

Using ClassPoint in Teaching Combinatorics to Improve Grade 10 Learners' Achievement and Engagement Levels

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ABSTRACT

This study aimed to use ClassPoint in teaching combinatorics to improve the achievement and engagement levels of Grade 10 learners during the School Year 2025–2026. The study employed a quantitative research design with qualitative support using a one-group pretest-posttest approach. Thirty Grade 10 learners participated in the study. The intervention involved five days of ClassPoint-integrated lessons covering the Fundamental Counting Principle, permutations, and combinations. Data were gathered through a validated lesson exemplar evaluation checklist, a 20-item achievement test adapted and modified from DepEd LRMDs, and an adapted engagement survey measuring cognitive, behavioral, emotional, and social engagement.

Findings revealed that the lesson exemplar with ClassPoint integration was rated Very Satisfactory by the panel of evaluators in terms of organization and design, content and pedagogy, technology integration, and format and presentation. Results also showed that learners' achievement levels improved from a pretest mean score of 5.43 to a posttest mean score of 14.37. The paired samples t-test revealed a significant difference between the pretest and posttest scores ($t = 20.24$, $p < 0.001$). In terms of engagement, the overall mean increased from 3.13 (Moderately Engaged) during the pre-survey to 4.40 (Highly Engaged) in the post-survey. Significant differences were also found across cognitive, behavioral, emotional, and social engagement dimensions. The normalized Learning Gain Score of 0.60 indicated a moderate learning gain among learners. Furthermore, learners described ClassPoint as interactive, enjoyable, motivating, and helpful in understanding combinatorics lessons. The study concludes that ClassPoint supported improved learner achievement and engagement in Grade 10 combinatorics.

Keywords: ClassPoint, combinatorics, mathematics achievement, learner engagement, technology integration

INTRODUCTION

Mathematics continues to be one of the most challenging subjects for many learners due to its abstract concepts and problem-solving demands. In Grade 10 Mathematics, combinatorics, particularly permutations and combinations, has consistently been identified as one of the least mastered competencies. Traditional lecture-based instruction often limits learner participation and reduces motivation, resulting in low achievements and engagements levels. In response to these concerns, educational technologies such as ClassPoint have emerged as innovative instructional tools that transform ordinary PowerPoint-presentations into interactive learning environments through quizzes, polls, annotations, and instant feedback.

Previous studies have emphasized that interactive digital platform improve learner participation, motivation, and academic performance. However, limited studies have explored the simultaneous improvement of achievement and engagement among junior high school learners in public school settings, particularly in mathematics. This study therefore aimed to determine how the integration of ClassPoint in teaching combinatorics improved the achievement and engagement levels of Grade 10 learners.

METHODOLOGY

The study employed a quantitative research design with qualitative support using a one-group pretest-posttest approach. The participants consisted of thirty (30) Grade 10 Learners from Rajah Cabungsu Integrated School, Lingig, Surigao del Sur. The intervention was implemented for five days covering lessons on the Fundamental Counting Principle, Permutation, and Combination.

ClassPoint was integrated into PowerPoint-based lessons using interactive features such as live quizzes, polls, drawing tools, and game-based activities. Data collection instruments included a validated lesson exemplar evaluation checklist, a 20-item pretest and posttest adapted from DepEd LRMDs materials, and an engagement survey measuring cognitive, behavioral, emotional, and social engagement. Open-ended questions were also administered to gather learners' perceptions regarding the use of ClassPoint.

The collected data were analyzed using weighted mean, mean, standard deviation, paired samples t-test, and Normalized Learning Gain Score (LGS). Thematic analysis was utilized to identify recurring themes from learners' qualitative responses.

RESULTS AND DISCUSSION

A. Validation of Lesson Exemplar

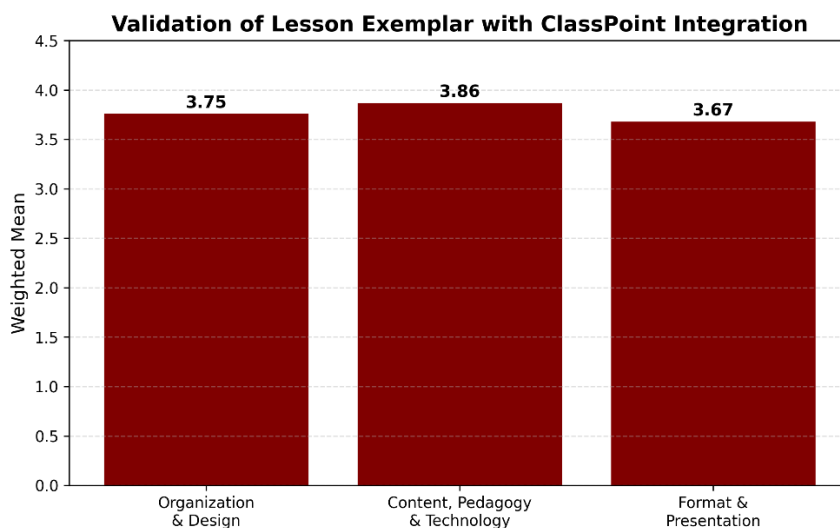


Figure 1. Validation Result of the lesson exemplar

The figure 1 shows revealed that the lesson exemplar integrated with ClassPoint obtained an overall rating of "Very Satisfactory", indicating that the instructional materials were well-organized, pedagogically sound, and technologically appropriate for classroom implementation.

B. Achievement Levels Before and After the Use of ClassPoint

Achievement Level	Before (Pre-test)	After (Post-test)
Outstanding	0	5
Very Satisfactory	0	8
Satisfactory	0	13
Fairly Satisfactory	3	4
Did not Meet Expectations	27	0
Mean Score	5.43	14.37
Standard Deviation	2.21	2.80

Note: Score of 18-20 is interpreted as Outstanding, 15-17 as Vert Satisfactory, 12-14 as Satisfactory, 9-11 as Fairly Satisfactory, and 0-8 as Did not Meet Expectations.

The table shows the distribution of learners' scores before and after using the ClassPoint in teaching combinatorics. During the pre-test, most learners specifically 27 learners belong to "Did not Meet Expectations". However, after the intervention the results improved. In the post test, 13 learners reached the satisfactory level. Therefore, the achievement results showed that learners demonstrated significant improvement in combinatorics after the use of ClassPoint-integrated instruction. The posttest scores reflected better mastery of the concepts compared to the pretest results.

C. Engagement Levels Before and After the Use of ClassPoint

Engagement Dimension	Pre- Survey Mean	Interpretation	Post- Survey Mean	Comprehension Level
Cognitive Engagement	3.00	Moderately Engaged	4.38	Highly Engaged
Behavioral Engagement	3.35	Moderately Engaged	4.39	Highly Engaged
Emotional Engagement	2.90	Moderately Engaged	4.53	Highly Engaged
Social Engagement	3.28	Moderately Engaged	4.29	Highly Engaged
Overall Engagement	3.13	Moderately Engaged	4.40	Highly Engaged

Note: A weighted mean of 4.20–5.0 is interpreted as Strongly Agree (Highly Engaged), 3.40–4.19 as Agree(Engaged), 2.60–3.39 as Neutral(Moderate Engaged), 1.80–2.59 as Disagree(Passively Engaged), and 1.00–1.79 as Strongly Disagree(Disengaged).

Table showed that the engagement levels of Grade 10 learners in combinatorics before and after the use of ClassPoint in terms of cognitive, behavioral, emotional, and social engagement. Before the implementation of ClassPoint, the overall engagement mean was 3.13, interpreted as Neutral or Moderately Engaged level. This indicates that learners only sometimes participated, showed interest, and became involved in mathematics activities. After the use of ClassPoint, the overall mean increased to 4.40, interpreted as Strongly Agree or Highly Engaged. This means that learners frequently demonstrated enthusiasm, participation, and interest during mathematics instruction.

Thus, the findings indicate that learners demonstrated higher levels of cognitive, behavioral, emotional, and social engagement after the use of ClassPoint in teaching combinatorics. The results imply that interactive and learner-centered instructional tools can encourage learners to become more active, motivated, participative, and collaborative during mathematics lessons.

D. Difference Between Pre-test and Post-test Scores of Learners on the Achievement Levels

Group	N	Mean (Pre)	Mean (Post)	Mean Difference (Post-Pre)	SD (Difference)	t-value	df	p-value	Interpretation
Learners	30	5.43	14.37	8.94	2.42	20.24	29	<0.001	Significant difference

The table presents the statistical evidence of improvement in learners' achievement before and after the use of ClassPoint. The results show a mean difference of 8.94 between the pre-test and post-test scores, with a pre-test mean of 5.43 and a post-test mean of 14.37. The computed t-value of 20.24 and a p value of <0.001, indicate that the improvement in scores is highly significant. Therefore, Hypothesis 1 is accepted, confirming that the use of ClassPoint as a teaching tool led to a significant increase in the achievement level of Grade 10 Mathematics learners in combinatorics. Also, the standard deviation of the difference scores is 2.42 suggesting that while all learners improved, the extent of improvement differed slightly across individuals. This suggests that while ClassPoint significantly enhanced learning outcomes, some learners may still require additional instructional support to reach higher mastery levels (Bird, Castleman, & Lohner, 2022; Chan, Wan, & Ko, 2019).

Moreover, the significance difference in scores also implies that interactive learning tools such as ClassPoint contribute not only to cognitive improvement but also to increased learner achievement in mathematics. Through features such as real-time quizzes, gamified activities, and immediate feedback, learners are actively involved in

the learning process, which helps address misconceptions, strengthen conceptual understanding, and sustain attention during instruction (Zhu & Urhahne, 2018).

Overall, these findings suggest that ClassPoint should be integrated as an essential component in teaching mathematics, particularly in abstract topics such as combinatorics.

E. Difference Between Pre-survey and Post-survey Mean Scores of Learners on the Engagement Levels

Engagement Dimension	Time Interval	Mean	Mean diff.	SD	t- value	p- value	Descriptive Interpretation
Cognitive	Pre-survey	3.00	1.38	0.58	13.05	<0.001	Significant
	Post-survey	4.38		0.41			
Behavioral	Pre-survey	3.35	1.04	0.61	10.42	<0.001	Significant
	Post-survey	4.39		0.44			
Emotional	Pre-survey	2.90	1.63	0.66	14.21	<0.001	Significant
	Post-survey	4.53		0.39			
Social	Pre-survey	3.28	1.01	0.63	9.88	<0.001	Significant
	Post-survey	4.29		0.47			

The Table presents the comparison of the learners' engagement levels in the pre-survey and post-survey across the four dimensions of learning engagement, using ClassPoint in mathematics lessons, particularly in combinatorics. Prior to the intervention, the pre-survey results showed consistently moderately Engaged means across all dimensions of engagement. Cognitive engagement (3.00), Behavioral engagement (3.35), Emotional engagement (2.90), and Social engagement (3.28) were all interpreted as Neutral or Moderately Engaged level, indicating that learners possessed only baseline levels of engagement and focus before the intervention.

However, after the implementation of ClassPoint, the post-survey means increased substantially across all dimensions; Cognitive engagement (4.38), Behavioral engagement (4.39), Emotional engagement (4.53), and Social engagement (4.29), all interpreted as Strongly Agree or High Engagement. These findings demonstrated a clear and positive shift in learners' overall engagement after exposure to ClassPoint, indicating that the tool was effective in promoting active participation, deeper mental processing, and regular classroom interaction. The mean differences in Cognitive (1.38), Behavioral (1.04), Emotional (1.63), and Social (1.01) further highlight the strong and meaningful magnitude of improvement across all engagement domains.

A closer analysis of the statistical results reveals that all computed t-values are notably high, ranging from 9.88 to 14.21, with corresponding p-values of less than 0.001. This confirms that the differences between the pre- and post-survey are highly statistically significant and not due to chance. Emotional engagement recorded the highest t-value ($t = 14.21$) and highest mean difference (1.63), indicating learners developed a powerful interest and highly positive attitudes towards mathematics. Significant improvements in cognitive engagement ($t = 13.05$) and behavioral engagement ($t = 10.42$) suggest increased task persistence, deeper mental involvement, and focused learning effort. Social engagement ($t = 9.88$), although slightly lower, still showed massive enhancement, reflecting improved collaboration and peer interaction. These findings support existing literature which emphasizes that interactive digital tools enhance multiple dimensions of learners' engagement by promoting active, collaborative, and meaningful learning experiences (Bond et al., 2020; Martin & Bolliger, 2018; Zainuddin et al., 2020; Rasheed et al., 2020).

In summary, it can be concluded that the use of ClassPoint had a statistically significant effect on improving learners' engagement levels. Overall, the findings imply that integrating interactive technology like ClassPoint in teaching combinatorics improved cognitive, behavioral, emotional, and social engagement, making the learning process more dynamic, student-centered, and meaningful (Schinder et al., 2017; Henrie et al., 2018). Therefore, the hypothesis 2 stating that there is a significant difference between the mean scores of the engagement levels of Grade 10 Mathematics learners before and after the use of ClassPoint in teaching combinatorics is accepted.

F. Normalized Learning Gain Score (LGS)

LGS Range	Interpretation	Number of learners	Percentage of learners
0.70 – 1.0	High Learning Gain	10	33.3%
0.30 – 0.69	Moderate Learning Gain	20	66.7%
0.00- 0.29	Low learning Gain	0	0.0%
TOTAL		30	100%

The Table presents the distribution of the Normalized Learning Gain Score (LGS) of the learners after using of ClassPoint integrated instruction in combinatorics. The results reveal that 10 out of 30 learner (33.3%) achieved high learning gain, while the majority, 20 learners (66.7%), attained moderate learning gains. Notably, no learner fell under the low learning gain category or 0.0%.

The predominance of learners in moderate learning gain category indicates that most learners experienced substantial and meaningful improvement in their understanding of combinatorics concepts following the intervention. This suggests that the integration of ClassPoint was effective in facilitating learning by enabling learners to build on prior knowledge and achieve measurable progress.

Moreover, the presence of learners in the high learning gain category demonstrates that a considerable proportion of learners were able to achieve near-maximum possible improvement, reflecting a strong positive effect of the instructional approach. These results may be attributed to the interactive features of ClassPoint, which promote active participation, immediate feedback, and engagement during the learning process.

Equally important was the absence of low learning gains scores, which indicates that all learners benefited from the intervention regardless of their initial performance levels. This finding suggests that the use of interactive digital tools contributed to a more inclusive learning environment, minimizing gaps among learners. These finding are supported by recent studies, shows that interactive teaching strategies significantly improve learners' engagement and academic performance by encouraging active participation and deeper understanding (Zhou et al., 2024).

Furthermore, adaptive and interactive learning tools contribute to improve learners' achievement and satisfaction by addressing individual learning needs and providing immediate feedback (Contrino et al., 2024). Local and recent studies also confirm that interactive learning approaches positively influence learners' academic achievement (Hafundar et al., 2025).

Overall, the marginal analysis of LGS confirms that the use of ClassPoint resulted in consistently positive learning outcomes, with most learners achieving moderate gains and a substantial proportion reaching high levels of improvement. This indicates that the intervention was effective in enhancing learners' achievement in combinatorics and in promoting more equitable learning gain across the class.

CONCLUSION & RECOMMENDATION

The study concluded that the integration of ClassPoint in teaching combinatorics effectively improved the achievement and engagement levels of Grade 10 learners. The findings revealed that learners demonstrated better academic performance after the implementation of the intervention, as reflected in the improvement of their posttest scores and learning gains. In addition, learners showed positive cognitive, behavioral, emotional, and social engagement during classroom activities. The use of interactive quizzes, immediate feedback, and collaborative learning opportunities made mathematics lessons more engaging, enjoyable, and meaningful. Furthermore, learners perceived ClassPoint as an effective instructional tool that helped them better understand combinatorics concepts and participate actively in the learning process. Therefore, the study affirms that technology-integrated instruction can contribute to improved learners' achievement and engagement in mathematics education.

Based on the findings and conclusions of the study, it is recommended that mathematics teacher integrate ClassPoint and other interactive digital tools in teaching mathematics to promote active participation and improve learners' academic performance. School administrators may also provide training programs, workshops, and

technical support to strengthen teachers' competence in technology-integrated instruction. Learners should likewise be encouraged to actively participate in interactive classroom activities to enhance their understanding and motivation in mathematics. Moreover, future researchers may conduct similar studies using larger sample sized, longer implementation periods, and other mathematical topics or subject areas to further validate the effectiveness of ClassPoint. Future studies may also explore additional variables such as motivation, retention, critical thinking, and problem-solving skills to gain broader insights into the impact of interactive technology in education.

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REFERENCES

1. Abdelrady, A. H., & Akram, H. (2022). An Empirical Study of ClassPoint Tool Application in Enhancing EFL Students' Online Learning Satisfaction. *Systems*, 10(5), 154. <https://doi.org/10.3390/systems10050154>
2. Abdul Rahim, R., Kalaichelven, K., & Ibrahim, N. (2022). Blended learning software applications in higher education.
3. Carvajal-Pasamonte, M. (2024). ClassPoint integration as a technology-based intervention in mathematics instruction.
4. Department of Education. (2022). DepEd highlights Digital Rise Program as key player in addressing challenges in education quality.
5. Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics.
6. Kharbach, M. (2024). ClassPoint: Easily create interactive PowerPoint.
7. Maamin, M., Maat, S. M., & Iksan, Z. H. (2022). The influence of student engagement on mathematical achievement among secondary school students.
8. Mayer, R. E. (2024). The past, present, and future of the cognitive theory of multimedia learning.
9. Saadah, N., & Indrawatiningsih, N. (2024). ClassPoint application as a digital transformation in mathematics education.
10. Wang, Y. H. (2020). Design-based research on integrating learning technology tools into higher education classes to achieve active learning.
11. Yan, Y., Fitzmaurice, O., & O'Donoghue, J. (2022). Learner motivation and engagement in mathematics classrooms.
12. Yusi, M. D. (2023). ClassPoint as an intervention strategy in teaching Business Math. *Asian Journal of Applied Research for Community Development and Empowerment*, 7(1), 95-98. <https://doi.org/10.29165/ajarcde.v7i1.176>
13. Zainuddin, Z., Shujahat, M., Haruna, H., & Chu, S.K.W. (2020). *The role of gamified e-quizzes on student learning and engagement*. *Computers & Education*, 150, 103839. <https://doi.org/10.1016/j.compedu.2020.103839>
14. Zarzua, N. J. R., & Pasia, A. E. (2024). Advancing the combinatorial thinking of Grade 10 students through structure of observed learning outcomes in team accelerated instruction. *TWIST*, 19(3), 698–704.
15. Zhou, Q., Zhang, H., & Li, F. (2024). The Impact of online interactive teaching on university students' deep learning: The perspective of self-determination. *Education Sciences*, 14(6),664. <https://doi.org/10.3390/educsci14060664>
16. Zhu, C., & Urhahne, D. (2018). The use of learner response systems in the classroom enhances teachers' judgment accuracy. *Learning and Instruction*, 58, 255–262. <https://doi.org/10.1016/j.learninstruc.2018.07.011>