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Leveraging Three-Step Interview Cooperative Learning Strategy in Enhancing Students' Mathematical Engagement and Performance

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Abstract: Three-Step Interview (TSI) is a cooperative learning strategy involving structured peer interaction, where students take turns as interviewers and interviewees, followed by group sharing. This study investigated the impact of the TSI on the mathematics engagement and performance of Grade 9 students at Tongantongan National High School, Valencia City, Bukidnon, for the academic year 2024- 2025. A quasi-experimental design was used, involving two intact sections: one exposed to TSI (n=50) and the other exposed to non-TSI (n=49). The data were collected using the Mathematics Engagement Scale and a teacher-made performance test. An analysis of Covariance was used to find statistical differences. The results indicated that both groups had the same engagement level before the intervention. However, after the intervention, students under the TSI improved across cognitive, emotional, behavioral, and social engagement domains. Overall, the engagement level of the TSI group was highly engaged (3.53) and moderately high (3.31) for the non-TSI. In addition, the level of mathematical performance in the pretest and the retention test of the TSI group was very low, and low for the posttest. Whereas the level of the non-TSI was very low across the pretest, posttest, and retention test. Moreover, there was no significant difference in the post-test performance, but the TSI group showed significantly better results on retention test scores and engagement. These findings suggest that TSI supports long-term learning and overall engagement. Future researchers may extend the duration of TSI beyond six weeks to allow students more time to adapt and deepen engagement.

Keywords: Three-Step Interview, Mathematics Engagement, Mathematics Performance, Cooperative Learning Strategy.

INTRODUCTION

Mathematics is a fundamental subject that equips students with skills to evaluate data, see trends, and devise novel solutions to challenging situations. These skills are critical in a variety of areas, including finance, healthcare, and technology, as they help individuals navigate today's fast-paced, data-driven world (Johnson, 2020). In the Education context, mathematics provides essential information that gives knowledge and skills in shaping life and making it into a globally competent individual (Ariyanti & Santoso, 2020). The Trends in International Mathematics and Science Study (TIMSS) and the Program for International Student Assessment (PISA) consistently reveal that Filipino students struggle in Mathematics compared to their peers globally. According to the 2022 PISA, the Philippines landed in the bottom 10 in the field of reading comprehension, Mathematics, and Science, scoring below the OECD average of 489 with only 355 points. Correspondingly, in TIMSS 2019, the results showed that the country was the lowest among the 58 participating countries. Such weak mathematics performance needs to be addressed, which requires a comprehensive strategy to ensure better outcomes in future international assessments.

The country's National Assessment, the National Achievement Test (NAT), emphasizes the dismal state of mathematics education. The Department of Education (DepEd) found out that the scores of students provide a concerning result, in which among the seven subjects examined, Mathematics and Sciences were the subjects performed poorly by Filipino learners. Some of the contributing factors of the country's performance includes insufficient teacher training, inadequate learning resources, and overcrowded classrooms, and socio economic disparities which may hinder effective instruction and individualized attention (David, 2018 & PISA, 2019), In response, the Philippine government rolled out initiatives including the shift to a K-12 curriculum, providing scholarships and incentives to math teachers, enhancing teaching methodologies, developing comprehensive educational materials, and aligning the curriculum with international benchmarks. Alongside these efforts, there is a necessity to take into account specific components in learning mathematics, such as the engagement and performance of the students.

The problem of student engagement in Mathematics is a substantial one in the Philippines, as there is a very scant amount of interest and motivation towards the subject for it to be effective in terms of learning in its regard. Those traditional ways of teaching, which depend much on rote memorization and little on critical thinking, coupled with infrequent integration of technology and interactive learning tools, is indeed a recipe to failure and leads to disengagement (Bernardo, 2017, Llego, 2020). Mathematics engagement

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among students includes observable behavior and thought, which includes attention, effort, cognition, and emotion, critical variables in academic success (Jansen, 2019). Studies show that students, in cases where no positive active engagement in Mathematics is found, will at worst have at least a positive disposition towards the subject, with severely adverse effects on the learning process where outcomes are concerned (Orleans, 2017).

To address the problems, leveraging cooperative learning strategies like the Three-Step Interview can be employed. It is a cooperative learning strategy that helps active engagement, communication, and collaboration. It has three phases: students interview their partner, Student A interviews Student B, switch of roles, Student B interviews Student A, and then the partners will share their response with another group. Learning through cooperative techniques provides a platform for greater success and a deeper understanding of concepts reinforced through dialogue with one another, and makes both individuals accountable when it fails (Johnson, *et al*., 2014). Similarly, TSI, applied in high school mathematics classes, positively affect engagement while attaining better learning outcomes in Mathematics that help mental retention of mathematical concepts (Usmadi, *et al*., 2020 & Öztürk, 2023).

Thus, the researcher gained interest in investigating how Three-Step Interview Cooperative Learning Strategy impacts the students' engagement as well as their mathematics performance to produce results that are significant and useful in providing globally-competitive and interactive instruction in the Mathematics subject.

METHODOLOGY

The study used a quasi-experimental design with two intact groups: an experimental group exposed to the TSI and the control group exposed to non-TSI. Both groups took the same pretest, posttest, and retention test to evaluate differences in mathematics performance and pretest and posttest for the engagement.

The research was conducted at Tongantongan National High School in Valencia City, Bukidnon. towards the Grade 9 students of the school year 2024-2025. The TSI class had 50 students, while 49 the non-TSI. Random sampling was employed in assigning the TSI and non-TSI using the spinning wheel.

To measure mathematics students' engagement, the researcher adopted the 33-item Mathematics Student-Report Engagement Scales by Wang, *et al.*, (2016). This five-point Likert scale assesses cognitive, effective, behavioral, and social engagement and has a Cronbach's alpha of 0.80 for reliability. The scoring procedure is as follows:

	Scale	Descriptive Setting	Qualitative Interpretation (QI)
5	4.51- 5.00	Strongly Agree	Very High Engagement (VHE)
4	3.51-4.50	Agree	High Engagement (HE)
3	2.51-3.50	Undecided	Moderately High Engagement (MHE)
2	1.51-2.50	Disagree	Low Engagement (LE)
1	1.00-1.50	Strongly Disagree	Very Low Engagement (VLE)

The primary data sources were students' pre-test, post-test, and retention test scores, assessed with a 50-item, content-validated multiple-choice test that scored 1 point each. The test had a Cronbach's alpha of 0.876 and used a table of specifications (TOS) for item construction. Scores were interpreted using the scale from DO #8, s. 2015 after the scores were transmuted.

Percentage Equivalent	Qualitative Interpretation (QI)
90-100	Outstanding (O)
85-89	Very Satisfactory (VS)
80-84	Satisfactory (S)
75-79	Fairly Satisfactory (FS)
Below 75	Did Not Meet Expectation (DNME)

The researcher obtained IERC clearance and permissions from the Valencia City DepEd Division and Tongantongan National High School to conduct the study. Participants were randomly assigned to TSI and non-TSI using the spinning wheel. Informed consent from the participants and an ascent letter was secured before the conduct of the study. Afterward, the researcher administered a pre-test before implementing the Three-Step Interview Cooperative Learning Strategy into

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action to evaluate the students' engagement and performance in Mathematics. Next, the researcher taught using the Three-Step Interview (TSI) Cooperative Learning Strategy to Section A while Section B received instruction using the non-Three-Step Interview (TSI) Cooperative Learning Strategy. After exposure to TSI, the researcher administered a post-survey and posttest to assess the students' level of engagement and performance in Mathematics, respectively. The retention was administered two (2) weeks after the study was conducted.

Data from the pretest and posttest were summarized using descriptive statistics, including MPS, frequency, and percentage, to assess students' mathematics performance and the mean for the students' engagement. The effectiveness of the TSI was evaluated using ANCOVA to identify significant differences between TSI and non-TSI, accounting for pre-test score differences. Before using ANCOVA, normality test and homogeneity test was conducted to the dependent variables and the results indicated that the data was normally distributed and homogenous, satisfying the assumptions for parametric testing.

RESULTS AND DISCUSSION

Level of Students' Engagement in Mathematics Before and After TSI and non-TSI.

Table 1: Level of student cognitive engagement in mathematics before and after exposure to TSI and non-TSI in terms of pretest, and posttest

COGNITIVE ENGAGEMENT INDICATORS	TSI				Non-TSI			
	Pretest		Posttest		Pretest		Posttest	
	Mean	QI	Mean	QI	Mean	QI	Mean	QI
I try to connect what I am learning to things I have learned before.	2.62	MHE	3.94	HE	3.45	MHE	3.80	HE
I try to understand my mistakes when get something wrong.	2.62	MHE	3.92	HE	3.39	MHE	3.66	HE
I go through the work for math class and make sure that it's right.	2.56	MHE	3.84	HE	3.61	HE	3.67	HE
I think about different ways to solve a problem	2.62	MHE	3.42	MHE	3.55	HE	3.61	HE
I would rather be told the answer than have to do the work. *	2.46	LE	3.42	MHE	2.90	MHE	2.98	MHE
I don't think that hard when I am doing work for class. *	2.06	LE	3.28	MHE	3.27	MHE	2.90	MHE
When work is hard, I only study the easy parts. *	2.44	LE	3.22	MHE	2.66	MHE	3.00	MHE
Do just enough to get by. *	2.32	LE	2.92	MHE	3.20	MHE	2.88	MHE
MEAN	2.46	LE	3.50	MHE	3.25	MHE	3.31	MHE

*negative indicators (scoring reversed)

Legend:

Scale	Range	Descriptive Rating	Qualitative Interpretation
5	4.51- 5.00	Strongly Agree	Very High Engagement (VHE)
4	3.51-4.50	Agree	High Engagement (HE)
3	2.51-3.50	Undecided	Moderately High Engagement (MHE)
2	1.51-2.50	Disagree	Low Engagement (LE)
1	1.00-1.50	Strongly Disagree	Very Low Engagement (VLE)

Table 1 shows the level of students' cognitive engagement of the TSI and the non-TSI group. For students in three-step interview group on the pre-test, there were four indicators under Moderately High Engagement and Low Engagement Level. The indicators in the pretest with the highest mean score were "I try to connect what I am learning to things I have learned before" (2.62), "I try to understand my mistakes when get something wrong" (2.62) and "I go through the work for math class and make sure that it's right." (2.56), and "I think about different ways to solve a problem", this indicates a moderately high engagement. On the post-test, the students exposed to three-step interview were highly engaged on three indicators and five for the moderately engaged. The high engaged indicators were "I try to connect what I am learning to things I have learned before." (3.94), "I try to understand my mistakes when get something wrong." (3.92), and "I go through the work for math class and make sure that it's right" (3.82). This implies that when students are encouraged to reflect, connect their prior knowledge, and review their work collaboratively, they are more likely to develop higher-order thinking skills and self-monitoring practices.

On the other hand, the students in the non-three-step interview on the pre-test were highly engage in "I go through the work for math class and make sure that it's right" with a mean of 3.61 and "I think about different ways to solve a problem." (3.55). While the indicator "when work is hard, I only study the easy parts. * (2.66) got the lowest mean. There were only two indicators under High Engagement and six Moderately High

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Engagement. As for the posttest, four indicators in both highly engaged and moderately high engaged. The highest indicator was "I try to connect what I am learning to things I have learned before." (3.80), followed by "I go through the work for math class and make sure that it's right." (3.67), "I try to understand my mistakes when get something wrong." (3.66), and "I think about different ways to solve a problem." (3.61). Additionally, the moderately high engaged were When work is hard, I only study the easy parts. *" (3), followed by "I would rather be told the answer than have to do the work. *" (2.98), "I don't think that hard when I am doing work for class. *" (2.90), and "I do just enough to get by. *" (2.88). All of the negative indicators in which the scores where reversed were moderately high engaged. This implies that their engagement depends on surface-level strategies with minimal effort specially when the tasks became difficult. Although they showed strength in validating work and exploring different problem-solving methods, the moderately high engagement in negative indicators implies that without structured peer interaction, students may be less motivated to engage in challenging lessons.

The weighted mean score of students' cognitive engagement under three-step interview has a weighted mean score of 2.46 in the pretest which indicates a low engagement and 3.50 for the posttest which interpreted as moderately high engagement. As for the non-TSI group, 3.25 in their pretest and 3.31 in the posttest, both indicates moderately high engagement. The result revealed that the first three indicators had a notable increase from the pretest the post-test from having 2.62, 2.62, 5.56 in the pretest and became 3.94, 3.92, 3.84 in the post test on the TSI group. Although the two groups showed moderately high engagement and their engagement in mathematics increased, the three-step interview shows improvement from having a low engagement from the pre-test to moderately high engagement on the post-test and the non-three-step interview group remained having a moderately high engagement.

Based on the result, it suggests that the TSI can enhance students' metacognitive awareness and self-regulatory skills. Students became more reflective in their learning process. The increase implies that they were more likely to linked new learning to previous learning, carefully examined errors to improve their understanding, and verified accuracy through their work. This improvement points out the potential of using this three-step interview strategy in promoting deeper learning. One key factor affecting the mathematics performance of junior high school students is their self-concept towards learning the subject (Peteros, 2020). Students who develop a positive self-concept are more likely to engage in learning activities and improve their academic performance. Additionally, this finding aligns in the idea of Sesmiyante (2016), that a student that is cognitively engage knows what to do in their studies. Such as diligently organizing and studying the task that has been given to them, being determined to further develop their learning abilities, and actively participating in class. Furthermore, study of Yang, *et al.,* (2021), support the idea that giving students instructional support is one way to increase their degree of cognitive engagement. Thus, the results of this study support the effectiveness of the Three-Step Interview strategy in enhancing cognitive engagement, leading to improved learning outcomes in mathematics.

Further studies support that a cooperative strategy like TSI enhances the cognitive engagement of the students. For instance, Galceran and Mugot (2019) showed that the Three-Step Interview (TS I) strategy improved the performance academically of Grade 8 science students as it provided structured peer interactions that promoted understanding and critical thinking. Meanwhile, Garcia Mendoza, *et al.,* (2017b) found that asynchronous text-based collaboration increased the cognitive engagement of Filipino students by promoting reflective thinking and knowledge construction. Further studies supporting the significance of collaboration was the study by Corrales and Tenorio (2024) wherein it was found that students' decision-making and problem-solving skills were positively affected by group dynamics online. All these studies reinforced that structured interactive learning strategies such as TSI meaningfully contribute to an increase in students' levels of cognitive engagement, regardless of setting-whether traditional, hybrid, or online.

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Table 2: Level of student emotional engagement in mathematics before and after exposure to TSI and non-TSI in terms of pretest, and posttest

EMOTIONAL ENGAGEMENT INDICATORS	TSI				Non-TSI			
	Pretest		Posttest		Pretest		Posttest	
	Mean	QI	Mean	QI	Mean	QI	Mean	QI
I feel good when I am in math class.	2.96	MHE	3.98	HE	3.37	MHE	3.65	HE
I look forward to math class.	3.10	MHE	3.84	HE	3.51	HE	3.71	HE
I want to understand what is learned in math class.	3.26	MHE	3.84	HE	3.47	MHE	3.88	HE
I enjoy learning new things about math.	3.26	MHE	3.74	HE	3.47	MHE	3.82	HE
I don't want to be in math class.*	3.12	MHE	3.70	HE	3.56	HE	3.45	MHE
I think that math class is boring.*	2.72	MHE	3.62	HE	3.47	MHE	3.31	MHE
I don't care about learning math.*	3.06	MHE	3.48	MHE	3.86	HE	3.37	MHE
I often feel down when I am in math class. *	3.06	MHE	3.42	MHE	3.31	MHE	3.27	MHE
I get worried when I learn new things about Math	3.00	MHE	3.38	MHE	3.29	MHE	3.22	MHE
I often feel frustrated when I am in Math class. *	3.16	MHE	3.06	MHE	3.04	MHE	3.44	MHE
MEAN	3.04	MHE	3.61	HE	3.43	MHE	3.51	HE

*negative indicators (scoring reversed)

Legend:

	Scale	Descriptive Setting	Qualitative Interpretation (QI)
5	4.51- 5.00	Strongly Agree	Very High Engagement (VHE)
4	3.51-4.50	Agree	High Engagement (HE)
3	2.51-3.50	Undecided	Moderately High Engagement (MHE)
2	1.51-2.50	Disagree	Low Engagement (LE)
1	1.00-1.50	Strongly Disagree	Very Low Engagement (VLE)

Table 2 shows the level of students' emotional engagement of the TSI and the non-TSI group with respect to pretest and posttest. For students in three-step interview group, all of the indicators in the pretest were moderately high engagement .For the posttest, there were six (6) indicators for the TSI groups under the "High Engagement" (HE) with the highest post-test score of 3.98 with statement "I feel good when I am in math class", followed by "I look forward to math class" (3.84, HE), "I want to understand what is learned in math class" (3.84, HE), "I enjoy learning new things about math" (3.74, HE), and two negative indicators were scored were reversed which are the statements "I don't want to be in math class.*"(3.7) and I think that math class is boring* (3.64, HE). The weighted mean of the TSI group were 3.04 and 3.61 and interpreted as moderately high and high engage in the pretest and post-test respectively.

On the other hand, the non-TSI group was moderately to high engage in the pretest. There were three indicators for highly engaged in the pretest: two negative indicators in which the score where reversed and 1 positive indicator. These are I don't care about learning math. *" (3.86), followed by "I don't want to be in math class. *" (3.56) and "I look forward to math class." (3.51). as for the post test, there were four (4) indicators falls under the "High Engagement" and the highest was the statement "I want to understand what is learned in math class" (3.88), followed by "I enjoy learning new things about math" (3.82), and "I look forward to math class" (3.71), and "I feel good in Math class" (3.65). Moreover, the non-TSI group was moderately high engage (3.43) in the pretest, and highly engage in the post test (3.51). The negative emotional indicators such as "I don't want to be in math class.*" (TSI: 3.7, HE; Non-TSI: 3.45, MHE), "I often feel frustrated in math class*" (TSI: 3.06, MHE; Non-TSI: 3.45, MHE) and "I don't care about learning math*" (TSI: 3.48, MHE; Non-TSI: 3.37, MHE), were interpreted in reverse which means that the higher scores signify more positive emotional state. The indicator "I feel good when I am in math class." had a notable increase from the pretest (2.96) to the post test (3.98), indicating a positive shift in students' emotional engagement towards the TSI group. On the contrary, the indicator "I often feel frustrated when I am in Math class" showed a slightly decrease from 2.96 (pretest) to 2.94 (posttest), which suggests minimal change in students' levels of frustration and it remained relatively stable (decrease of 0.02)

This implies that the students in the TSI group benefited from the intervention provided which leads to improved emotional engagement, and the emotional engagement of the non-TSI group remained relatively stable. These findings suggest that the students under TSI developed a stronger motivation and interest towards mathematics after the intervention. The TSI strategy fostered a more supportive and engaging learning environment, helping students develop a more positive attitude toward mathematics as compared to non-TSI.

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This finding aligns with previous studies, such as the study of Aristy, *et al.*, (2019) where they concluded that three-step interview made the students motivated to join the class which is reflected with their performance in front of the class. Their engagement was not only evident in their willingness to join class discussions but was also reflected in their performance when presenting in front of their peers. This suggests that the interactive nature of the TSI strategy fosters a sense of confidence and enthusiasm, encouraging students to take an active role in their learning. Additionally, Rahmat, *et al.*, (2018) stated one of the responses of the TSI student when it interviewed that "Yes, very interesting, because with this technique, we can say interesting enough and make the students more active". This response implies that the student felt interested in learning because she felt more active. The increased interaction among peers through structured discussions are likely become more dynamic and participative learning environment, which reinforce students' sense of involvement and motivation. Also, it is interesting to note that a recent study conducted by Torrego-Seijo, *et al.*, (2020) with Spanish primary school students presented positive results concerning the effect of cooperative strategies on students' academic performance and emotional adaptability.

Moreover, the study conducted by Rivera-Pérez, *et al.*, (2020) in the Filipino students that an eight-week cooperative learning intervention improved emotional intelligence in physical education students in terms of emotional control and empathy. Also, López-Mondéjar documented that cooperative learning fostered empathy, assertiveness, and group cohesion within the context of university students, resulting in higher levels of emotional involvement. The studies taken together suggest that cooperative learning strategies such as TSI can cultivate emotional engagement, thereby enabling students to engage in social interactions and perform well academically.

Table 3: Level of student behavioral engagement in mathematics before and after exposure to TSI and non-TSI in terms of pretest, and posttest

BEHAVIORAL ENGAGEMENT INDICATORS	TSI				Non-TSI			
	Pretest		Posttest		Pretest		Posttest	
	Mean	QI	Mean	QI	Mean	QI	Mean	QI
I stay focused.	3.32	MHE	3.88	HE	3.61	HE	3.39	MHE
I put effort into learning math.	3.24	MHE	3.76	HE	3.67	HE	3.52	HE
I keep trying even if something is hard.	3.38	MHE	3.60	HE	3.33	MHE	3.37	MHE
I complete my homework on time.	3.14	MHE	3.52	HE	3.29	MHE	3.29	MHE
I do other things when I am supposed to be paying attention. *	3.02	MHE	3.40	MHE	2.67	MHE	2.96	MHE
I talk about science/math outside of class.	3.02	MHE	3.30	MHE	2.82	MHE	3.02	MHE
I don't participate in class*	3.14	MHE	3.20	MHE	3.22	MHE	3.12	MHE
If I don't understand, I give up right away. *	3.18	MHE	3.02	MHE	3.10	MHE	3.24	MHE
MEAN	3.18	MHE	3.46	MHE	3.21	MHE	3.24	MHE

*negative indicators (scoring reversed)

Legend:

	Scale	Descriptive Setting	Qualitative Interpretation (QI)
5	4.51- 5.00	Strongly Agree	Very High Engagement (VHE)
4	3.51-4.50	Agree	High Engagement (HE)
3	2.51-3.50	Undecided	Moderately High Engagement (MHE)
2	1.51-2.50	Disagree	Low Engagement (LE)
1	1.00-1.50	Strongly Disagree	Very Low Engagement (VLE)

Table 3 presents the behavioral engagement levels of the students exposed to Three-Step Interview (TSI) and Non-Three-Step Interview (Non-TSI) groups with respect to their pre-test and post-test results. Prior to the conduct of the intervention, it can be seen that the TSI group attained a moderately high engagement (MHE) in all indicators with the scoring mean of 3.18. For the post test, the weighted mean was 3.46, indicating a moderately high engagement. There were four (4) indicators on which was "I stay focused.", followed by "I put effort into learning math" (3.76), "I keep trying even if something is hard." (3.6), and "I complete my homework on time." (3.52).

On the other hand, the level of the engagement of the non-TSI group in the pretest were moderately to high engagement: two highly engaged and six moderately engaged. As for the post test, there were one indicator which was highly engaged and that was "I put effort into learning math." (3.52) and seven moderately engage. The weighted mean of the behavioral engagement of the non-TSI

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group were 3.21 and 3.24 in the pretest and posttest respectively which indicates both moderately high engagement level. The indicator "I stay focused." had a notable increase of 0.56 from the pretest (3.32) to the post test (3.88), indicating a positive shift in students' behavioral engagement. On the contrary, the negative indicator "If I don't understand, I give up right away. *" showed a slightly decrease from 3.18 (pretest) to 3.02 (posttest), which suggests while other indicators improve there was minor decline in students' persistence. This may suggest that even though students generally expressed positive feelings, this implies that we must reinforce their self-monitoring skills and self-regulation of problem-solving strategies, especially in collaborative instructional environments. Though the level of the TSI group was still moderately high engage, but still there was an increase of 0.28 from the pretest to the post-test which implies that there was a positive reinforcement of behavioral engagement.

This is consistent with the previous research conducted by Usmade, *et al.*, (2020), which found that through TSI, the passive behavior of students by merely attending, listening, reading and writing were became more active as students became more excited to participate in the activities. Similarly, Dewi, *et al.*, (2019) explored the implementation of three-step interview on how it enhances the students' motivation in speaking activities and they found that improving learning motivation includes fostering positive classroom where students feel relaxed and supported and, in that way, students will become more attentive and involved in the classroom activities. Several researches in the Philippines had been focusing on the use of cooperative learning strategy in alleviating the influence of peer pressure on students' motivation (Fragata, *et al*., 2023). The study of Tacadena, *et al.*, (2022) further explains that a hybrid learning environment will show a positive response to students towards cooperative learning as this type of environment would generate a more engaging environment for the students during the learning process.

By fostering a classroom environment that encourages participation and interaction among peers, TSI helps students develop a learning habit, increased confidence, and a greater commitment towards their learning.

Table 4: Level of student engagement in mathematics before and after exposure to LLA and non-LLA in terms of pretest, and posttest

SOCIAL ENGAGEMENT INDICATORS	TSI				Non-TSI			
	Pretest		Posttest		Pretest		Posttest	
	Mean	QI	Mean	QI	Mean	QI	Mean	QI
I try to work with others who can help me in math.	3.36	MHE	3.68	HE	3.08	MHE	3.04	MHE
I try to understand other people's ideas in math class.	3.30	MHE	3.66	HE	3.18	MHE	3.31	MHE
I build on others' ideas.	3.16	MHE	3.58	HE	3.14	MHE	3.08	MHE
I try to help others who are struggling in math.	3.28	MHE	3.54	HE	2.82	MHE	2.98	MHE
When working with others, I don't share ideas. *	3.16	MHE	3.52	HE	2.96	MHE	3.00	MHE
I don't like working with classmates. *	3.38	MHE	3.42	MHE	3.24	MHE	3.16	MHE
I don't care about other people's ideas.	3.22	MHE	3.20	MHE	2.98	MHE	3.06	MHE
MEAN	3.27	MHE	3.51	HE	3.06	MHE	3.09	MHE

*negative indicators (scoring reversed)

Legend:

	Scale	Descriptive Setting	Qualitative Interpretation (QI)
5	4.51- 5.00	Strongly Agree	Very High Engagement (VHE)
4	3.51-4.50	Agree	High Engagement (HE)
3	2.51-3.50	Undecided	Moderately High Engagement (MHE)
2	1.51-2.50	Disagree	Low Engagement (LE)
1	1.00-1.50	Strongly Disagree	Very Low Engagement (VLE)

The table 4 presents the social engagement levels of the students exposed to Three-Step Interview (TSI) and Non-Three-Step Interview (Non-TSI) groups with respect to their pre-test and post-test results.

Looking at the student engagement prior to the conduct, the TSI group attained moderately high engagement in all indicators with a mean of 3.27 (MHE). For the post test, the weighted mean was 3.51, signifying a high engagement level. There were five (5) indicators on high engagement level and two (2) for the moderate engagement level

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with the highest of 3.68 which was "I try to work with others who can help me in math.", followed by "I try to understand other people's ideas in math class. (3.66), "I build on others' ideas." (3.58), and "I try to help others who are struggling in math." (3.54), and "When working with others, I don't share ideas. *" (3.52). Also, for the moderately engaged, the indicators were "I don't like working with classmates. *" (3.42), and "I don't care about other people's ideas." (3.2).

On the other hand, the level of the engagement of the non-TSI group in the pretest and posttest were also moderately high in all indicators and with a mean of 3.06 (MHE) and 3.09 (MHE) respectively.

The TSI group showed an increase in their social engagement in most of the collaborative behaviors. For example, the statement "I build on others' ideas" increased from 3.16 (MHE) to 3.58 (HE), and the willingness to "understand other people's ideas in math" was further improved from 3.3 (MHE) to 3.66 (HE). Additionally, the statement "When working with others, I don't share ideas*" got the mean of 3.16 (MHE) to 3.52(HE), this will be interpreted reversely which means the more the higher the score the more it improved the social engagement because of the TSI.

This implies that the Three-Step Interview had a meaningful impact on students' social engagement as it seen in the increase of their mean score and from being moderately engage to highly engage. Further, these findings support the importance of structured peer interactions to promote student involvement, better communication skills, and the feeling of freely expresses its understanding.

The three step-interview has been studied for its impact on enhancing students' social skills as this cooperative learning model improved the communication skills by encouraging them for an active listening and articulation of their thoughts as they share it with their partner and their group. The said finding is in line with the previous research that the Three-Step Interview (TSI) enhances student engagement in way that it encourages students to talk about the lesson collaboratively and support each other as they verbalize their own understanding towards the lesson which helps to build their self-confidence and speaking skills (Suguianto, 2020). The Three-step interview cooperative learning model shown a positive impact which influenced and enhanced communication and social skills (Utah State University, n.d. & Barks, 2025). Moreover, Iglip, *et al*., 2025 studied senior high school learners in San Narciso, Quezon, and found that cooperative learning greatly enhances their development of interpersonal competence, social motivation, and teamwork. Similarly, de Leon and Bucayu (2021), in the area of Social Studies, studied the attitudes of Filipino students toward cooperative learning and found that they respond positively, showing evidence of improved collaborative efforts and participation in class.

Level of Students' Mathematics Performance Before and After TSI and non-TSI.

Table 5: Level of students' mathematics performance exposed to TSI and non-TSI in terms of pretest, posttest and retention test

	TSI (n=50)						Non-TSI (n=49)						
Grading Scale	Pretest f	Pretest %	Posttest f	Posttest %	Retention f	Retention %	Pretest f	Pretest %	Posttest f	Posttest %	Retention f	Retention %	QI
90% and above	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	O
85%-89%	0	0%	7	14%	0	0%	0	0%	2	4.08%	0	0%	VS
80%-84%	0	0%	9	18%	5	10%	0	0%	8	16.33%	0	0%	S
75%-79%	0	0%	9	18%	12	24%	0	0%	12	24.49%	5	10.20%	FS
74% and below	50	100%	24	48%	33	66%	49	100%	27	55.10%	44	89.80%	DNME
MPS	32.72% (68%)		60.88% (75%)		49.56% (72%)		30.41% (67%)		58.16% (74%)		39% (69%)		
QI	DNME		FS		DNME		DNME		DNME		DNME		

Legend:

Percentage Equivalent	Qualitative Interpretation (QI)
90-100	Outstanding (O)
85-89	Very Satisfactory (VS)
80-84	Satisfactory (S)
75-79	Fairly Satisfactory (FS)
Below 75	Did Not Meet Expectation (DNME)

The table 5 shows the performance level of the TSI and non-TSI in terms of Pretest, Posttest, and Retention in Mathematics. The level of the pretest in TSI group (n=50) got 100% under 74% and below which is interpreted as "Did Not Meet Expectations". In the post test the TSI group had 24 or 48% attained "Did Not Meet Expectations"., 18% (9 students out of 50) as "Fairly Satisfactory"

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and "Satisfactory", 14% (9 students out of 50), and 2% (1 students out of 50) as "Outstanding". In terms of the retention test, 33 students did not meet expectations, 12 students as fairly satisfactory, 5 students had a satisfactory level of performance and no students performed very satisfactory and outstanding in the retention test.

On the other hand, the level of the pretest in the non-TSI group (n=49) showed that 100% of the students (49 out of 49) scored within the 74% and below range, which is interpreted as "Did not meet expectations." In the posttest, 27 students or 55.10% remained at the did not meet expectations level, 12 students or 24.49% were at the fairly satisfactory level, 9 students or 18.33% achieved fairly satisfactory, and only 2 students or 4.08% attained a "High" level. No student reached the outstanding level. In terms of the retention test, 44 students or 89.80% maintained a did not meet expectation level, 5 students or 10.20% were at the fairly satisfactory level, and no students reached the satisfactory, very satisfactory and outstanding performance levels. The Mean Percentage Scores (MPS) of the TSI group on the pretest and retention test was interpreted as "Did not meet expectations" with 32.72% and 49.56% respectively, and Fairly Satisfactory (60.88%) for the post test. While for the non-TSI group, the pretest, posttest, and retention test were interpreted as "Did not meet expectations" with an MPS of 30.41%, 58.16%, 39% respectively.

The TSI group has shown a significant rise from pretest to post test and retention of the number of students who were promoted to higher grade brackets. In contrast, a majority of the non-TSI group remained concentrated at the lower grading scale (74% and below) with little movement into higher score brackets during all testing times. The distribution of scores among both groups reveals that the TSI group had a high percentage of student. Hence, while both groups improved in post-test, the TSI group was found to show better retention of knowledge as evidenced by a more significant posttest improvement that was better sustained over time. The overall performance for the TSI group as a whole- particularly in moderate to very high-performance categories- outclassed that of the non-TSI group in every testing phase.

The result implies that the Three-Step Interview (TSI) strategy is beneficial for students' performance on Mathematics. The progress of the TSI group from lower levels to the higher performance levels suggests that the structured peer interaction may be beneficial in understanding and learning how to apply mathematical concepts. The slight improvement in retention scores of the TSI, which also suggest learning with clearer lasting outcomes which is important for student curricular success. The findings emphasize the importance of incorporating TSI-like strategies into the classroom pedagogy for their effect on deeper understanding and long-term retention of learning as TSI promotes students to verbalize their thoughts, interact with peers, and reflect on problem-solving processes.

The significance of the results achieved by cooperative learning strategies, such as the Three-Step Interview (TSI), in improving student performance and retention in mathematics were supported by Usmadi, *et al.*, (2020) who noted that students who sustained the TSI model were therefore known to improve learning, fostering the evident benefit of highly structured peer interaction. Moreover, the study of Eze (2024) emphasized that cooperative learning method led to an increase of retention in mathematics and enhanced the students' academic achievement. Another study conducted in the Philippines which also supported that TSI improved students' performance. Galceran, *et al*., (2019), found out that there was an increase of post test scores of the students exposed TSI. Similarly, Gamit, *et al*., (2017) also enumerated in their study that cooperative learning helped performance in mathematics among tenth graders and positive

Analysis of Covariance (ANCOVA) of Student Engagement in Mathematics

Analysis of Covariance (ANCOVA) was used to present the comparison of mathematics engagement and performance between groups of students exposed to TSI and those students exposed to non-TSI. Before it was tested, the normality assumptions were considered and it was found that the distribution of test scores was normally distributed.

The following tables shows comparison of mathematics engagement and performance between groups of students exposed to three-step interview (TSI) and those exposed to non-three-step interview (non-TSI). It presents the overall mean and standard deviation of the two groups. Additionally, it includes significance level between TSI and Non-TSI groups.

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Table 6: Comparison of Mathematics Engagement in the post-test between students exposed to TSI and those exposed to non-TSI

Group	N	MEAN	SD
Three-Step Interview (TSI)	50	3.52	0.29
Non-Three-Step Interview (Non-TSI)	49	3.31	0.34
TOTAL	99	3.42	0.33

Source	SS	if	MS	F-value	Sig	Partial Eta Squared
Group	1.074	1	1.074	10.846	0.001**	0.102
Pre_Engage (Covariate)	0.001	1	0.001	0.008	0.929	0.000
Error	9.509	96	0.099			
Total	1167.914	99				

Note:** –highly significant at 0.05 level

Table 6 displays the comparison of post-test mathematics engagement between students exposed to the Three-Step Interview (TSI) strategy and those group exposed to a non-TSI strategy. The TSI group (n=50) had a mean engagement score of 3.53 with a standard deviation of 0.29, which is higher than the non-TSI (n=49) of having a mean of 3.31 with an SD of 0.34.

The result revealed that there is a significant difference in the mathematics engagement of students between the two groups, F= 10.846, Sig= 0.001, with a partial eta squared of 0.102, which indicates a moderate effect size. Moreover, the pre-engagement variable (covariate) did not significantly affect the post-test engagement scores, having F= 0.008 and a Sig= 0.929, which implies that the initial levels of engagement of the students of both groups did not influence their engagement after the conduct of the intervention.

Thus, these findings indicate that the use of the Three-Step Interview cooperative learning strategy left students more positively influenced by students' mathematics engagement compared to the non-TSI. Also, the prior engagement levels did not affect the outcome.

This finding is supported by the existing literature, particularly Gillies (2016), who emphasized that cooperative learning strategy promotes students' engagement, critical thinking, and overall academic performance. The results align with the various studies that interactive strategies promote deeper learning and involvement.

Table 7: Comparison of Students' Mathematics Performance Between Interventions in Terms of Posttest of students exposed to TSI and non-TSI.

Group	N	MPS	SD
Three-Step Interview (TSI)	50	60.84	6.66
Non-Three-Step Interview (Non-TSI)	49	58.16	5.73
TOTAL	99	59.51	6.20

Source	SS	df	MS	F-value	Sig	Partial Eta Squared
Group	48.392	1	48.392	1.630	0.205^{ns}	0.017
Pretest (Covariate)	6.304	1	6.304	0.212	0.646	0.002
Error	2849.550	96	29.683			
Total	90566.000	99				

Note: *ns- not significant*

The table 7 presents the comparison of post-test mathematics engagement between students exposed to the Three-Step Interview (TSI) strategy and those group exposed to a non-TSI strategy. The TSI group (n=50) had a mean percentage score of 60.84 with a standard deviation of 6.66, while the non-TSI group (n=49) had a mean score of 58.16 with a standard deviation of 5.73.

The results revealed that there is no significant difference between groups, F=1.630, Sig=0.205. The partial eta squared value of the group was 0.017, which indicates a very small effect size. Also, the covariate did not have a significant effect on the post-test results, F= 0.212, p= 0.646, which means that the TSI strategy contributed a very small amount to the variance in students' post-test scores.

This finding is in contrast to a previous study that the Three-Step Interview demonstrated a positive outcome. For instance, the study of Usmadi, *et al.*, (2020) found that the use of the TSI cooperative strategy in mathematics classes improved learning outcomes. Their findings suggested that the TSI effectively enhances their participation and academic performance. Another study that is contrary to the result is the study of Nurfauzan, *et al.,* (2022) that there is a significant effect of using the three-step interview strategy on students' learning outcomes.

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Given that this study has a small effect size and low explained variance, other reasons such as instructional methods, student motivation, or prior knowledge could have contributed to the results. Therefore, it is needed to consider related factors when evaluating the impact of TSI on students' learning outcomes

Table 8: Comparison of Students' Mathematics Performance Between Interventions in Terms of Retention test of students exposed to TSI and non-TSI.

Group			N	MPS	SD	
Three-Step Interview (TSI)			50	49.56	6.66	
Non-Three-Step Interview (Non-TSI)			49	39.10	5.73	
TOTAL			99	44.38	6.72	
		24.78	6.66			
Source	SS	df	MS	F-value	Sig	Partial Eta Squared
Group	454.709	1	454.709	15.242	0.000**	0.137
Pretest (Covariate)	882.690	1	882.690	29.587	0.000	0.236
Error	2864.012	96	29.833			
Total	53179.000	99				

Note:** −*highly* significant at 0.05 level

The table 8 presents the comparison of students' mathematics performance in the retention test between those exposed to the TSI and those exposed to non-TSI learning strategy.

The results reveals that there is a significant difference between the two groups (F= 15.242, Sig = 0.000) in terms of retention. It indicates that the students exposed to TSI demonstrated better recall of mathematical concepts. The pretest also significantly affected the retention (F=29.587, Sig= 0.000< 0.05) which showed that the students' prior knowledge affected their retention test scores. The partial eta squared for the group is 0.137 had a moderate effect while the covariate had a larger effect which is 0.236.

The findings imply that the three-step interview strategy had a positive effect on students' mathematics retention than those students exposed to non-TSI in terms of better recalling of mathematical concepts. Moreover, the significant effect of the pretest emphasize that prior knowledge plays a crucial role in students' ability to retain information. Students with a stronger foundation of the concepts performed better, this emphasize that there is a need to build a strong conceptual understanding.

These results are consistent with the findings of Gillies (2016), which he emphasized that cooperative learning strategy such as Three-Step Interview enhances not only students' engagement and critical thinking but also retention. This supports that the Active participation and collaborative learning of TSI deepens understanding and better academic outcomes.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The following conclusions were made based on the study's findings:

The grade 9 students exposed to the Three-Step Interview and those exposed to a non-Three-Step Interview were both on the same level of mathematics engagement and performance, which indicated that both groups started from an equivalent baseline for the intervention.

The level of mathematical engagement before exposure to TSI was low for the cognitive engagement and moderately high for emotional, behavioral, and social. After the intervention, the level of cognitive engagement became moderately high, as well as the behavioral engagement and the emotional and social engagement became highly engaged. On the other hand, the level of the pretest across all domains for the non-TSI group was moderately high and, after the intervention, it remained at the level of moderately high on the cognitive, behavioral, and social, while highly engaged in the emotional engagement. Overall, the engagement of the TSI group was highly engaged (3.53) as compared to non-TSI, which was moderately high (3.31).

The level of mathematical performance in the pretest and the retention test of the TSI group was very low, and for the posttest, their level of posttest was low. On the other hand, the level of the non-TSI was very low across the pretest, posttest, and retention test.

The findings revealed that there is a significant difference in students' mathematics engagement. In terms of the performance in mathematics, there is no significant difference on the posttest, while there is a significant difference in the posttest between the TSI and the non-TSI.

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RECOMMENDATIONS

Based on the study's findings and conclusions, the following recommendations were drawn:

Mathematics teachers may utilize the Three-Step Interview (TSI) Cooperative Learning Strategy in their lessons, as this has been demonstrated to cause an increase in their level of engagement in terms of cognitive, emotional, behavioral, and social. The data suggest that the TSI not only elevates cognitive engagement but also fosters a deeper emotional connection and stronger social interaction among students, which are essential for sustained learning motivation and performance.

The administrators may design or implement training programs on incorporating the Three-step interview in teaching mathematics and provide necessary training to improve the current low performance of the students in the subject.

Teachers may also provide the students with activities to enhance their engagement before tackling the subject, such as group discussions, interviews, or problem-solving sessions to foster their engagement in mathematics.

Educators should consider integrating supplementary instructional interventions such as concept-focused and problem-solving activities alongside TSI to strengthen its effect on performance. Additional studies may explore the effectiveness across different grade levels and you may extend the duration of TSI interventions beyond six weeks to allow students more time to adapt and engage meaningfully with the approach.

Curriculum developers and policymakers should explore the integration of cooperative learning strategies such as TSI into the mathematics curriculum, as these approaches enhance students' engagement and performance.

For future researchers, it is recommended to further explore the long-term effects of the Three-Step Interview (TSI) on students' mathematical performance and engagement across diverse educational contexts.

By implementing these recommendations, educators and school leaders can foster a more engaging and effective mathematics learning experience, ultimately improving students' engagement, performance, and overall academic achievement

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