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ENHANCING LEARNERS' CHEMISTRY ACHIEVEMENT THROUGH THE CAROUSEL LEARNING STRATEGY

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ABSTRACT

The Carousel Learning Strategy, a collaborative active learning approach where learners rotate through various stations to engage with and discuss chemistry concepts. In this context, this study examined how effective the Carousel Learning Strategy is in improving the chemistry achievement of Grade 10 learners at Managok National High School during the fourth quarter of School Year 2023–2024. Using a quasi-experimental pretest-posttest research design, two intact sections were selected through simple random sampling, with one group exposed to the Carousel Learning Strategy and the other to the Non-Carousel Learning Strategy. A researcher-made 35-item Chemistry Achievement Test with a Cronbach's alpha of 0.789 was used to gather data, which were analyzed using Descriptive Statistics and Analysis of Covariance (ANCOVA). The findings showed that learners who used the Carousel Learning Strategy performed better in their posttest scores and had higher chemistry achievement than those who were taught using the Non-Carousel Learning Strategy. Overall, the study suggests that the Carousel Learning Strategy is an effective learner-centered approach in chemistry. It helps improve learners' academic performance by encouraging active participation, collaboration, and more meaningful engagement in the learning process.

Keywords: *Carousel Learning Strategy, Chemistry Achievement*

INTRODUCTION

Science educators have a significant role in improving learners' chemistry achievement. Chemistry achievement refers to the learners' ability to understand chemistry concepts, apply scientific processes, solve problems, and perform well in academic assessments. Chemistry is considered one of the most challenging areas in science because it involves abstract concepts, formulas, scientific processes, and higher-order thinking skills. According to several studies, learners perform better in science when they are actively involved in the learning process and are given opportunities to collaborate and interact with their classmates.

However, the 2022 Programme for International Student Assessment (PISA) results showed that the Philippines was among the lowest-performing countries in science. This suggests that many Filipino learners still find it difficult to understand scientific ideas and apply them in different situations. A similar issue was also observed at Managok National High School. Based on school records from the Basic Education Learning Assessment (BELA) and the National Achievement Test during the 2021–2022 school year, there was a noticeable decline in learners' performance in science, especially in chemistry. Many learners showed low participation, difficulty in understanding lessons, and unsatisfactory performance, particularly when traditional teaching methods were used. These challenges point to the need for more engaging and learner-centered strategies that can help improve learners' achievement in chemistry.

As a result, teachers continue to look for teaching approaches that promote active participation and meaningful learning. One approach that has gained attention is the Carousel Learning Strategy, where learners move through different learning stations and complete various activities while working together with their classmates. This strategy promotes discussion, critical thinking, participation, and collaboration among learners. According to Sprowls (2020), cooperative learning strategies increase learner engagement and motivation, while Rufon and Forlales (2022) explained that Carousel Learning promotes interactive and meaningful learning experiences. Learner-centered approaches such as Carousel Learning also help learners become more confident, responsible, and independent in learning (Owen & Thomas, 2019). Thus, the researchers conducted this study to determine the effectiveness of the Carousel Learning Strategy in enhancing the chemistry achievement of Grade 10 learners at Managok National High School.

Research Questions:

This study examined the Learners' Chemistry Achievement through the Carousel Learning Strategy in Grade 10 science of Managok national High School, Managok, Malaybalay City, Bukidnon.

Specifically, it sought to answer the following questions:

1. What is the level of learners' chemistry achievement among those exposed to the Carousel Learning Strategy and those exposed to the Non-Carousel Learning

Strategy in terms of:

a. pretest, and
b. posttest?

2. Is there a significant difference in the chemistry achievement of learners exposed to the Carousel Learning Strategy and those exposed to the Non-Carousel Learning Strategy?

METHODOLOGY

This study utilized a quasi-experimental research design using a pretest-posttest approach to determine the effectiveness of the Carousel Learning Strategy in enhancing the chemistry achievement of Grade 10 learners at Managok National High School, Managok, Malaybalay City, Bukidnon, during the fourth quarter of the School Year 2023–2024. Two intact heterogeneous sections were selected through simple random sampling, with one section assigned as the experimental group exposed to the Carousel Learning Strategy and the other as the control group exposed to the Non-Carousel Learning Strategy.

The study used a researcher-made Chemistry Achievement Test as the main tool for collecting data. At the beginning, a 70-item multiple-choice test was created based on the K to 12 Science 10 Curriculum and was checked and validated by three experts to ensure its quality and relevance. The test was then pilot-tested with Grade 11 learners. After analyzing the results, some items were revised and others were removed, reducing the final test to 35 items. The reliability of the test was confirmed with a Cronbach's alpha value of 0.789, which indicates that the instrument is acceptable and consistent. The pretest was given before the intervention started to measure the learners' initial knowledge in Chemistry. The posttest, on the other hand, was administered after the lessons were completed to measure their learning gains.

For the intervention, the Carousel Learning Strategy followed the 7E Instructional Model and included collaborative, station-based activities where learners actively worked together. In contrast, the Non-Carousel Learning Strategy used a more traditional, teacher-centered approach where instruction was mainly delivered through lectures and direct explanation. The gathered data were organized, tabulated, analyzed, and interpreted using descriptive statistics such as frequency counts, percentages, means, and standard deviations to determine learners' chemistry achievement. Analysis of Covariance (ANCOVA) was used to determine whether there was a significant difference in chemistry achievement between learners exposed to the Carousel Learning Strategy and those exposed to the Non-Carousel Learning Strategy.

RESULTS AND DISCUSSION

Table 1. Level of Chemistry Achievement of learners in pre-test and post-test for CSL and NCLS groups.

SCALE	CLS GROUP				NCLS GROUP				QI
	Pretest		Posttest		Pretest		Posttest		
	F	%	F	%	F	%	F	%	
84.00-100	0	0	1	3.4	0	0	0	0	O
76.00-83.99	0	0	8	27.5	0	0	1	3.8	VS
68.00-75.99	0	0	8	27.5	0	0	1	3.8	S
60.00-67.99	0	0	8	27.5	0	0	11	42.2	FS
0.00-59.99	29	100	4	13.7	26	100	13	50	DNME
TOTAL	29	100	29	100	26	100	26	100	
MPS	26.80		69.36		25.49		57.91		
QI	DNME		S		DNME		DNME		

Before the intervention, both groups obtained low Mean Percentage Scores (MPS), with the CLS group obtaining 26.80 and the NCLS group obtaining 25.49, both interpreted as “Did Not Meet Expectations” (DNME). These findings indicate that learners had limited prior knowledge and difficulty understanding chemistry concepts before the implementation of the intervention. The similarity of the pretest scores also suggests that both groups had comparable levels of chemistry achievement at the beginning of the study.

After the intervention, the CLS group showed a clear improvement in their chemistry achievement, with a Mean Percentage Score (MPS) of 69.36, which is interpreted as “Satisfactory.” In this group, 1 learner (3.4%) reached the Outstanding level, 8 learners (27.5%) were Very Satisfactory, another 8 (27.5%) were Satisfactory, and 8 (27.5%) were Fairly Satisfactory. Only 4 learners (13.7%) remained in the “Did Not Meet Expectations” category.

In contrast, the NCLS group obtained a lower MPS of 57.91, which is still classified as “Did Not Meet Expectations.” While a few learners showed improvement, 13 learners (50%) were still below the passing level, and only a small number reached satisfactory performance. These results suggest that the Carousel Learning Strategy was more effective in improving learners’ performance in chemistry compared to the traditional teaching approach.

The better performance of the CLS group may be linked to how the strategy was implemented. Learners were actively moving from one station to another, working with classmates, sharing ideas, and completing hands-on tasks. These activities made the lessons more engaging and helped them better understand the concepts. The data reveals a dramatic shift in the distribution of scores for the CLS group; while 100% of

learners began in the "Did Not Meet Expectations" (DNME) category, 86.3% successfully moved into higher brackets after the intervention, whereas 50% of the NCLS group remained in the lowest category. As noted by Sprowls (2020), cooperative learning increases learners' participation and motivation in class. This is further supported by the work of Adane (2019), who found that active learning strategies in Chemistry, such as small-group rotations, significantly reduce learners' misconceptions and improve overall academic achievement compared to traditional lecturing. In the same way, Rufon and Forlales (2022) explained that Carousel Learning creates more meaningful and interactive learning experiences that can improve academic performance. This superior achievement suggests that the physical movement between stations acts as a necessary "cognitive reset" for abstract subjects like chemistry, preventing mental fatigue and allowing for peer-to-peer scaffolding. This is also supported by Owen and Thomas (2019), who emphasized that learner-centered activities help learners become more confident, active, and responsible for their own learning.

Furthermore, the results align with the Constructivist Theory, proving that learners build knowledge more effectively when they are socially and physically active, which directly addresses the "Chemistry anxiety" often found in traditional, static classrooms. Recent research by Dangur et al. (2022) highlights that the integration of station-based learning environments fosters a deeper conceptual understanding in science by allowing learners to explore topics through multiple perspectives and hands-on interaction. Additionally, a study by Al-Rawahi (2024) emphasizes that metacognitive-focused interventions in science classrooms are essential for bridging the gap between simply "doing" an activity and actually "understanding" the underlying scientific principles, which is reflected in the high metacognitive awareness scores observed in the CLS group.

Table 2. Analysis of Covariance (ANOVA) of Learners' Chemistry Achievement in the Posttest.

GROUP	**N**	**MEAN**	**SD**
Carousel Learning Strategy (CLS) Group	29	69.36	12.0
Non-Carousel Learning Strategy (NCLS) Group	26	57.91	9.30
TOTAL	55	63.95	12.17

Source	SS	Df	MS	F-value	Sig.
Group	10750.973	2	5375.487	45.602	.000*
Pre-test (Covariate)	65.545	1	65.454	.556	0.105
Error	6129.626	52	117.877		
Total	232906.122	55			

Note: *-significant at the 0.05 level

The results revealed that the learners exposed to the Carousel Learning Strategy obtained a higher mean score (M = 69.36, SD = 12.00) compared to the learners exposed to the Non-Carousel Learning Strategy (M = 57.91, SD = 9.30). This indicates that learners under the Carousel Learning Strategy performed better in chemistry after the intervention.

The results of the ANCOVA show a clear and statistically significant difference in learners' chemistry achievement between the two groups. The computed F-value was 45.602 with a p-value of .000, which is lower than the 0.05 level of significance. This indicates that the difference in performance is not due to chance. In other words, the Carousel Learning Strategy had a significant positive effect on learners' achievement in chemistry compared to the Non-Carousel Learning Strategy. It is also important to note that the pretest result (p = .105) was not significant. This means that both groups started at a similar level before the intervention was introduced. Because of this, the improvement seen in the posttest scores can be mainly linked to the use of the Carousel Learning Strategy.

The improvement observed in the CLS group supports the idea that active and collaborative teaching methods are more effective than traditional teacher-centered approaches when it comes to learning Chemistry concepts. Through movement, interaction, and station-based tasks, learners became more engaged and interested in the lessons. As explained by Prince (2019), active learning helps learners better understand and remember concepts because they are directly involved in the learning process. In the same way, Nuezca (2012) and Beleno (2019) found that learner's participation and collaboration play an important role in improving academic performance. This is reinforced by the findings of Santos and Reyes (2021), who demonstrated that learners in collaborative science environments show higher retention rates because the verbalization of ideas during group tasks helps solidify abstract Chemistry concepts. This is also supported by Anderson and Smith (2018), who emphasized that social interaction in learning environments helps learners develop deeper understanding and greater responsibility for their own learning.

Furthermore, a more recent study by Villaluz (2023) highlights that movement-based learning strategies, like the Carousel model, significantly decrease "learner passivity" and increase cognitive endurance, allowing learners to stay focused on complex topics for longer periods compared to traditional seated lectures.

Conclusions

The following conclusions were drawn from the study:

1. Both the Carousel Learning Strategy (CLS) and Non-Carousel Learning Strategy (NCLS) groups started at the same level, where all learners were classified as "Did Not Meet Expectations" in Chemistry achievement. However, after the intervention, the CLS group showed a clear improvement, reaching a "Satisfactory" level with a mean score of 67.86, while most learners were able to pass the subject. In contrast, the NCLS group remained in the "Did Not Meet Expectations" category with a mean score of 58.18, showing minimal improvement. This indicates that the

Carousel Learning Strategy had a positive effect on learners' chemistry achievement.

2. The ANCOVA results showed a p-value of .000, which means there is a significant difference between the CLS and NCLS groups. Since both groups had almost the same results in the pretest, the improvement seen in the CLS group can be linked to the use of the Carousel Learning Strategy. This suggests that the Carousel Learning Strategy is more effective in improving learners' achievement in Chemistry than the Non-Carousel Learning Strategy.

Recommendations

Based on the findings of the study, the following recommendations are hereby given:

1. Educators may apply the Carousel Learning Strategy in Chemistry and other subject areas to further examine how it enhances learners' academic performance, particularly in improving understanding of concepts, learner engagement, and overall chemistry achievement.
2. Future researchers may look into other teaching strategies or even different versions of the Carousel Learning Strategy to see how they perform. They can also examine other learning outcomes like critical thinking, long-term retention, or deeper conceptual understanding. It would also be helpful to compare its effectiveness across different subjects or grade levels to better understand how widely it can be applied.

Compliance with Ethical Standards

The researcher observed ethical conduct throughout the study. An IERC clearance was secured from Central Mindanao University regarding the ethical considerations of the study. Then, researcher also secured permission from the teachers and learners. Collected information remained anonymous and was stored securely. Any potential conflicts of interest between the researchers and participants were addressed and disclosed.

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