90-100)). Despite these varied performances, the average score for Science in MPS for Grade 7 is 44.46, falling far below the target minimum of 75. It is observed that many learners face difficulties due to spending two years in modular distance learning before transitioning to Grade 7.

Using effective teaching strategies is one way to improve learners' academic performance and learning behaviors, such as interest in science concepts. According to Komikesari (2016), academic performance is influenced by learners' cognitive abilities, learning preferences, and the quality of their learning environment, where some learners learn quickly while others struggle. A learner's academic performance reflects their achievements in specific subjects. Kalaivani et al. (2023) found that learners who used Localized Graphic Organizers (LGOs) in Science better understood critical concepts and could apply knowledge to solve problems more effectively.

Interest plays an essential role in learning. It is the learners' curiosity about a particular topic or subject area. This interest leads to learning motivation and can improve learning outcomes (Sutarto et al., 2020). However, according to Justice and Doman (2021), when learners demonstrate a lack of interest, this can hinder their academic progress. Consequently, approaches catering to learners' interests may be necessary to improve learning outcomes. Wiśniewska (2013) also mentioned that some learners are less interested if they find the activities less engaging.

There are some potential gaps or areas that need attention. The instructional strategy mentioned was designed to capture learners' attention and stimulate their interest in Science. Incorporating visually appealing structures, relevant examples, and localized applications makes the strategy more engaging and relatable to learners. Providing clear instructions, explaining how to use the LGOs, and offering guidance and feedback can help the learners maximize the benefits of using the said instructional strategy for academic performance and interest in Science.

There is a need to study the impact of LGOs on academic performance and interest, even if it is crucial to improve learners' learning outcomes. It may enhance learners' understanding, engagement, and overall academic performance. The researcher's goal is to observe an increase in the general scholastic average and the mean performance score of learners by the 3rd quarter compared to the 1st Quarter. Implementing this instructional strategy may provide learners with visual tools that promote active learning participation. This approach aims to boost learners' interest and improve academic achievement.

Framework of the Study

The study is anchored on Bruner's Theory of Development (1966), which states that the usual course of intellectual development moves through three stages: enactive, iconic, and symbolic. Children can learn complex concepts with appropriate instructional support, and this readily lends itself to practical education applications. Figure 1 shows the application of these theories in this study through the schematic diagram.

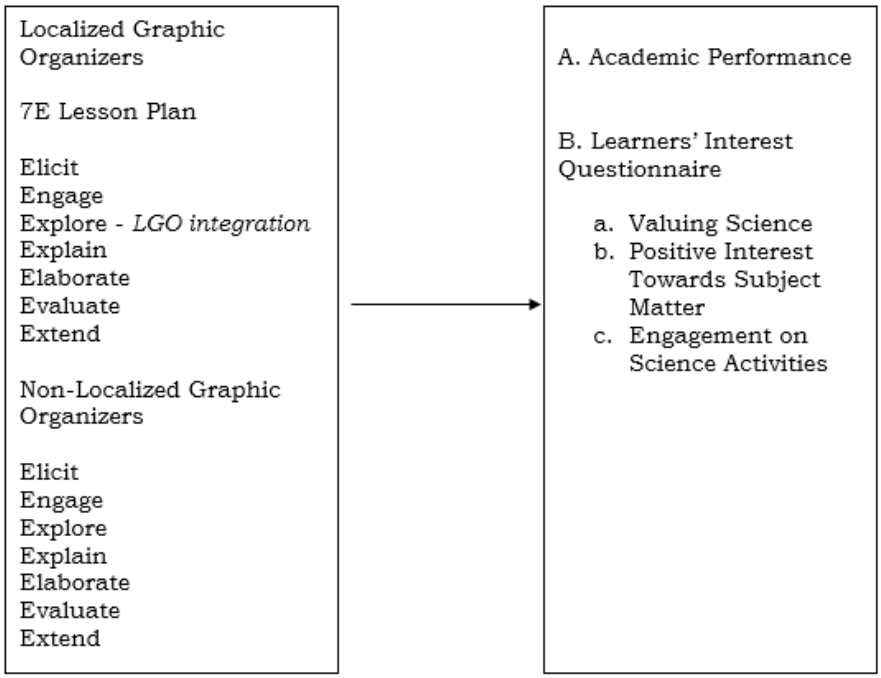

Figure 1. The Schematic Diagram of the Study

The box on the left side shows the Localized Graphic Organizers in the lessons Distance versus Displacement, Speed versus Velocity, and Waves, highlighting that this activity can be found in the Explore part of the 7E lesson plan. Non-Localized Graphic Organizers (NLGO) are found on the left box. The box on the right is the academic performance and Learners' Interest Questionnaire regarding the Value of Science, Positive Interest Towards Subject Matter, and Engagement on Science Activities.

The study is also anchored on Gardner's Multiple Intelligences (1983), which states that individuals with visual-spatial intelligence benefit from learning materials that incorporate images, figures, graphics, and other visual aids. Graphic Organizers align with visual-spatial intelligence, as they involve using visual aids and spatial arrangements to represent information and concepts.

The theory of David Ausubel (1960) on Graphic Organizers supports this study, emphasizing the importance of structure and connecting new information to what is already known. The Theory of Meaningful Verbal Learning advocates the value of graphic organizers in preparing, using, and organizing information to maximize learning.

Jean Piaget's Theory of Cognitive Development (1920) believes that a schema involves a category of knowledge and the procedure to obtain that knowledge. As individuals gain new experiences, new information is modified. Miller (2011) states that cognitive development is about acquiring knowledge and building mental models of the world around us. This concept aligns with the use of Graphic Organizers to enhance the learners' academic performance.

Localized Graphic Organizer is a teaching approach for Science that may help learners digest, comprehend, and retain freshly provided material, increasing academic performance and interest in learning. Frey and Fisher (2004) define LGO as "visual representations of key concepts and relationships that help learners organize their prior knowledge and predict a new topic before they read about it.

Academic performance is where learners achieve their learning goals. Grades, standardized tests, and other assessments typically measure it. Evidence that learning has occurred is the scores gathered at the end of the session, topic, and term. Failure and success are always present in learners' lives; some succeed in learning fast, while others fail (Komikesari, 2016). It is how the learners cope with the different tasks given by the Teacher. Ciullo et al. (2014) state that interventions utilizing Localized Graphic Organizers were associated with improved learner outcomes.

Accordingly, academic performance similarly increases among highly motivated learners, affecting their cognitive learning since it measures learners' accomplishment (Honicke & Broadbent, 2016). A recent study by Kalaivani et al. (2023) found that learners who used Localized Graphic Organizers in their science class better understood key concepts and could apply their knowledge to solve problems more effectively.

Interest in learning is essential for education. Engagement and attention increase if the learners are introduced to a subject matter through visually engaging Localized Graphic Organizers (Chen & Hsiao, 2020). Personalization enhances interest as learners feel more in control of their learning process, allowing them to create their own Localized Graphic Organizers to represent the material they are learning and fostering a sense of ownership (Solari et al., 2022).

Learning the relationship between ideas and concepts can lead to a sense of mastery and increased interest in the subject matter (Johnson & Hashemi, 2019). More importantly, collaborative learning through group-created activity can foster social interactions, which lead to shared interest and enthusiasm for the topic (Nguyen & Yeung, 2020).

However, according to Justice and Doman (2021), when learners demonstrate a lack of interest, this can hinder their academic progress. Consequently, approaches catering to learners' interests may be necessary to improve learning outcomes. Wiśniewska (2013) also mentioned that some learners are less interested if they find the activities less engaging.

Another study, authored by Harackiewicz et al. (2016), defined interest as "a psychological state of engagement or attention that arises from the perception of novelty, challenge, or aesthetic value in an object or activity" (p.220). This definition highlights factors that can contribute to a person's interest in a particular subject, such as the novelty or challenge it presents.

The preparation and usage of Localized Graphic Organizers may help learners easily remember concepts and topics during lessons (Ayverdi et al., 2014). By explicitly examining how learners use this tool in Science, they see the level at which learners can organize thought and information. Additionally, when learners effectively utilize Localized Graphic Organizers to manage Science knowledge, they can organize and reflect upon the information gathered. This process ultimately leads to a more thorough understanding of the content (Condidorio, 2010). On the other hand, localization is the process of positioning related information nearby. Placing information that the learners can relate to helps them retain Science concepts (Kiewra,2012).

Statement of the Problem

This study assessed the Grade 7 learners' academic performance and interest before and after integrating Localized Graphic Organizers. It was conducted at Valencia National High School, Valencia City, Bukidnon, during the school year 2023-2024.

Specifically, this study sought to answer the following questions:

1. What is the academic performance of learners who are exposed to Localized Graphic Organizers and Non- Localized Graphic Organizers?

2. What is the learners' level of interest who are exposed to Localized Graphic Organizers and Non-Localized Graphic Organizers in terms of:

a. Valuing Science;

b. Positive Interest Toward Subject Matter; and,

c. Engagement on Science Activities?

3. Is there a significant difference of the academic performance of Grade 7 learners who are exposed to Localized Graphic Organizers and Non-Localized Graphic Organizers?

4. Is there a significant difference of learners' interest as exposed to Localized Graphic Organizers and Non-Localized Graphic Organizers?

Null Hypotheses

HO1: There is no significant difference between academic performance and Localized Graphic Organizers.

HO2 There is no significant difference between interest of learners and the Localized Graphic Organizers.

Significance of the Study

The result of this study would be beneficial to the following groups:

For learners, the use of Localized Graphic Organizers would lead to improved academic performance and interest in learning Science.

For teachers, the results of this study would provide evidence-based support for using Localized Graphic Organizers in their lessons, particularly on the least mastered competencies. It would help them make instructional materials and design activities for learners to improve their academic performance and interest in Science. The data gathered by the researcher can be the basis for designing more activities that would help the learners understand the concepts of Science.

The results of this study would enable the administrators of the Division of Valencia City to integrate Localized Graphic Organizers in teaching since they would be disseminated and utilized by informing the Division Office by submitting the study results. Including this in the training matrix can also be disseminated during School Learning Action Cells (SLAC) and In-Service Training (InSET). This would also serve as learning input in their respective teaching-learning strategies and encourage everyone to analyze, consider, and incorporate these results in their teaching strategies.

For science education programs, the findings of this study would be used to develop additional resources and learning materials in science subjects that utilize Localized Graphic Organizers.

Delimitation of the Study

The study was conducted on 46 Grade 7 learners exposed to LGO and another 46 Grade 7 learners exposed to NLGO of Valencia National High School, Valencia City, Bukidnon School Year 2023-2024. The quasi-experimental design was utilized as a research method, and data were gathered through two questionnaires. Pre-test and post-test results were gathered from the learners' scores on the academic performance test. The second part is a survey questionnaire to measure the learners' interest.

The study assesses the Grade 7 learners' academic performance and interest in Science using Localized Graphic Organizers. The topics incorporated with LGO are Distance versus Displacement, Speed versus Velocity, and Waves. In gathering the data, the researcher used the 60-item Academic Performance pre-test and post-test results and modified an instrument based on learners' interests.

MATERIALS

Research Design

A quasi-experimental design was used in the study. The researcher utilized experimental and control groups to assess learners' academic performance and interest in Science using Localized Graphic Organizers (LGOs).

Research Locale

The study was conducted at Valencia National High School, Junior High School Department, Valencia City, Bukidnon. It is one of the largest secondary schools in the province, with over 10,000 learners enrolled, where

1,180 are in the Grade 7 curriculum. Due to a large volume of learners and a shortage of classrooms, Valencia National High School operates on three shifts: a morning shift for grades 7,9 and 11, an afternoon shift for grades 8, 10, and 12, and a regular shift for the special programs including Special Science Program, Special Program for Journalism, Special Program for Arts, Special Program for Sports, Special Program for Foreign Language, and Special Needs Education.

The internet connection was sponsored by the Department of Information and Communications Technology, but the connectivity remains limited, resulting in only a few learners being able to access it. Despite the school's size, instructional strategies are not fully digitized, leading to the use of Localized Graphic Organizers (LGOs). Furthermore, teachers receive training for instructional strategies through School Learning Action Cells organized by department per grade level. Figure 2 shows the location of the research locale.

Participants of the Study

The study participants were 46 exposed to LGO and 46 exposed to NLGO Grade 7 learners of Valencia National High School, Valencia City, Bukidnon. The researcher used the random sampling technique to obtain the study population. This was done by selecting 2 out of 22 sections enrolled in Grade 7 during the school year 2023-2024. The researcher observed that some learners have visual learning preferences and enjoy organizing information.

Development of 7E Lesson Plan Integrating Localized Graphic Organizers

Design and Development

This part discusses how the learners used the Localized Graphic Organizers (LGOs) in the Explore part of the lesson. It also contains needs assessment, planning, and designing stages.

First, the learners were given 5 minutes to read a reading material. Second, they used the LGO prepared by the teacher and supplied the needed information following the given direction. Third, the learners presented their output to the whole class.

Need Analysis. The needs analysis survey was among the teachers who handled the Science 7 subjects. They were asked to write the most difficult lessons in the Department of Education Science 7 Curriculum Guide that need to have Localized Graphic Organizers utilized. The top 3 lessons were chosen: Distance versus Displacement, Speed versus Velocity, and Waves.

With the topics and strategy identified, the researcher prepared the Task Analysis Matrix (TAM), which includes the following: objectives, science concepts, LGO, skills developed, and assessments used.

Choosing the Topic. The topics were within the K + 12 Curriculum framework and focused on the concepts under the third quarter: Distance versus Displacement, Speed versus Velocity, and Waves. The sequential arrangement of these topics ensured a smooth progression and maintained continuity throughout the learning process.

Preparing the Task Analysis Matrix. The Task Analysis Matrix (TAM) included topics, learning goals, ideas, and skills needed for the activity and the Localized Graphic Organizers (LGOs), time frame, and references. The researcher used various resource materials. According to the Department of Education's Science Curriculum Guide, the K + 12 Curriculum helped set the goals, and these goals in the TAM formed the basis for what students need to learn.

Writing the Lessons. This stage includes writing the lesson using Localized Graphic Organizers on Distance versus Displacement, Speed versus Velocity, and Waves. The following were the parts of the lessons.

Topics. Each lesson covered the Science concepts, following the K + 12 Teachers Guide and Learner's Material provided by the Department of Education.

Concepts. These were the brief statement of ideas from the topic found in the reading material before answering the Localized Graphic Organizers. These concepts gave the learners an overview of what to expect in the LGOs.

Materials and Props. This refers to the properly enhanced illustrated figures and visuals in the Localized Graphic Organizers in every lesson.

Instructional Objectives. This refers to what learners are expected to do during and after the lesson and what they should achieve.

Thinking Skills. This refers to the science skills expected to develop during and after the activity.

Science Processes Skills. These are the skills that learners find, use, and share as they do the activity.

Activities and Exercise. The teacher prepared these hands-on activities to attain the stated instructional objectives utilizing Localized Graphic Organizers. The teacher provides short activities, such as scrambled letters and a table completion activity, that help the students answer their activity on Localized Graphic Organizers.

Assessment. This refers to the questions given to the learners after the lesson or activity.

Validation Stage and Revision Stage

The lessons incorporating Localized Graphic Organizers were checked by a panel of experts and the researcher's adviser. They were then submitted to the experts for corrections and suggestions to ensure the validity of the content and instrument.

Validation Stage. The researcher presented the Task Analysis Matrix, Daily Lesson Log, 100-item questionnaire, and the adopted Learner's Interest Questionnaire to a panel of experts seeking insights and feedback. Then, each expert conducted a thorough review, writing comments and suggestions to help improve the materials. Their feedback guided the materials' improvement to ensure they were of good quality and effective.

Revision Stage. During the revision stage, the researcher incorporated all the comments written by each panel of experts. Once the revised materials were submitted to the experts again, they issued a certificate of validation, certifying that the materials had undergone validation and could be integrated into the research. This process ensured that the experts thoroughly checked and approved the content and materials, assuring the effectiveness and quality for integration into the research.

Ethical Considerations

The researcher followed research ethics when doing the study. The researcher secured permission from the College of Education of Bukidnon State University officials, the Division of Valencia City, and Valencia National High School officials. Permission was also secured from the participants and their parents through consent and assent forms. Only when proper permission was granted, did the researcher proceed with the study. Learners' data were treated with confidentiality. Learners, when data were presented, were given codes to ensure anonymity.

Data Gathering Procedure

The researcher secured a permission letter from the College of Education dean. Another permission letter was addressed to the division superintendent of the Division of Valencia City, the senior education program specialist Planning and Research of the Division, the school principal of Valencia National High School, the Science and Technology department head, and the participants. After the letters were signed, the researcher conducted a pilot test to test their reliability to Grade 8 learners of the said school. The 100-item academic performance test for Grade 8 learners gained 0.73 kr to pass the Ruder-Kuderson reliability test. For the Interest Questionnaire test, it has a global Cronbach Alpha of .865.

Before the instrument was administered to the participants, the researcher asked permission from the class advisers to show the approved letter by the school principal. The data was gathered from the pre-test, and a statistician consulted the questionnaire. As a result, was released, the researcher underwent a revision for the final launch of the instrument. The researcher then personally distributed the research instruments to the participants.

Before the instruments were administered, learners' availability was carefully arranged. The venue where the participants answered was ensured to have a good environmental condition. The researcher gave the learners an orientation on how to answer the instrument. The participants were given enough time to answer and finish the instrument. The participants were assured of the strict confidentiality of their answers. The questionnaires were retrieved when the participants finished answering the teacher-made pre-test/post-test and learner interest questionnaire.

RESULTS AND DISCUSSION

The Learners' Academic Performance

The researcher developed an academic performance test comprising 60 items about Distance versus Displacement, Speed versus Velocity, and Waves. The test was given to learners before and after implementing LGO. Localized Graphic Organizer is employed within the K to 12 Science Curriculum Framework. All the 46 learners in each group took the exam. Table 1 presents the results of learners' academic performance in the pre-test and post-test. The result also backs Miller's statement (2011) that the concept aligns with using Localized Graphic Organizers to enhance the learners' academic performance.

Academic performance includes learners' attainment and ability to learn. It is with evidence that learning has taken place by scores gathered at the end of the session. Failure and success are always present in learners' lives; some succeed in learning fast, while others fail (Komikesari, 2016). It is basically how learners deal with their studies and accomplish the different tasks teachers give.

Groups	N	Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
Control	46	18.63	4.36	Did not meet expectation	26.26	6.68	Fairly Satisfactory
Experimental	46	20.72	6.03	Did not meet expectation	36.50	8.49	Satisfactory

Table 1. Academic Performance Before and After Implementation of Localized Graphic Organizers

The learners' academic performance in both pre-test and post-test was interpreted using the descriptive statistics mean and standard deviation. Table 1 shows the mean and standard deviation of the learners' performance in the pre-and post-implementation of LGOs. Both groups were still at the Did not Meet Expectation level during the pre-test, and the pretest mean score difference was only 2.09. This indicates that the levels of learner's abilities in Grade 7 Science from both groups were very close and, therefore, comparable prior to the conduct of this study. This might be because they were enrolled in the same school and their background and experience in the previous science subject were similar. Moreover, the standard deviation of the experimental group is higher than that of the control group but on a slightly marked basis. This indicates that both the learners in the control and experimental groups had similar scores on their pretests.

During the posttest, it can be observed that the learners in the control group who were not using LGOs improved to a Fairly Satisfactory level, with a mean score of 26.26 and a standard deviation of 6.68. In contrast, the experimental group improved to a Satisfactory level with a mean score of 36.50 and a standard

deviation of 8.49. This indicates that the performance scores of the learners in the control group and experimental group improved.

On the other hand, the experimental group obtained a Satisfactory level, meaning that using LGO might affect their academic performance. Also, the standard deviation results in the post-test score in the experimental group entail the dispersion of their conceptual understanding improvement. There were learners who could score higher on the test and those who might also score lower relative to the group's average scores.

The experimental group's post-test scores improved because, even if it was their first time being exposed to LGO, particularly in Science, it helped them better understand and retain the knowledge. Integrating localized scenarios and examples helps them remember the information during the activity and the post-exam. Additionally, the learners found the LGO engaging, aiding their retention of the concepts. They could imagine the information's location within the instructional tool, which helps them recall it later.

During the pre-test, the control and experimental groups struggled to understand the prerequisite and fundamental knowledge, skills, and concepts related to Distance versus Displacement, Speed versus Velocity, and Waves. They lacked the necessary understanding to aid their comprehension. However, improvements were observed in both groups during the post-test. The control group showed a fair level of improvement, but they still required assistance throughout the performance task. On the other hand, the experimental group showed satisfactory improvement in developing fundamental knowledge; However, their understanding was limited, and they demonstrated some comprehension through authentic performance tasks.

The pre-test and post-test are forms of assessment typically measured by grades (York et al., 2015). The scores serve as evidence gathered at the end of the topic and term (Komekisari, 2016). The results paralleled the findings in the study of Candraloka and Rosdiana (2020), which revealed that Localized Graphic Organizers significantly improved the experimental group's performance and differed greatly from that of the control group.

Additionally, the study's results agree with those of Kalaivani et al. (2023), who found that learners who used LGO in their Science class better understood critical concepts and could apply their knowledge to solve problems more effectively. More so, the use of LGO contributed to improving learners' academic performance. A Localized Graphic Organizer using a concept map is concise and manageable so learners can grasp the concepts (Canas et al., 2015).

The study's results also support the claims of Mallick, Mihirkumar, and Amandeep (2014) that Localized Graphic Organizers enhance academic performance, where they perform better on tests. Learners' exposure to the activity using LGO helped them become more confident in their ability to succeed and obtain high scores in Science (Wachanga et al., 2018).

More importantly, collaborative learning through group-created Localized Graphic Organizers can foster social interactions that lead to shared interest and enthusiasm for the topic (Nguyen & Yeung, 2020). Meanwhile, Guo et al. (2020) mentioned in their study that learners who used LGO in their Science class outperformed learners who did not use the strategy at the end of the unit, which aligns with the result that learners exposed to LGO had high scores compared to learners exposed to NLGO's.

The Learners' Interest

The learners' interest in Science was also analyzed using the mean and standard deviation. The researcher used a modified Learners' Interest Questionnaire adopted and modified from Knekta et al. (2020) to determine the learners' interests. The questionnaire has 30 items and has three parts, categorized as Value of Science, Positive Interest Toward Subject Matter, and Engagement on Science Activities. The questionnaire underwent validation and reaped a Cronbach Alpha of .865, a good reliability indicator. After the validation, the questionnaire was given to the learners before and after implementing Localized Graphic Organizers. The following are the learners' interests along the three components.

Valuing Science

Table 2 shows the results of the learners' interest in the control and experimental groups, analyzed using descriptive statistics, specifically the mean scores and standard deviation. Among the indicators, the belief that "Science is essential for everyone to learn" had the highest mean score. In the control group, this indicator had a mean score of 4.67 with a standard deviation of 0.63. Similarly, in the experimental group, the mean score for this indicator was 4.93, with a standard deviation of 0.32. These findings indicate that the control and experimental groups were highly interested in Valuing Science.

Indicators	Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
I believe that science is essential for everyone to learn.	4.67	0.63	Extremely Interested	4.93	0.32	Extremely Interested
I value the role of science in society.	4.02	0.93	Highly Interested	4.15	1.01	Highly Interested
I believe that science can be used to solve real-world problems.	4.00	1.05	Highly Interested	4.22	0.81	Extremely Interested
I am supportive of scientific research and innovation.	4.20	0.91	Highly Interested	4.20	0.88	Highly Interested
I believe that science is essential for our future.	3.98	1.10	Highly Interested	4.43	0.72	Extremely Interested
I am willing to stand up for science and defend it from attack.	3.78	1.05	Highly Interested	3.91	0.89	Highly Interested
I try to stay informed about current scientific developments.	3.59	1.08	Highly Interested	3.89	1.10	Highly Interested
I am confident that learning about Science directly corresponds to my personal preferences.	4.07	1.21	Highly Interested	4.17	0.90	Highly Interested
I value the knowledge that I have about Science.	4.13	1.04	Highly Interested	4.48	0.83	Extremely Interested
I support the teaching of science in schools.	4.43	1.10	Extremely Interested	4.65	0.64	Extremely Interested
Sub-mean	4.09	0.51	Highly Interested	4.30	0.37	Extremely Interested

Table 2. The Learners' Interest of the LGO and NLGO in Terms of Valuing Science

In addition, it is worth noting that the control group displayed the lowest mean score for the indicator related to staying informed about current scientific developments. The control group had a mean score of 3.59 with a standard deviation of 1.08 for this indicator. Similarly, the experimental group had a mean score of 3.89 with a standard deviation of 1.10 for the same indicator. Since both groups have SD more significant than 1, learners have different ratings or preferences, which caused the variation in the results. These findings suggest that both groups were highly interested in staying informed about current scientific advancements.

The control and experimental groups exhibited extreme interest in the subject matter, as evidenced by the high mean scores for this indicator in both groups. However, both groups demonstrated a low mean score in their respective indicators. Despite these differences, a high level of interest in the subject matter has been shown.

The study of Palmer et al. (2017) parallels the result, stating that learners ranked interest and the perceived value of the subject in their future study or career plans as important factors when choosing to study Science. Also, the study of Nawawi et al. (2021) showed increased interest in learning Science and confidence in their ability to do so. These studies highlight the importance of interest in engaging with science subjects.

Positive Interest Towards Science Subject

Table 3 presents the learners' positive interest in the Science subject. In this analysis, the control group obtained the highest mean score in the indicator that they are proud to be a learner of Science, with a mean of 4.76 and a standard deviation of 0.56. On the other hand, the experimental group had the highest mean in the

indicator of finding science subjects interesting, with a mean of 4.74 and a standard deviation of 0.57. Both groups showed extremely interested in their respective indicators. Conversely, the control group had the lowest mean in believing that science can make a better place, with a mean of 3.65 and a standard deviation of 1.37. While the experimental group had the lowest mean of feeling comfortable asking questions and sharing their ideas in class, with a mean of 3.70 and a standard deviation of 1.22, both groups indicated a high level of interest in this aspect.

Indicators	Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
I find Science subjects interesting.	4.63	0.64	Extremely Interested	4.74	0.57	Extremely Interested
I enjoy learning about new Science concepts and ideas.	4.30	0.78	Extremely Interested	4.59	0.68	Extremely Interested
I believe that Science is important for understanding the world around me.	4.22	0.96	Extremely Interested	4.63	0.61	Extremely Interested
I am curious to learn more about Science, even outside of class.	3.93	1.18	Highly Interested	4.26	0.90	Extremely Interested
I find myself thinking about Science concepts and ideas in my everyday life.	3.72	1.16	Highly Interested	3.85	0.89	Highly Interested
I am excited about the potential applications of Science to solve real-world problems.	3.67	1.23	Highly Interested	4.09	1.00	Highly Interested
I believe that Science can make the world a better place.	3.65	1.37	Highly Interested	4.00	0.86	Highly Interested
I am proud to be a learner of Science.	4.76	0.56	Extremely Interested	4.63	0.64	Extremely Interested
I feel comfortable asking questions and sharing my ideas in Science class.	3.67	1.15	Highly Interested	3.70	1.22	Highly Interested
I enjoy working with my classmates on Science projects and activities.	4.41	0.95	Extremely Interested	4.50	0.86	Extremely Interested
Sub-mean	4.10	0.50	Highly Interested	4.30	0.40	Extremely Interested

Table 3. The Learners' Interest of the LGO and NLGO in Terms of Positive Interest Towards Subject Matter

The interpretation of the analysis suggests that the control and experimental groups showed extremely interested in their respective indicators related to Positive Interest Toward the Subject Matter by their highest mean scores. Despite these differences, both groups still demonstrated a high level of interest in their respective indicators with the lowest means. Since both groups have SD greater than one, learners have different ratings or preferences, which caused the variation in the results. Overall, the learners in both the control and experimental groups showed extreme interest towards positive interest in the subject matter on their respective indicators while being highly interested in other aspects.

The result agrees with the statement of Tai et al. (2021) that the importance of learners' interests and attitudes toward Science are influential in participation in STEM-related fields. Nawawi et al. (2021) also found that attractive activities could add value to learners' intrinsic motivation for science subjects. These academic contributions point to learners' positive interest in science.

Engagement in Science Activities

Table 4 shows the data results on the learners' interest in their engagement in Science activities. In the control group, the learners displayed the highest mean score in the indicator of enjoying learning about science through activities, with a mean of 4.52 and a standard deviation of 1.02. This suggests they were highly interested in engaging with science through hands-on activities. On the other hand, the experimental group showed a high level of interest in the indicator of feeling like they were learning a lot during science activities and having fun. They had a mean score of 4.52 with a standard deviation of 0.72 and 0.80, respectively, for these indicators. This indicates that the learners in the experimental group found science activities to be both

educational and enjoyable.

Conversely, the control group had the lowest mean of asking questions and seeking clarification during science activities, indicating a high level of interest in this aspect, with a mean of 3.61 and a standard deviation of 1.42. In contrast, the experimental group showed a high interest in persevering in science activities even if they were difficult, with a mean of 3.70 and a standard deviation of 1.00. Since both groups have SD greater than one, learners have different ratings or preferences, which caused the variation in the results.

Indicators	Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
I am excited to participate in Science activities in class.	4.15	1.09	Highly Interested	4.22	0.86	Extremely Interested
I am actively involved in Science activities and discussions.	4.07	1.06	Highly Interested	4.00	1.05	Highly Interested
I contribute my ideas to Science activities and projects.	4.07	1.21	Highly Interested	4.13	0.83	Highly Interested
I am willing to try new things in Science activities, even if challenging.	3.87	1.12	Highly Interested	4.20	1.04	Highly Interested
I persevere in Science activities, even when they are difficult.	3.67	1.19	Highly Interested	3.70	1.00	Highly Interested
I ask questions and seek clarification during Science activities.	3.61	1.42	Highly Interested	3.78	1.11	Highly Interested
I help my classmates during Science activities.	3.89	1.15	Highly Interested	3.78	1.00	Highly Interested
I enjoy learning about Science through activities.	4.52	1.02	Extremely Interested	4.48	0.86	Extremely Interested
I feel like I am learning a lot during Science activities.	4.35	0.94	Extremely Interested	4.52	0.72	Extremely Interested
I have fun during Science activities.	4.41	1.14	Extremely Interested	4.52	0.80	Extremely Interested
Sub-mean	4.06	0.65	Highly Interested	4.13	0.53	Highly Interested

Table 4. The Learners' Interest of the LGO and NLGO in Terms of Engagement in Science Activities

The learners in both the control and experimental groups showed extremely high interest and engagement in Science activities, as indicated by the highest mean scores in their respective indicators. These findings highlight the learners' enthusiasm and interest in actively participating in science activities. On the other hand, the control and experimental groups with their lowest mean showed a high level of interest. The control and experimental groups demonstrated a strong interest and engagement in Science activities, emphasizing their positive attitude toward the subject matter.

This result parallels the study of Swarat et al. (2012), which found that hands-on activities and engagement with technology tend to elicit higher interest among learners. It is also aligned with the study of Koretsky et al. (2019), which found that authentic, complex, and challenging Science learning activities increase the likelihood of learner engagement, particularly when these activities are embedded in school Science projects.

Overall Learners' Interest in the LGO and NLGO in the Implementation of Localized Graphic Organizers

The summary of the data on learners' interest is presented in Table 5. The data analysis reveals that the learners in the control group displayed a high level of interest in the Localized Graphic Organizer, with an

overall mean of 4.10 and a standard deviation of 0.44. On the other hand, the learners in the experimental group exhibited extreme interest, showing extreme interest with a mean score of 4.26 and a standard deviation of 0.36.

Indicators	Control			Experimental		
	Mean	SD	Descriptive Level	Mean	SD	Descriptive Level
Valuing Science	4.09	0.51	Highly Interested	4.30	0.37	Extremely Interested
Positive Interest Towards Subject Matter	4.10	0.50	Highly Interested	4.30	0.40	Extremely Interested
Engagement on Science Activities	4.06	0.65	Highly Interested	4.13	0.53	Highly Interested
Overall Mean	4.10	0.44	Highly Interested	4.26	0.36	Extremely Interested

Table 5. Overall Learners' Interest in the LGO and NLGO in the Implementation of Localized Graphic Organizers

In the control group, the learners showed a highly interested result in valuing science, positive interest towards the subject matter, and engagement on science activities. This indicates that they found this Localized Graphic Organizer engaging and effective in their learning process. Similarly, the experimental group exhibited extreme interest in valuing science, positive interest in the subject matter, and engagement in science activities. These findings suggest that both groups recognized the importance of science, had a positive attitude toward the subject matter, and actively engaged in various science-related activities. This suggests that the experimental group found the Localized Graphic Organizer to be a precious tool in enhancing their understanding and retention of the subject matter. The results highlight the effectiveness of the LGO in capturing the learners' attention and fostering their engagement in both the control and experimental groups.

The result aligns with the study of Huang (2014), where two groups in her study showed that the experimental group was more engaged in class activities and showed improvement on the post-test, while the control group showed little changes from the pretest to the post-test. The study of Greenleaf et al. (2011) found that learners in treatment groups, which were likely to use strategies including LGO, performed better on standardized assessments in Biology and other subject areas than controls.

The Test of Difference in the Learners' Academic Performance

In order to test the significant difference in the post-test scores between the learners from the experimental group and those from the control group while controlling for the pretest scores, the data gathered were subjected to a One-way Analysis of Covariance (ANCOVA). The data were found to be approximately normal, with a non-significant Kolmogorov-Smirnov and Shapiro-Wilk for both the control and experimental groups (Hanusz & Tarasińska, 2015). The result in Table 6 indicated that the treatment within obtained a p-value of less than 0.000.

Source	Adj SS	df	Adj MS	F-value	P-Value	η^2
Treatment	3481.810	2	1740.905	36.980	.000	.454
Within	1741.230	1	1741.230	36.987	.000	.294
Error	4189.875	89	47.077			
Total	16516	92				

**Significant at p<0.05 alpha level*

Table 6. Summary of the Learners' Academic Performance in Science

The data in Table 6 show a significant difference (F=36.98, p<.05) in the post-test scores between the experimental and control group learners. The null hypothesis, which states no significant difference in the

Post-Test scores of Grade 7 science learners taught using the Localized Graphic Organizer, was tested at a 0.05 significance level. The result in Table 6 indicated that the treatment within obtained a p-value of less than 0.000. The null hypothesis is rejected since the p-value was lower than the significant level of 0.05.

Based on the results, Localized Graphic Organizer helped learners obtain high scores and improved their academic performance in Grade 7 Science. Also, the partial eta square (η^2=.294) indicates that the grouping can explain 8.64% of the differences in the posttest. The experimental group that used the Localized Graphic Organizer had better academic performance than the others.

There is a significant difference in the academic performance of learners who used LGO and those who did not. The rejection of the null hypothesis indicates that using Localized Graphic Organizers had a notable impact on the learners' academic performance. This aligns with the instructional strategy's potential benefits in enhancing academic performance, as highlighted in the search results. The rejection of the null hypothesis suggests that the observed differences in posttest scores as their academic performance between the two groups are not due to random chance, emphasizing the meaningful impact of using Localized Graphic Organizers on learners' academic performance.

A recent study by Kalaivani et al. (2023) supports that learners who used Localized Graphic Organizers in their Science class better understood critical concepts and could apply their knowledge to solve problems more effectively. Mallick, Mihirkumar, and Amandeep (2014) parallel these results, stating that using LGO enhances academic performance. In contrast, learners who used the instructional strategy performed better on tests, as shown with the experimental group. Additionally, the result of both groups showing their exposure to Science process skills through the use of LGOs helped them become more confident in their ability to succeed and obtain high scores in Science (Wachanga et al., 2018).

Souisa's (2020) study supports the results that LGOs are visual tools that help learners organize and represent information. Additional studies by Ciullo et al. (2014) align with the finding that using LGOs positively impacts learners' academic performance.

The Test of Difference in the Learners' Interest in Science

In order to test the significant difference between the learners' interest scores of the group, the data were subjected to a one-way independent t-test and presented in Table 7. The data were screened and tested to determine whether they met the one-way independent t-test assumptions. The data were approximately normal, with a non-significant Kolmogorov-Smirnov and Shapiro-Wilk for both groups (Hanusz & Tarasińska, 2015). The results showed that the interest scores of learners in science exhibited a p-value equal to .06. Hence, the results indicate a statistically non-significant difference in the science interest scores of the learners. Thus, there is not enough evidence to reject the null hypothesis.

Group	N	Mean	t	df	p
Control	46	4.26	1.90	90	.06
Experimental	46	4.10			

*Significant at p<0.05 alpha level

Table 7. Summary of the Learners' Interest in Science

This finding contrasts with existing theories proposing that Localize Graphic Organizers can significantly enhance learning outcomes. However, it is essential to note that mean scores for both groups were relatively close, with the experimental group only slightly higher than the control. This similarity in scores could be attributed to factors such as the overall positive interest in science in both groups at the outset, as indicated by the pretest scores. Additionally, the nature of the study setting, the specific content covered, or the individual preferences of learners could have contributed to the minimal difference. These results underscore the educational interventions and suggest that more research is needed to reconcile these differences.

There is no significant difference in the learners' interest between those exposed to Localized Graphic Organizers and those not. The p-value suggests that the difference in interest between the experimental and control groups did not reach statistical significance. Based on these findings, no substantial evidence supports a significant difference in learners' interest between the group exposed to LGO and those not exposed to them. Thus, it means that when looking at the effectiveness of LGO, the level of interest from learners may not be the most important factor. It shows that they are not interested in Localized Graphic Organizer.

The study's results agree with Hanusz and Tarasińka's (2015) claims that there was no significant difference in the interest scores between the groups.

CONCLUSION

From the findings, the following conclusions were drawn.

1. Using the Localized Graphic Organizers can advance learners' academic performance.
2. Learners were interested in Science and enjoyed doing science activities. They continued to be interested and involved in learning about Science.
3. Localized Graphic Organizers can be employed to develop the fundamental knowledge, skills, and understanding of Distance versus Displacement, Speed versus Velocity, and Waves automatically and flexibly through authentic tasks.
4. The learners may not be interested in studying Science using the Localized Graphic Organizers.

ACKNOWLEDGEMENT

The researcher is grateful to the following individuals whose guidance, support, and encouragement have been invaluable throughout their journey in completing the thesis.

Dr. Joy M. Mirasol, president of Bukidnon State University, for ensuring that everyone has easy access to the facilities in the university;

Dr. Hazel Jean M. Abejuela, vice president for academic affairs of Bukidnon State University, for ensuring that programs offered help students, especially this researcher, grow professionally;

Dr. Salome L. Escalona, graduate studies director of Bukidnon State University, for the approval of requests for whatever is most helpful;

Dr. Ann Shiela C. del Rosario, dean of the College of Education, for the encouragement and unending support;

Dr. Wilfred G. Alava Jr., the thesis adviser, for his expertise and unlimited guidance that have been instrumental in shaping the work. His guidance pushed the researcher to delve deeper and strive for excellence.

The thesis panel chair, Dr. Iris April L. Ramirez, for her insightful feedback and for leading the discussions with wisdom and clarity. Her suggestions have truly enhanced the quality of the study;

The panel members, Dr. Catherine D. Libertad and Dr. Jay Fie P. Luzano, for their constructive inputs which greatly contributed to the refinement of the thesis. Their expertise in the field has been truly a guiding light.

The thesis secretary, Ms. Ivy T. Eran, for the meticulous record-keeping and organization throughout the meetings. Her attention to detail ensured that everything ran smoothly;

The validators, Dr. Cecille Marie T. Improgo, Dr. Shiela Mae I. Segumpan, and Dr. Edna T. Maganding, for their thorough evaluation of the content, lesson plans, and instruments used in the study, which was immensely helpful;

The statistician, Dr. Joseph C. Pasco, for his statistical prowess and patience in explaining complex analyses, which were crucial in presenting accurate and meaningful results;

The Schools Division Superintendent, Dr. Jesnar Dems S. Torres, CESO V, for his support by allowing the study to be conducted in the division of Valencia City;

The school principal, Dr. Ramilito P. Paloma, for allowing the study to be conducted within the school premises. His support made the research possible;

The department head, Ms. Lorraine E. Sapanta and Ms. Girlie Rose C. Magdato, former department head, for their assistance and understanding of the demands of the thesis amidst the researcher's responsibilities.

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