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Cooperative Learning Strategies in Technology and Livelihood Education for an Enhanced Students' Multi-Dimensional Skills

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A B S T R A C T

This study sought to determine the effectiveness of cooperative learning strategies in Technology and Livelihood Education (TLE) for enhancing students' multi-dimensional skills among Grade 8 learners at Lutucan Integrated National High School. Employing a descriptive experimental research design with fifty (50) purposively sampled respondents, the study examined student profiles, perceptions on cooperative learning through peer teaching and group projects, and measured improvements in personal and critical thinking skills. Findings revealed that students predominantly aged 13 with balanced gender representation held positive perceptions towards cooperative learning strategies, particularly valuing peer teaching and group projects as effective collaborative tools. A significant improvement was observed in personal skills from pre-test to post-test scores, indicating the efficacy of cooperative learning in developing multi-dimensional competencies such as critical thinking, communication, and teamwork. The study concludes that cooperative learning strategies contribute positively to student personal skill and critical thinking skill development in Technology and Livelihood Education (TLE) and recommends their integration in teaching practices to foster holistic growth in 21st-century learners.

Keywords: Cooperative Learning Strategies, Technology and Livelihood Education, Multi-dimensional Skills, Peer Teaching, Group Projects

1. Introduction

In this globally and digitally interconnected world, there is a growing need to equip students with 21st century competencies such as critical thinking, interpersonal communication, collaborative skills, and global awareness in order to develop the next generation of innovators and creative thinkers (Johnson, Johnson, Roseth, & Shin, 2014). To develop those skills, educational institutions would need to consider using innovative teaching methods to ignite passion for learning and provide students with the opportunity for active learning (OECD, 2005; Saavedra & Opfer, 2017). Cooperative learning (CL) is widely recognized as a pedagogical practice that promotes socialization and learning among students from kindergarten through the tertiary level and across different subject domains. It involves students working together to achieve common goals and/or complete group tasks goals and tasks that they would be unable to accomplish by themselves. (Robyn M. Gillies, Barbara Millis and Neil Davidson, 2023).

The role of a teacher has existed as long as mankind has but the definition of the role has evolved greatly over time. In the past, teachers would typically teach a subject with the primary aim of ensuring the student scores well in examinations. However, as the focus of education has changed to developing multidimensional skills in students, teachers now wear many hats. Teachers today have to do so much more than "teach". This often requires them to act as guides and counsellors. Schools envision education as a holistic process and to this end, require teachers to develop multidimensional skills in their students. To do this, teachers need to help students learn in an optimal manner using methods that work best for them. (DeccanHerald.com,2018). According to Jane Ng (2023), every student is unique, and every classroom dynamic is different, one teaching approach stands out as a beacon of effectiveness – cooperative learning. It's a proven strategy that can transform your classroom management game.

The Republic Act 10533, also known as K to 12 act, supports the inclusion of vocational subjects in the curriculum since vocational subjects allow high school graduates to have middle-level skills to enable them to have better opportunities and be productively employed or become entrepreneurs right after high school. In the Philippines, Technology and Livelihood Education (TLE) is one of the subject areas in secondary schools. As a subject in high school, it essentially teaches the basic principle of technicalities found in people's everyday lives. Technology and Livelihood Education (TLE) is recognized to be a highly skill-based subject where teachers must expose their students in a pragmatic, firsthand, and authentic teaching-learning experiences. Therefore, students learn best when they take an active part and have hands-on experiences in Technology and Livelihood Education (TLE) class. Additionally, Technology and Livelihood Education (TLE) is a subject in which students learn best by doing. It also provides activities that help students acquire the skills and values they need to be productive and meet the expectations of the labor market. (Legarde M.A, 2022). The more active a lesson, the more students tend to engage intellectually and emotionally in the learning activities. Cooperative learning is the foundation on which many of the active learning procedures are based. Cooperative learning is the instructional use of small groups so that students work together to maximize their own and

each other's learning. To be cooperative, however, five basic elements must be structured into the situation: positive interdependence, individual and accountability, face to face interaction, group behaviors, and group processing. (Johnson DW, Johnson RT,2018)

Traditional teaching methods make the classes teacher-centered which does not help the students to improve themselves (Yassin & Razak, 2017). However, cooperative learning made the process of learning student-centered, and this instructional strategy can be achieved by dividing the students into small groups (Machado & Coimbra, 2015). In cooperative learning situations, students become aware that they depend on one another and must push themselves to do their best. The team members share equal responsibility for their learning. Students consider that their team has worked more effectively when they perceive there to be responsibility within the team (León del Barco et al., 2017, 2018). Each team member undertakes to carry out their share of the work and the team is seen as being responsible for achieving the objectives. These mechanisms of interdependence and responsibility enhance students' overall motivation and improve learning goals.

According to Slavin (1996) dividing the students into teams might not be helpful if there is no task or a goal to be achieved by each group. Furthermore, it was also hypothesized that learning in the "New Normal" among high school students impacts their psychological and cognitive constructs. (Legarde & Sumandal, 2022). Following this line of thought, the researchers investigate the link concerning cooperative learning strategies and student's performance in Technology and Livelihood Education (TLE) is advantageous. As a result, the researchers' concerns regarding the cooperative learning strategies in student's performance in Technology and Livelihood Education (TLE) serve as the catalyst for this research.

In cooperative learning-based classrooms learners become unsettled when they experience delays in work which are caused by others, and which lead to a succession of delayed reviews in the teacher. It is difficult for leaners to familiarize themselves to the experience of social interdependence. According to Johnson and Johnson (2008), the studies showed that cooperative learning outperforms individualistic and competitive learning in hundreds of studies and resulted in a better psychological health. They added that this because of the distinctive feature of cooperative learning as it is close to theory, research and practice. Moreover, active learning is a basic element in language learning and using cooperative will give the students a chance to manipulate the materials and exchange experiences to learn through building meaningful concepts. Cooperative learning, therefore, is a method to help the students interact with each other to construct their knowledge. Cooperative learning gives the students a chance to discover their mistakes and exceed the level of natural learning to the potential level of learning through interaction which can be achieved through using computer assisted cooperative learning.

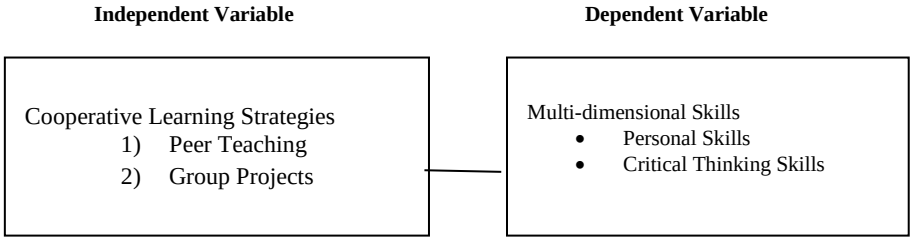

Figure 1: Research Framework

2. Research Problem

Specifically, this study aimed to answer the following questions:

1. What is the profile of the students in terms of:

    1.1 age,

    1.2 sex, and

    1.3 section?

2.How do the respondents perceive cooperative learning strategies in terms of the following:

    2.1 peer teaching and

    2.2 group projects?

3. What is the level of multi-dimensional skills of the respondents in terms of the following:

    3.1 personal skills and

    3.2 critical thinking skills?

4. What are the pre-test and post-test scores of the students in multi-dimensional skills before and after using cooperative learning strategies:

    4.1 personal skills and

    4.2 critical thinking skills?

5. Is there a significant difference in the pre-test and post-test scores of the students in multi-dimensional skills before and after using cooperative learning strategies:

5.1 personal skills and

5.2 critical thinking skills?

6. Is there a significant relationship between cooperative learning strategies and students' multi-dimensional skills as to:

6.1 personal skills and

6.2 critical thinking skills?

7. Is there a significant difference between personal skills and critical thinking skills after the exposure to cooperative learning?

3. Materials and Methods

Descriptive-Experimental research design is a research method used to examine the effect of cooperative learning strategies—specifically peer teaching and group projects—on students' multi-dimensional skills, including personal skills and critical thinking skills. The design was chosen to observe the relationships between the independent variables (cooperative learning strategies) and the dependent variables (multi-dimensional skills).

The respondents consisted of fifty (50) Grade 8 students enrolled in two sections at Lutucan Integrated National High School during the School Year 2024-2025. These students were selected using purposive sampling, based on their enrolment in the specific sections and their willingness to participate in the study. The sections were matched based on their academic performance to ensure comparability.

Two sets of instructional activities were developed: one utilizing cooperative learning strategies through peer teaching and group projects, and a control setup following traditional teaching methods. The instructional modules and lesson plans were prepared in accordance with the curriculum standards and were validated by experts in education and the subject area.

Prior to the implementation of the strategies, a letter of permission was secured from the school principal and the school division office. The study was conducted over a designated period within the second quarter of the academic year. The students' demographic profiles, including age and sex, were recorded to facilitate analysis.

All participants completed a 20-item pre-test designed to measure baseline levels of personal skills and critical thinking skills, aligned with the learning competencies of Technology and Livelihood Education. The test items were developed based on the existing curriculum and validated for content accuracy.

The experimental group engaged in cooperative learning activities where students worked collaboratively through peer teaching and group projects, guided by structured lesson plans. The control group received traditional instruction without cooperative strategies.

After the intervention, students answered a post-test identical in structure to the pre-test to measure any changes in their skills. Additionally, a Likert-scale questionnaire was administered to gather the respondents' perceptions of the cooperative learning strategies employed.

The data collected from the pre-test, post-test, and perception questionnaires were analyzed using descriptive and inferential statistics. Paired t-tests were conducted to determine significant differences between pre- and post-test scores within groups. Independent t-tests were used to compare the post-test scores between the experimental and control groups. Descriptive statistics including mean scores and standard deviations were also calculated to interpret the data.

This approach aimed to establish the effectiveness of cooperative learning strategies in enhancing students' multi-dimensional skills in the context of Technology and Livelihood Education.

4. Result and Discussions

Table 1. shows that out of 50 respondents, the majority, 44, fall within the 13-year age bracket, which accounts for 88% of the total. Only 2 respondents are in both the 12 and 14 age brackets, each representing 4% of the sample, while there are also 2 respondents aged 15, also making up 4%.

Table 1: Distribution of Respondents by Age

Age	Frequency	Percent
12	2	4
13	44	88
14	2	4
15	2	4
Total	50	100

Table 2. shows that the distribution of respondents by gender indicating a near-equal gender balance, with 52% identifying as female and 48% as male. This slight predominance of female students suggests a balanced representation in the sample, reflecting an inclusive environment where both genders are similarly engaged in the educational setting. The close percentages highlight the absence of significant gender disparity among the respondents, indicating that cooperative learning strategies are likely to be effective across different sexes.

Table 2. Distribution of Respondents by Gender

Sex	Frequency	Percent
Male	24	48
Female	26	52
Total	50	100

Table 3. shows that the distribution of respondents by section which indicates an equal division, with 50% of the students in the Elm section and 50% in the Ebony section. This balanced representation suggests that both sections are equally involved in the study, providing a diverse perspective on the perceptions of cooperative learning strategies. The equal sample sizes from both sections

Table 3. Distribution of Respondents by Section

Section	Frequency	Percent
Elm	25	50
Ebony	25	50
Total	50	100

Table 4 shows that the perception of respondents on peer teaching is generally favorable, with an overall mean score of 3.33, indicating agreement on its effectiveness as a learning strategy. The individual indicators reflect positive sentiments, with specific mean scores ranging from 3.20 to 3.44.

Table 4. Respondent's Perceived on the Cooperative Learning Strategies

Perception on the Cooperative Learning Strategies in terms of Peer Teaching

Indicators	Mean	SD	Verbal Interpretation
In terms of Peer Teaching, I…			
1. find peer teaching to be an effective way of learning new concepts.	3.34	0.48	*Agree*
2. feel more comfortable asking questions in peer teaching sessions than in traditional lectures.	3.20	0.45	*Agree*
3. understand the material better.	3.26	0.57	*Agree*
4. enjoy teaching my peers as part of the learning process.	3.40	0.61	*Agree*
5. develop better communication skills.	3.44	0.61	*Agree*
Overall	3.33	0.34	*Agree*

Legend: *3.50-4.00-Strongly Agree(SA),2.50-3.49-Agree (A),1.5-2.49-Moderately agree (MA),1.0-1.49-Disagree (D)*

This implies that students find peer teaching to be an effective method for learning new concepts, enhancing their understanding of the material. Notably, the highest mean score of 3.44 suggests that respondents believe peer teaching significantly aids in developing better communication skills. Overall, the results demonstrate that peer teaching is viewed as a valuable and effective component of the learning process among the respondents.

Table 5. Perception on the Cooperative Learning Strategies in terms of Group Projects

Indicators	Mean	SD	Verbal Interpretation
In terms of Group Projects, I… 1. enhance my understanding of the subject matter.	3.38	0.53	*Agree*
2. feel that my contributions are valued in group projects.	3.36	0.49	*Agree*
3. learn new perspectives from working with diverse group members.	3.44	0.54	*Agree*
4. improve my ability to collaborate with others.	3.53	0.50	*Strongly Agree*
5. prefer group projects over individual assignments.	3.20	0.54	*Agree*
Overall	3.38	0.30	*Agree*

Legend: *3.50-4.00-Strongly Agree (SA),2.50-3.49-Agree (A), 1.50-2.49-Moderately agree (MA),1.0-1.49-Disagree (D)*

Table 5 shows that the perception of respondents on group projects is also positive, with an overall mean score of 3.38, indicating agreement on their effectiveness as a learning strategy. The mean scores for individual indicators range from 3.20 to 3.53, with the highest score of 3.53 suggesting that a majority of respondents strongly agree that group projects foster collaborative learning. This implies that the respondents view group projects as a valuable means of enhancing their learning experiences and achieving educational objectives. Overall, these findings reveal that group projects are perceived as an effective pedagogical approach, supporting the development of essential skills among the students.

Table 6. Respondent's Perception on the Level of Multi-Dimensional Skills

Perception on the Level of Personal Skill as a Multi-Dimensional Skills of the Respondents

Indicators	Mean	SD	Verbal Interpretation
In terms of Personal Skills, I am… 1. effectively manage my time to balance study and personal life.	3.14	0.61	*Agree*
2. confident in my ability to set and achieve personal goals.	3.34	0.56	*Agree*
3. able to adapt to the new situations and challenges easily.	3.18	0.63	*Agree*
4. skilled in both verbal communication skills and written.	3.18	0.53	*Agree*
5. able to work independently with minimal supervision.	3.08	0.63	*Agree*
6. good at managing stress and maintaining emotional balance.	2.90	0.74	*Agree*
7. self-motivated and proactive in pursuing my academic and personal goals.	3.38	0.67	*Agree*
Overall	3.17	0.39	*Agree*

Legend: *3.50-4.00-Strongly Agree(SA),2.50-3.49-Agree (A), 1.50-2.49-Moderately agree (MA),1.0-1.49-Disagree (D)*

Table 6 indicates the respondents show a positive perception of their personal skills, with an overall mean score of 3.17, which falls in the "Agree" range. The individual indicators demonstrate agreement, with mean scores ranging from 2.90 to 3.38. The highest mean score of 3.38 reflects that respondents particularly agree that one of the indicators related to personal skills is effective. This suggests that the students feel confident in their personal skills development through the learning strategies employed. Overall, the results indicate that the respondents have a favorable view of their personal skills, with most agreeing that they have the necessary skills for effective engagement in their educational activities.

Table 7 below indicates that the level of respondents' critical thinking skills is also viewed positively, with an overall mean score of 3.10, indicating an "Agree" response. The individual indicators, which range from 3.00 to 3.28, show that all items are met with agreement by the respondents. Notably, the highest mean score of 3.28 suggests a strong agreement on the extent to which one of the indicators effectively supports their critical thinking abilities. This indicates that the students feel competent in their critical thinking skills as a result of the cooperative learning strategies used. Overall, these findings reflect a general consensus among respondents that they have developed satisfactory critical thinking skills through their learning experiences.

Table 7. Perception on the Level of Critical Thinking as a Multi-Dimensional Skills of the Respondents

Indicators	Mean	SD	Verbal Interpretation
In terms of Critical Thinking Skills, I am…			*Agree*
1. able identify and analyze problems effectively.	3.00	0.57	
2. capable of evaluating information and sources critically.	3.04	0.53	*Agree*
3. able generate creative solutions to complex problems.	3.12	0.56	*Agree*
4. able to think logically and make reasoned judgments.	3.08	0.63	*Agree*
5. able to effectively synthesize information from multiple sources.	3.02	0.55	*Agree*
6. construct well-reasoned arguments and defend my viewpoints.	3.14	0.58	*Agree*
7. good at identifying biases and assumptions in my own thinking and in others'.	3.28	0.61	*Agree*
Overall	3.10	0.37	*Agree*

Legend: *3.50-4.00-Strongly Agree (SA),2.50-3.49-Agree (A), 1.50-2.49-Moderately agree (MA),1.0-1.49-Disagree (D)*

Table 8 illustrates a significant transformation in students' personal skills as a result of the implementation of cooperative learning strategies. The Pre-Test results depict a concerning baseline, with 78% of students scoring in the "Fair" category and another 18% also falling into this range, indicating that a substantial portion of the class demonstrated only average levels of personal skill competency. Furthermore, 22% of students were categorized as "Needs Improvement," highlighting notable gaps in essential personal skills such as communication, collaboration, and self-management.

Table 8. Respondents Pre-test and Post-test Scores in the Test of Multi-Dimensional Skills in terms of Personal Skills

Pre-test				Post Test		
Scores	F	%	Verbal Interpretation	F	%	Verbal Interpretation
17-20				37	74	Excellent
13-16				13	36	Very Good
9-12						
5-8	39	78	*Fair*			
1-4	11	22	*Need improvement*			
Total	50	100		50	100	

Legend: *17-20 excellent, 13-16 Very good, 9-12 Good, 5-8 Fair, 1-4 Need improvement*

However, the Post-Test results reveal a marked improvement following the application of cooperative learning strategies. A remarkable 74% of students attained "Excellent" scores, indicating substantial growth in their personal skill sets. In addition, 26% achieved a "Very Good" rating, reflecting a clear upward trend in performance. This dramatic shift in performance levels suggests that the cooperative learning strategies were highly effective in fostering the development of key personal skills. The instructional approach not only enhanced individual competency but also promoted a more engaged and collaborative learning environment, ultimately equipping students with the tools necessary to succeed both academically and professionally. The data affirms the transformative impact of active and participatory teaching methods in strengthening students' personal growth and skill proficiency.

Table 9. Respondents Pre-test and Post-test Scores in the Test of Multi-Dimensional Skills in terms of Critical Thinking Skills

Pre-test				Post Test		
Scores	F	%	Verbal Interpretation	F	%	Verbal Interpretation
17-20				34	68	Excellent
13-16				16	32	Very Good
9-12	2	4	Good			
5-8	37	74	*Fair*			
1-4	11	22	*Need improvement*			
Total	50	100		50	100	

Legend: *17-20 excellent, 13-16 Very good, 9-12 Good, 5-8 Fair, 1-4 Need improvement*

The table reveals a clear and compelling improvement in students' critical thinking skills because of the implementation of cooperative learning strategies. Prior to the intervention, the Pre-Test scores indicated a significant need for development in this area. Specifically, 76% of students were categorized as "Fair," 22% fell within the "Needs Improvement" range, and only 2% reached the "Good" level. These results reflect a limited ability among students to engage in higher-order thinking, analysis, and problem-solving prior to receiving targeted instructional support.

However, following the introduction of cooperative learning strategies, the Post-Test scores demonstrated a remarkable transformation. A substantial 68% of students achieved an "Excellent" rating, signifying a dramatic enhancement in their critical thinking capabilities. Furthermore, 32% reached the "Very Good" level, indicating a broad upward shift in performance. This substantial shift in performance levels suggests that the cooperative learning strategies implemented were highly effective in promoting cognitive engagement, collaboration, and reflective thinking among students. The data strongly support the conclusion that these instructional approaches played a pivotal role in fostering the development of students' analytical and reasoning abilities, leading to measurable gains in their critical thinking skills.

Table 10. Test of Significant Difference in the Level of Multi-Dimensional Skills in terms of Personal Skills before and after using Cooperative Learning Strategies

Personal Skills	Mean	SD	t-value	Df	p-value
Pre-test	5.54	1.49	-34.6	49	< .001
Post Test	18.16	2.04			

Legend: *Significant at .01 Level of Significance*

The data in Table 10 demonstrates a significant difference between the Pre-Test and Post-Test scores of the students regarding their personal skills, indicating a marked enhancement following the implementation of cooperative learning strategies. The Pre-Test mean score was 5.54, with a standard deviation (SD) of 1.49, while the Post-Test mean score soared to 18.16, accompanied by an SD of 2.04. The t-value calculated was -34.6, with degrees of freedom (df) at 49, resulting in a p-value of less than 0.001, which is far lower than the significance level of 0.05 (Sig. $\leqslant$ 0.05). This substantial p-value clearly indicates that the difference in scores from the Pre-Test to the Post-Test is statistically significant.

The negative t-value of -34.6 indicates that the Post-Test scores are significantly higher than those of the Pre-Test, reinforcing the effectiveness of the cooperative learning strategies employed in improving the personal skills of the students. The highly significant p-value ($p < 0.001$) confirms that the changes observed in the students' scores were not due to random variation but were instead a direct result of the instructional interventions.

Thus, we can conclude that the cooperative learning strategies provided a substantial benefit in developing the personal skills of the respondents. This supports the hypothesis that such instructional approaches, when integrated into the learning process, significantly enhance students' personal capabilities and skill sets, aligning with the principles of experiential learning.

Table 11. Test of Significant Difference in the Level of Multi-Dimensional Skills in terms of Critical Thinking Skills before and after using Cooperative Learning Strategies

Critical Thinking Skills	Mean	SD	t-value	Df	p-value
Pre-test	5.46	1.51	-37.3	49	< .001
Post-test	18	1.97			

Legend: *Significant at .01 Level of Significance*

Table 11 indicates a significant difference in the pre-test and post-test scores of the respondents in terms of critical thinking skills after implementing cooperative learning strategies. The pre-test mean score was 5.46, accompanied by a standard deviation (SD) of 1.51, while the post-test mean score rose significantly to 18.00 with an SD of 1.97. The calculated t-value was -37.3, with 49 degrees of freedom (df), resulting in a p-value of 0.001, which is well below the significance threshold of 0.05 (Sig. $\leqslant$ .05).

This substantial negative t-value of -37.3 indicates that the post-test scores are significantly higher than the pre-test scores, reflecting a marked improvement in the critical thinking skills of the student respondents. The significant p-value ($p = 0.001$) further confirms that the differences observed in scores from the pre-test to the post-test are statistically significant, meaning that these changes are unlikely to have occurred by random chance.

Thus, we can conclude that the use of cooperative learning strategies has had a considerable positive effect on enhancing the critical thinking skills of the respondents. This supports the hypothesis that integrating cooperative learning approaches into instructional practice significantly boosts students' critical thinking abilities, aligning with educational goals aimed at fostering higher order thinking skills.

Table 12. Test of Significant Relationship between Cooperative Learning Strategies and in the Level of Multi-Dimensional Skills

Multi-dimensional Skills	Cooperative Learning Strategies	
	Peer Teaching	Group Projects
Personal Skills	0.537***	0.320*
Critical Thinking Skills	0.439**	0.270

Legend: *** Significant at <.01, **Significant at <.05 Level of Significance

Table 12 presents the relationship between the cooperative learning strategies employed and the personal skills of the respondents. The correlation values range from 0.270 to 0.537, indicating a moderate to strong correlation between these strategies and the enhancement of personal skills.

The strongest relationship identified was between peer teaching and personal skills, with a correlation coefficient of r = 0.537, suggesting a significant positive correlation. This indicates that students who engaged more with peer teaching not only perceived its value positively but also demonstrated enhanced personal skills as a result. Conversely, the correlation between group projects and personal skills was r = 0.320, which, while also positive, indicates a weaker relationship compared to peer teaching.

Both correlation coefficients are significant at the $p < 0.001$ level, affirming that the relationships observed are not due to chance and that the application of cooperative learning strategies has a noteworthy impact on the development of personal skills among students.

These findings suggest that while both peer teaching and group projects contribute positively to personal skill development, peer teaching has a more pronounced effect. Consequently, it can be concluded that these cooperative learning strategies significantly enhance the personal skills of the respondents, supporting the hypothesis that such educational approaches effectively foster skill development in students, thereby improving their overall learning experiences.

The evidence in Table 12 illustrates the relationship between cooperative learning strategies and the critical thinking skills of the respondents. The correlation values for this relationship vary from 0.270 to 0.439, reflecting a moderate correlation between these strategies and the enhancement of critical thinking abilities. The strongest correlation was observed between peer teaching and critical thinking skills, with a correlation coefficient of r = 0.439. This indicates a notable positive relationship, suggesting that increased involvement in peer teaching activities contributes significantly to the development of students' critical thinking skills. In contrast, the correlation between group projects and critical thinking skills was lower, at r = 0.270, indicating a weaker yet still positive relationship. Both correlation coefficients are significant, with peer teaching showing significance at the $p < 0.01$ level and group projects at $p < 0.05$. This statistical significance implies that relationships are unlikely to have occurred by chance, further corroborating the effectiveness of cooperative learning strategies in enhancing critical thinking skills among students.

These findings suggest that while both types of cooperative learning strategies positively influence critical thinking skills, peer teaching appears to have a stronger impact. Thus, it can be concluded that the implementation of these strategies significantly enhances critical thinking abilities, leading to improved learning outcomes and deeper engagement in the educational process.

Table 13 below addresses whether there is a significant difference between personal skills and critical thinking skills after students were exposed to cooperative learning strategies. The mean scores for personal skills post-test were 18.16 (SD = 2.04), while the mean scores for critical thinking skills were slightly lower at 18.00 (SD = 1.97). To determine if the difference between these two means is statistically significant, a t-test was conducted. The resulting t-value was 0.733, with 49 degrees of freedom, and the p-value was 0. 467.Given that the p-value of 0.467 exceeds the conventional threshold of 0.05 for significance, this indicates that there is no statistically significant difference between the post-test scores of personal skills and critical thinking skills among the respondents.

Table 13. Test of Significant Difference in the Level of Multi-Dimensional Skills before and after using Cooperative Learning Strategies

Multi-dimensional Skills	Mean	SD	t-value	df	p-value
Personal Skills	18.16	2.04	0.733	49	0.467
Critical Thinking Skills	18	1.97			

Legend: Significant at <.01 Level of Significance

Significant at <.05 Level of Significance

In conclusion, while both personal skills and critical thinking skills showed a high level of performance after the intervention, the lack of a significant difference suggests that students benefited equally from the cooperative learning strategies applied to develop these skills. This highlights the effectiveness of these strategies in promoting both personal and critical thinking skills concurrently among the students.

5. Conclusions

The study revealed that there is no significant difference in the pre-test and post-test score of the students in multi-dimensional skills before and after using cooperative learning strategies. There is no significant relationship between cooperative learning strategies and students' multi-dimensional skills. There is no significant difference between personal skills and critical thinking skills after the exposure to cooperative learning.

6. Recommendations

Educators may implement cooperative learning strategies systematically within their curricula to maximize student engagement and enhance multidimensional skills. Workshops and training sessions may be conducted for educators to effectively incorporate these strategies into their teaching. Teachers may be encouraged to adopt a variety of collaborative learning techniques such as peer teaching and group projects to create an inclusive and interactive learning environment. This will help in fostering communication and critical thinking skills among students.

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