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Students' Perceptions, Behaviors, and Social Dynamics on Teacher- and Student-formed Cooperative Learning Groups in Mathematics

Sir Charles A. Pedreña*[1], Atty. Velessa Jane N. Dulin, PhD[2]
[1] King's College of Marbel, Inc., City of Koronadal, South Cotabato, Philippines
[2] Sultan Kudarat State University, Isulan, Sultan Kudarat, Philippines
*Corresponding Author e-mail: *charlesped0112@gmail.com*

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Abstract

Aim: Cooperative learning is a fundamental pedagogical approach in teaching Mathematics under the K to 12 Basic Education Curriculum, emphasizing active learning through collaboration. A central concern in implementing this strategy is the effective formation of student groups. This study explored the perceptions, lived experiences, observed behaviors, and social dynamics of Grade 7 students from King's College of Marbel, Inc. under two different group formations: teacher-formed and student-formed.

Methodology: The study used a qualitative research design, specifically transcendental phenomenology. Ten participants were selected through criterion-based purposive sampling and took part in in-depth interviews and focus group discussions. Classroom observations involving the entire class supported the data. Thematic analysis was used to identify emerging themes from transcripts.

Results: Findings identified five central themes concerning students' views on cooperative learning in Mathematics: improved academic outcomes through collaboration, effective communication and teamwork, increased confidence and enjoyment in group settings, enhanced engagement and participation, and challenges related to group dynamics and conflict. Additionally, eight themes emerged from students' lived experiences in different group formations, reflecting variations in task structuring, roles, conflict resolution, and group perception. Observations highlighted differences in role assignment, accountability, group processing, adaptability to time constraints, and interaction patterns. Students in teacher-formed groups generally expressed positive views, anticipating learning and collaboration. However, difficulties such as inadequate role fulfillment and uneven participation indicated challenges in group dynamics, accountability, and motivation.

Conclusion: Cooperative learning in mathematics is viewed as beneficial for enhancing academic achievement, communication, teamwork, and student engagement, although challenges such as conflicts and non-participation can arise. Teacher-formed groups tend to have structured roles and promote accountability, leading to active student participation, while student-formed groups may foster comfort among peers but often struggle with task focus and equal role distribution. Observations reveal that teacher-formed groups encourage organized collaboration, whereas student-formed groups can lack structure, resulting in passive behavior. Ultimately, while both approaches yield benefits in cooperation and social skills, the clarity and support provided by teacher-formed groups contribute to more effective learning outcomes.

Keywords: Cooperative Learning, Group Formation, Teacher-formed Groups, Student-formed Groups, Phenomenology

INTRODUCTION

Cooperative learning is a fundamental principle integrated into Mathematics Education, as outlined in the 2016 Mathematics Curriculum Guide. This approach focuses on active learning through collaboration, allowing students to work together on tasks (Department of Education, 2016). The MATATAG Curriculum also upholds cooperative learning as a key pedagogical method in mathematics instruction (Department of Education, 2023).

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Students' perceptions play a crucial role in the success of cooperative learning in mathematics, as understanding their experiences helps educators enhance instructional strategies. Baer (2003) emphasizes that the effectiveness of cooperative learning is contingent upon appropriate group composition, highlighting the importance of determining "who with whom."

Notably, heterogeneous groupings are generally preferred over homogeneous ones, as they allow lower-achieving students to benefit from interactions with more knowledgeable peers, thereby enhancing language skills and experience (Zamani, 2016). Additionally, both teacher-formed and student-formed groups present distinct advantages. Teacher-formed groups tend to demonstrate greater professionalism and cohesiveness, enhanced diversity, and opportunities for conflict resolution (Conklin et al.,2024; Hastie, 2019; Mensah, 2015). Conversely, empirical studies indicate that student-formed groups may outperform teacher-formed groups academically (Løvold et al., 2020; Miller et al., 2022; Smyser & Jaeger-Helton, 2015). Despite these notable findings, there is no or limited research on students' perceptions of cooperative learning as well as their behaviors, lived experiences, and social dynamics in teacher-formed and student-formed groups in mathematics.

This study aims to enhance the existing literature by exploring students' perceptions and lived experiences within teacher-formed and student-formed cooperative learning groups and the subsequent impact on their behavior and social interactions. The results will provide valuable insights for educational policymakers, school administrators, and educators, facilitating a better understanding of how varying group structures can affect the implementation of cooperative learning strategies across different educational settings.

This study is based on several learning theories that stress the social and interactive nature of knowledge construction, particularly in cooperative learning environments. Central to the study is the Social Interdependence Theory, which states that individual goal achievement is influenced by the actions of others (Johnson,1970), making it relevant for analyzing the dynamics of teacher-formed and student-formed groups.

Jean Piaget's Constructivist Theory (1929) supports the investigation by emphasizing that learners actively build understanding through interactions with their environment and peers, focusing on conceptual understanding and conflict resolution in mathematics.

Vygotsky's Sociocultural Learning Theory (1978) further frames the study by highlighting the importance of social interaction and cultural context in learning, aligning to compare students' perceptions and actual behaviors in different group structures. Lastly, Bandura's Social Learning Theory (1977) provides insights into how observation and modeling among peers within various group compositions influence students' academic and social behaviors.

Objectives

The study was conducted to explore and understand students' perceptions, lived experiences, behaviors, and social dynamics in cooperative learning with different group formations. With that aim, it addressed the following questions:

1. What are students' perceptions of cooperative learning in their mathematics classes?
2. What are students' lived experiences in teacher-formed and student-formed cooperative learning groups?
3. How do students' behaviors differ between the two cooperative learning groups?

METHODS

Research Design

The study employed a qualitative research design, specifically a transcendental phenomenological approach, to understand the essential meaning of phenomena of interest from the perspective of those directly involved (Friolo & Mutya, 2022). In this context, the transcendental phenomenological approach allowed the study to identify and describe the shared essence of participants' perceptions, lived experiences, behaviors, and social dynamics in cooperative learning while maintaining a neutral stance to prevent personal assumptions from influencing the findings.

Population and Sampling

This study purposively selected ten (10) Grade 7 students from King's College of Marbel, Inc., representing the inaugural Junior High School cohort for School Year 2024–2025. Using criterion-based purposive sampling, a non-probability method, participants were chosen based on the following criteria: (A) enrolled as Grade 7 students during the specified year; (B) experience in cooperative learning activities within varied groups; and (C) willingness and ability to articulate their perceptions and experiences.

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Instrument

The researchers used multiple instruments to address the research questions on students' perceptions, lived experiences, and behaviors in cooperative learning. A validated semi-structured interview guide (validity rating: 4.67, very highly valid), translated into Filipino and the Mother Tongue, explored perceptions through six open-ended questions. Interviews were recorded in accessible locations. Findings guided a Focus Group Discussion (FGD) on lived experiences in teacher-formed and student-formed groups, using a translated guide (Filipino and Hiligaynon), with recordings and moderator notes capturing responses. Classroom observations followed, using a modified Cooperative Learning Observation Protocol (CLOP) by Kern et al. (2007), with three teacher-observers independently validating data. Finally, interview, FGD, and observation data were compared to identify alignments or gaps between perceptions, experiences, and behaviors.

Data Collection

The researchers followed a systematic process for data collection. A content validity form validated the semi-structured interview guide with a panel of experts, followed by pilot testing and securing permissions from the Dean of the Graduate School, the Schools Division Superintendent, and the School Principal. Consent letters were distributed, and guardians signed for minor participants. Responses were video-recorded, following protocols from Protacio (2021) and Sonza et al. (2022). After interviews, participants joined a Focus Group Discussion (FGD) based on protocols from Protacio (2021) and Sonza et al. (2022), recorded using two video cameras. Classroom observations were conducted by the researchers and two teacher-observers using the Cooperative Learning Observation Protocol (CLOP) by Kern et al. (2007), focusing on group activities in both teacher-formed and student-formed groups. Data collection spanned five weeks, with transcripts translated into English. Member-checking ensured data accuracy and credibility (McKim, 2023).

Data Analysis

After completing the study, the researchers sought help from a data analysis expert to analyze the qualitative data using Thematic Analysis, as outlined by Braun and Clarke (2006). The analysis focused on students' perceptions and experiences in both teacher-formed and student-formed cooperative learning groups. Data from interviews, focus group discussions, and classroom observations were manually analyzed over a week using a six-phase process. Initially, the researchers and analyst familiarized themselves with the data and generated initial codes to identify patterns, categorizing the information into themes. These themes were reviewed, refined, and defined to accurately reflect students' experiences. The final phase involved creating a report and validating the themes with participants to ensure their accuracy. Additionally, a comparative analysis and data triangulation were employed to explore variations in students' perceptions and behaviors during cooperative learning activities. This comprehensive approach offered insights into the social dynamics and interactions within these groups.

Ethical Considerations

The study prioritized ethical considerations to maintain integrity and validity, generating valuable insights for educational practices and faculty development in Cooperative Learning. Informed consent was obtained from participants and guardians, with risks and benefits assessed to protect well-being. Privacy was ensured through anonymization, pseudonyms, and secure records. Participants received equitable treatment and tokens of appreciation. Transparency was upheld through rigorous data analysis and accessible documents, with adequate resources secured for efficient execution. Adhering to ethical standards, the study was conducted responsibly and respectfully, contributing significantly to the educational community.

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RESULTS and DISCUSSION

This section presents the analysis and interpretation of data gathered from in-depth interviews, focus group discussions, and classroom observations. The findings are organized thematically, with corresponding interpretations and implications discussed in each theme. The presentation follows the sequence outlined in the statement of the problem to ensure a logical and systematic flow of discussion.

1. Students' Perceptions of Cooperative Learning in Mathematics

The students' perceptions of cooperative learning in mathematics reflect its impact on their learning and social life and were categorized into five emerging themes.

Themes

Enhanced Academic Learning Through Group Collaboration
Effective Communication and Teamwork
Increased Confidence and Enjoyment in Group Work
Enhanced Engagement and Active Participation
Challenges in Group Dynamics and Conflict

1.1 Enhanced Academic Learning Through Group Collaboration

Students reported that working together in groups allowed them to learn new concepts, solve math problems collectively, and expand their understanding of topics like sets. The following are some of the participants shared views:

Mira: I just know that I really learned something — like, it feels so good to cooperate with every classmate.
Zara: What I have learned, sir, is how to cooperate and communicate with my groupmates... It has helped me because whenever there are lessons or math problems I don't understand, I can ask them for help.
Reed: What I have learned from my group in Math class is: solving Math problems and how to cooperate with them so you can help them with your answers... it helps because my grades have improved, sir.

Students often view cooperative learning as an effective strategy for understanding mathematical concepts, solving problems, and improving overall academic performance since they can share their thoughts and discuss their lessons with their peers. According to Johnson and Johnson (2014), students learning in a collaborative setting had greater knowledge acquisition, retention of materials, and higher-order problem-solving and reasoning abilities than students working alone.

1.2 Effective Communication and Teamwork

Cooperative learning creates an environment where students can exchange ideas, ask questions, and work together to reach solutions, fostering a sense of teamwork in math classes. The following are the thoughts of the participants about the theme:

Zara: What I have learned, sir, is how to cooperate and communicate with my groupmates.
Reed: We help each other to achieve the answer and share different thoughts.
Faye: My understanding of cooperative learning is that it is about helping each other learn, sharing thoughts with one another.

The participants highlighted that effective communication and teamwork were essential aspects of cooperative learning in mathematics. They consistently emphasized the value of collaborative environments where they can exchange ideas, ask questions, and work together to achieve solutions. Munawaroh et al. (2022) supported these findings, stating that cooperative learning fosters effective communication, which leads students to produce new ideas and solutions and increase their learning when encouraged.

1.3 Increased Confidence and Enjoyment in Group Work

This theme indicates that many students expressed that group work makes them feel more confident and comfortable. The participants expressed the following responses:

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Mira: I want to have someone with me... because if there's something I don't understand, I can ask for help.
Zara: It becomes easier and more enjoyable... I feel more comfortable when I have someone with me.
Reed: I feel more comfortable, sir because you have someone with you... it's better to have a group...

The improved confidence and enjoyment experienced by the participants when working on group tasks in math classrooms points out the life-changing implications of cooperative learning. Most participants claimed they were more confident and comfortable working in groups and they pointed out that working in a group setting makes math more fun. This finding is supported by Almulla (2016), mentioning that cooperative learning principles lead to social benefits such as enjoyment in learning, reduction in anxiety, increased confidence, and positive relationships.

1.4 Enhanced Engagement and Active Participation

This theme underscores that students indicated that being in a group encourages them to actively participate in discussions and ask more questions. The participants shared the following:

Mira: If there are parts of the work that I can't do or don't know yet... it motivates you to express yourself and share what you want to say...
Zara: I can ask more questions and cooperate with them. If there's something I don't understand, I will ask them.
Reed: I can ask more questions… because sometimes I don't understand, sir.

In this theme, the participants noted that collaboration promotes a student-driven atmosphere, facilitating the free exchange of ideas and effective communication. This enhanced engagement enables a deeper understanding of concepts as students become directly involved in their learning process. This is supported by Mohite (2024), who highlights that cooperative learning enhances student engagement in mathematics classrooms, characterized by active participation, question-asking, and deeper conceptual understanding.

1.5 Challenges in Group Dynamics and Conflict

Alongside the benefits, students also shared concerns about group work. The following were the significant statements by the participants associated with the theme:

Mira: In the ones I like, it's when they cooperate... But in the ones, I don't like, it's when they don't cooperate... we argued back then because they didn't like our answer...
Zara: What I like is when we have a team/group... But what I don't like is when, sometimes, they just stay quiet and they don't want to share...
Reed: Sometimes we argue, we fight when we don't understand each other on the Math problem... we didn't understand each other, we fought because they didn't know the answer...

In this theme, the participants reported issues like lack of cooperation, uneven participation, and conflicts that negatively impacted group dynamics and the efficacy of their collaborative efforts. As mentioned by Andersen (2009), despite improved engagement and participation, challenges such as uneven group participation will lead to difficulties in managing conflicts that can impede effective collaboration (Le et al., 2018). Along these lines, Lenkauskaitė et al. (2020) added that teamwork can cause students to misbehave, which can cause frustration.

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2. **Students' Lived Experiences in Teacher-Formed and Student-Formed Cooperative Learning Groups**

The analysis of students' lived experiences in both teacher-formed and student-formed cooperative learning groups revealed eight key themes. These themes elucidate the various structures, role assignments, methods of conflict resolution, and overall perceptions of participants regarding the differing formats of these groups in their mathematics classes.

Themes

Structured Task Assignment and Group Organization (Teacher-formed Groups)
Role Responsibility and Fairness in Teacher-formed Groups
Conflict Resolution and Management in Teacher-formed Groups
Overall Perceptions of Teacher-formed Groups
Informal Group Dynamics and Peer Selection (Student-formed Groups)
Collaboration and Role Responsibility in Student-formed Groups
Conflict Handling in Student-formed Groups
Overall Perceptions of Student-formed Groups.

2.1 Structured Task Assignment and Group Organization (Teacher-formed Groups)

Students described teacher-formed groups as having a clear structure. The following were the shared experiences of the participants:

Vera: In a teacher-formed group, my groupmates and I were together to finish our task... Also, we discussed and planned our approach and assigned roles and responsibilities.
Reed: In a teacher group, our specific tasks were usually assigned, and take note since the teacher makes the groups, we are (a) a mix of different skill levels.
Cole: Most of the time, or almost always, my experience working with my groupmates is chaotic and difficult... We struggle to answer and finish the tasks because some of my groupmates don't want to work or help us.

The implementation of cooperative learning in teacher-formed groups revealed varied student experiences, emphasizing the necessity of structured organization for task completion. Participants stressed the importance of clear role distribution and effective teacher facilitation in designing tasks. According to Pateşan et al. (2016), when the task is equally divided among the students, they tend to rely on each other to produce a final successful output.

2.2 Role Responsibility and Fairness in Teacher-formed Groups

The theme explores the distribution of roles and responsibilities within teacher-formed groups. The following were the significant statements mentioned by the participants about the theme above:

Reed: I have always fulfilled my assignment; if I am the leader, I will make everyone cooperate efficiently.
Nate: It was easier, sir, because they cooperated well, and they didn't move around to different groups or leave.
Vera: I respond to assigned roles and responsibilities by being accountable, communicating effectively, and contributing my skills and ideas.

The cooperative learning approach in mathematics allows teachers to assign specific roles to students to enhance accountability. Some students may feel overwhelmed by tasks due to less capable peers, leading to situations where more knowledgeable members must compensate. With this prevailing concern on roles, responsibility, and fairness, the academically inclined students would be the ones to offer the most help, noting a positive effect on the students (Mendo-Lázaro et al., 2018).

2.3 Conflict Resolution and Management in Teacher-formed Groups

Conflicts occur in teacher-formed groups, but students reported that these are usually managed through discussion and compromise. The following were some of the experiences of the participants:

Reed: Most of the time, we tried to resolve the problem by discussing and compromising... If the problem is too big, we ask for the teacher's guidance.

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Mira: We try to solve the problems in our group by helping each other or asking the teacher for guidance on what to do.

Faye: We talk about the things we don't understand, but it's not easy to find a solution because sometimes they're hard-headed.

In this theme, participants noted that these groups often consist of individuals with varying abilities and personalities, which can lead to conflicts. Solutions typically emerged through discussions, compromises, and, when necessary, teacher intervention. Lee et al. (2015) coined that different individual difference factors can trigger conflicts in the group, and these usually happen when there is a lack of social skills. However, Yean et al. (2024) pointed out that these conflicts will be resolved through effective leadership, positive communication, and consensus.

2.4 Overall Perceptions of Teacher-formed Groups

This theme highlights how participants view teacher-formed groups in general. The participants noted the following:

Vera: I think that working in teacher-formed groups is valuable learning... The main advantages include promoting teamwork, communication, and collaboration.

Reed: I feel comfortable and not comfortable because there are advantages and disadvantages... the disadvantage is the different students are not a good match or (do) not concentrate much in the group.

Mira: The good part is that we have members who are willing to participate and cooperate... the not-so-good part is that some just want to stay quiet and then complain...

This theme reflects students' mixed feelings about the method in math classes. While teacher-formed groups offered equal opportunities for expression, some students noted uneven participation, leading to frustration. Additionally, negative feedback about mistakes affected group dynamics. Notably, Chang and Brickman (2018) observed that students in both high- and low-performing groups continued to complain about unequal contributions while still appreciating the social support provided by their peers. Similarly, Lenkauskaitė et al. (2020) added that teamwork can sometimes lead to student misbehavior, which may cause frustration within the group.

2.5 Informal Group Dynamics and Peer Selection (Student-formed Groups)

Students described their experience as more casual. The participants' common experiences were as follows:

Nate: It's fun, sir if you're with the people you chose because you choose your close... if you're with your close friends, you end up bonding, and you learn a lot.

Reed: I usually choose sir with my classmate that I'm comfortable with because this made - this makes our discussion and decision easier.

Mira: It's fun, sir, because when we work together, it's not just about finishing the tasks, we also laugh a lot... In our group, there was more laughter than work {giggle}, but we still managed to finish while having fun.

In student-formed cooperative learning groups, members often select familiar peers. This practice, grounded in existing friendships, fosters comfort but can result in issues such as unclear roles and uneven participation. According to Theobald et al. (2017), working with friends did not significantly impact performance. However, it noted that working with friends was the biggest predictor of students' comfort.

2.6 Collaboration and Role Responsibility in Student-formed Groups

In student-formed groups, members decide among themselves how to share the workload. While this can lead to comfortable interactions, it sometimes results in uneven participation. The following were the common experiences of the participants:

Nate: It was easy because everyone was contributing. One person copied from others {laugh}, another wrote things down, ... but overall, they still helped.

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Reed: I feel more comfortable working with my friends because collaboration is easier … and we assign roles based on our strengths.

Mira: It was a good experience because our group members respected each other's opinions. That made us feel comfortable working together because we knew each other's capabilities.

The formation of student groups based on friendship led to a self-assigned distribution of roles, particularly in collaborative learning environments such as math classes. This approach encouraged comfortable interaction, however, it also resulted in unequal participation. According to Theobald et al. (2017) working with friends provided students with much comfort. However, Andersen (2009) mentioned that uneven participation and behavior issues could still be a prevailing concern in this group formation.

2.7 Conflict Handling in Student-formed Groups

Conflicts in student-formed groups are generally less frequent, but when they occur, they are often left unresolved or managed with minimal intervention. Participants shared their experiences:

Mira: For us, there was nothing to be resolved because there was no conflict, and we were comfortable with each other... We made sure to understand one another.

Faye: We were comfortable with a student-formed group because we didn't have any arguments, and we got along well with our groupmates.

Reed: Since we are comfortable, we can express our concerns more freely… by sharing our knowledge and compromising.

In this theme, the participants noted that conflicts in these groups tend to be less frequent compared to those in teacher-formed groups. According to Chapman et al. (2006), students in the student-formed groups had better communication, were more enthusiastic about working together, and were more confident in other team members' abilities. In addition to these, Tran et al. (2019) also promote mutual understanding and acceptance of students' differences.

2.8 Overall Perceptions of Student-formed Groups.

Students noted that while student-formed groups offer flexibility and a relaxed atmosphere due to existing friendships, the lack of structure can lead to off-task behavior and uneven contributions. The following were some of the participants' significant statements:

Zara: The good thing is that I am comfortable because I am close to them and they are like friends. The downside is that some do not help and are idle.

Reed: I enjoy working with student-formed groups because of the flexibility and the level of comfort with my teammates. The main advantage is that we can collaborate more easily.

Faye: We feel more comfortable in a student-formed group because we don't have any problems, and we understand each other well.

In this theme, the participants expressed enjoyment and comfort due to the relaxed and interactive environment, often working alongside friends. However, this structure also presented challenges, as some members contributed less and engaged in off-task discussions, leading to disagreements. Le et al. (2018) noted that deficient friendships among students contribute to difficulties with cooperative learning implementation. However, students working with friends in a student-formed group create an interesting learning atmosphere in which they can feel comfortable (Han, 2015).

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3. Students' Behavioral Differences Between Teacher-Formed and Student-Formed Cooperative Learning Groups

Students' behavioral differences between teacher-formed and student-formed cooperative learning groups revealed five emerging themes that manifest in various aspects of group interactions, task management, and participation.

Themes

Structured Role Assignment and Task Organization vs. Unstructured Role Distribution
Participation, Accountability, and Free-Riding Behaviors
Group Processing and Feedback Dynamics
Response to Time Pressure and Changes in Group Dynamics
Physical Proximity and Interaction Patterns

3.1 Structured Role Assignment and Task Organization vs. Unstructured Role Distribution

This theme highlights behavioral differences between teacher-formed and student-formed groups. Teacher-formed groups, with defined roles and structured tasks, promote positive interdependence and equal participation. In contrast, student-formed groups often face unclear role distribution, leading to uneven workloads and potential conflicts. The structured nature of teacher-formed groups was supported by Gillies (2004), stating that children in the structured groups demonstrated less noncooperative behaviors and less off-task behaviors than their peers in the unstructured groups. On the contrary, despite the unstructured nature of student-formed groups, Myers (2011) noted that students who selected their members had higher levels of commitment, trust, and relational satisfaction, as well as more affective and cognitive learning.

3.2 Participation, Accountability, and Free-Riding Behaviors

Classroom observations showed that in teacher-formed groups, students start with active participation, but as the task goes on, some members may become passive or free-ride, relying on others to complete the work. A similar pattern of uneven contribution was seen in student-formed groups. These practices were related to socialization skills, technical skills, self-esteem, shyness, financial situations, family situations, and academic abilities (Casan et al., 2024). They further added that free-riding students were aware of their inappropriate behaviors. To prevent the occurrence of this in both teacher- and student-formed groups, Laal et al. (2013) suggested that students should be reminded of their accountability in their respective groups and that they were accountable for their success.

3.3 Group Processing and Feedback Dynamics

Classroom observations revealed a lack of group processing in both teacher-formed and student-formed groups. Feedback in teacher-formed groups often centers on identifying errors rather than fostering improvement, while student-formed groups fail to engage in meaningful discussions about their performance. Group processing is one of the five key components of cooperative learning under the Social Interdependence Theory (Johnson & Johnson, 2013). Unfortunately, neither group formation nor teacher- and student-formed groups showed any sign of clear group processing activities. Sutherland et al. (2019) highlighted possible reasons for such findings: lack of time, the misguided notion that students reflect by simply engaging in the activities, or because teachers do not know how to facilitate an effective group processing session.

3.4 Response to Time Pressure and Changes in Group Dynamics

Students in teacher-formed groups experience heightened tension as deadlines approach, marked by increased noise and occasional disputes. Conversely, student-formed groups tend to exhibit a more relaxed demeanor, attributed to existing personal relationships, leading to more off-task discussions. As mentioned by Loh and Ang (2020), if members of the group are not friends, it will take them time to get to know each other or ascertain the group members' abilities. With this notion, it was believed that students, during their activity, tend to get to know each other first before doing their tasks. On the other hand, the members in student-formed groups displayed more comfortability despite their unstructured nature.

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3.5 Physical Proximity and Interaction Patterns

In teacher-formed groups, students purposefully use eye contact and physical gestures (like pointing or leaning) to communicate effectively. In student-formed groups, while frequent eye contact is common due to familiarity, there are also instances of off-task physical interactions that reflect the casual nature of these groups. In the study conducted by Siposova et al. (2018), communicative looks produced an expectation of collaboration. On the contrary, Han (2015) highlighted that members of the student-formed groups disposed of more interesting learning environments as they were working with friends, offering comfort to one another.

Conclusions

The study concludes that cooperative learning in mathematics is perceived by participants as a beneficial approach that enhances academic learning, communication, teamwork, confidence, enjoyment, and engagement. However, challenges in group dynamics, such as arguments, conflicts, and non-participation, also emerged. Students' lived experiences showed contrasting patterns: teacher-formed groups, with structured tasks and defined roles, promoted fairness and conflict resolution, while student-formed groups, based on friendships and flexibility, fostered comfort but struggled with accountability and balanced roles. Classroom observations reinforced these findings, with teacher-formed groups showing structured organization and active participation, while student-formed groups exhibited unstructured roles, passivity, and free-riding. Time pressure and physical proximity influenced group interactions and task completion. Overall, Students' perceptions and behaviors in cooperative learning activities emphasize the benefits and challenges of group work, particularly in teacher- and student-formed groups. Even though engagement, cooperation, and positive social skills were observed in both group formations, the structured nature of teacher-formed groups fostered clearer and appropriate role assignments and task-driven interactions. Contrary to these, student-formed groups, despite their comfortable and enjoyable nature, faced challenges related to group participation and focus in accomplishing the tasks.

Recommendations

The study recommends that teachers may balance structured guidance with student independence; students may enhance their teamwork and communication skills; and school administrators may support cooperative learning through training and resources. Future researchers may recognize the limitations of this study, including its specific participant sample and the subjective nature of experiences, and be encouraged to explore cooperative learning in varied contexts, adopt longitudinal studies to assess long-term impacts, incorporate quantitative measures for enhanced objectivity, and examine teacher facilitation strategies to deepen understanding of group dynamics.

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