PRESERVICE TEACHER EXPERIENCES IN FORMAL AND INFORMAL CO-OPERATIVE LEARNING GROUPS IN A MATHEMATICS COURSE

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ABSTRACT

Co-operative group learning is known to be an effective instructional practice, especially for mathematics. While group work can be incorporated into the classroom in multiple ways, not every group is a co-operative learning community. In the current study, class observations and preservice teacher interviews were used to compare experiences during formal and informal group work. The findings indicate that formal co-operative learning groups, or prolonged interaction with the same group of people, develops a sense of strong community within the classroom, thereby providing a safe space and facilitating discussions. Preservice teachers involved in formal co-operative learning reported they learned better, gained confidence in the subject, and associated positively to using group work in their future classroom. However, preservice teachers involved in informal co-operative learning had neutral perceptions about group work. We suggest that prolonged interactions among the group members is required to establish effective co-operative learning groups.

Keywords: Co-operative learning, mathematics, preservice teachers, group work, qualitative research

INTRODUCTION

Since the early 20th century, solving problems through group discussions and hands-on activity has been popularized by educators such as John Dewey, Jean Piaget, and Lev Vygotsky. Being involved in co-operative learning groups is associated with academic and psychological benefits (Johnson & Johnson, 2008). Additionally, the National Council for Teachers of Mathematics has advocated for co-operative group learning in the mathematics classroom (Leinwand, Huinker, & Brahier, 2014; National Council for Teachers of Mathematics, 1988; 2014). With an increase in student-centered instruction techniques, small group work has a common place in the mathematics classroom at all grade levels.

There are a variety of ways to implement co-operative learning in the classroom, all of which involve students working in small groups (Brame & Biel, 2016). However, merely placing students in a group does not ensure co-operative group work (Rappaport et al., 2017). Thoughtful planning and effort on the part of the teacher is required to transform groups of students into co-operative learners. The current study aims to explore preservice teachers' group work experiences and their perspective of working in small groups. The current study draws on the co-operative learning theory to identify effective co-operative learning practices.

THEORETICAL FRAMEWORK

The co-operative learning theory is derived from constructivist cognitive development and social learning theories (Tran, 2013). Co-operative learning occurs when a group of students mutually work together helping each other achieve their learning objectives (Johnson & Johnson, 2009). The basic elements of co-operative learning are:

1. Positive interdependence,
2. Face-to-face promotive interaction,
3. Individual accountability,
4. Interpersonal and social skills, and
5. Group processing (Johnson & Johnson, 2008; Tran, 2013).

The first element of co-operative learning, positive interdependence, refers to the belief that unique individual contributions are pivotal for the success of all group members (Jensen, Moore, & Hatch, 2002). While a member's successes benefit every other member, his or her failure reflects negatively on all the group members. The shared sense of responsibility for the success or failure of the group motivates students to perform better. Positive interdependence may be structured differently depending on the nature of the task and the group dynamic.

The second element, promotive interaction, refers to the exchange of ideas, thoughts, and explanations among group members to promote productivity (Johnson & Johnson, 2009). Promotive interaction between group members requires the members to establish a trusting relationship where the group members are comfortable assessing their peers by providing resources and constructive feedback. In addition, all group members must feel responsible for their contribution to the collective outcome. Thus, the third element, individual accountability, refers to ensuring that students are able to participate in group activities, ask for assistance, and offer assistance (Tran, 2013). Students in smaller groups experience more individual accountability as compared to larger groups.

The fourth element, interpersonal and social skills, refers to the skills required for interacting and collaborating with peers. Interpersonal skills such as listening, questioning, and negotiating are essential for co-operative learning (Johnson & Johnson, 2008). Students should be taught to communicate respectfully and resolve conflicts effectively. Social and interpersonal skills promote better performance and positive relationships among the group members. The fifth element, group processing, refers to allowing group members to reflect on their sessions to identify effective and ineffective practices (Yager, Johnson, Johnson, & Snider, 1986). Group processing provides the members a chance to revise their behavior and reinforces effective practices.

With the integration of the elements of co-operative learning, the role of the teacher is transformed from a lecturer to a facilitator. Meanwhile, the students engage in more active learning with multiple educational benefits, such as higher motivation, better performance, greater confidence, and better peer relationships (Johnson & Johnson, 2008).

LITERATURE REVIEW

Human beings are inherently group oriented. While the world has drastically changed in the past 5,000 years, the human brain is till wired to navigate a tribal society (Berreby, 2005). Extending that to the classroom, a sense of attachment with teachers and peers facilitates learning among students. Educators are advocating the construction of a "tribal classroom," with activities that promote small-group interactions and secure attachment, to improve education by capitalizing on students' primitive social instincts (Cozolino, 2014). Using co-operative learning groups is one way to set up effective classrooms.

Due to the applicability of group work across various educational settings, starting from kindergarten to university classrooms, co-operative learning in a small group setting is a heavily researched area. The positive outcomes of co-operative learning on academic achievement have been established through multiple meta-analyses over the past few decades (e.g., Bowen, 2000; Kyndt et al., 2013; Thanh, Gillies, & Renshaw, 2008). Co-operative learning has been found to be especially effective for nonlinguistic subjects such as mathematics (Hossain & Tarmizi, 2013; Kyndt et al., 2013; Nunnery, Chappell, & Arnold, 2013). The merits of using co-operative learning, both academic and psychological, have been well researched and are established.

Working in cooperative small group settings provides students with learning opportunities that individual work may not provide and allows students to interact and collectively negotiate the meaning of the subject, thereby developing new ways of thinking and doing (Sullivan & King, 1999). Structured co-operative learning is known to improve the acquisition of knowledge and the self-perceived competence in the subject (Ruiz-

Gallardo, López-Cirugeda, & Moreno-Rubio, 2012), thus facilitating better academic performance. The communal aspect of co-operative learning provides multiple academic benefits for the group members:

> *When implemented successfully, cooperative learning affords students the experience of learning in an environment where knowledge is not a stilted, externally prescribed and measured product, but a dynamic, creative element that grows out of the interaction between students, however diverse their backgrounds, interests, experiences, and ideas (Sharan, 2010, p. 12).*

Along with improved academic performance, students involved in co-operative groups develop a higher intrinsic value for the subject, the motivation to learn, and self-efficacy (Nichols, 1996). Students involved in small groups developed better attitudes towards the subject (Zakaria, Chin, & Daud, 2010), improved their social skills, and experienced personal growth. Students involved in co-operative group work are more persistent in the face of challenges and more likely to enjoy and attend school. The positive outcomes of co-operative group work as summarized by Johnson & Johnson (2000) include:

> *... achievement, higher-level reasoning, retention, time on task, transfer of learning, achievement motivation, intrinsic motivation, continuing motivation, social and cognitive development, moral reasoning, perspective-taking, interpersonal attraction, social support, friendships, reduction of stereotypes and prejudice, valuing differences, psychological health, self-esteem, social competencies, internalization of values, the quality of the learning environment, and many other outcomes (p. 450).*

While the benefits of using co-operative learning are well established, small group learning is preferred by educators for multiple reasons. With the increasing popularity of group work in most jobs, skills such as communication and the ability to work in groups improves the employability of an individual (McCorkle et al., 1999). Alternately, instructors may use group work to introduce variation during lessons and to encourage student involvement (Gottschall & García-Bayonas, 2008). Some teachers may use group work as a classroom management technique to better control student activities rather than as a co-operative learning opportunity (Baines, Blatchford, & Kutnick, 2003). Instructors often choose to use group work not because of the research-based evidence but due to their personal experience of its effectiveness (Dweck, 2012). Therefore, teachers' experience and perception of group work influences the implementation of co-operative learning strategies in the classroom.

Co-operative learning is a broad term that includes numerous types of organization and instruction that can be incorporated into the classroom. Co-operative learning activities can be categorized as: (1) formal co-operative learning, i.e., small group activities with stable group membership that last from one to several weeks, and (2) informal co-operative learning, i.e., short group activities that last for a few minutes, usually used in conjunction with teacher-lead instruction (Johnson & Johnson, 2000; Smith, 1996). While the merits of informal (e.g., Lange, Costley & Han, 2016) and formal (e.g., Capar, & Tarim, 2015; Johnson & Jonson, 2000) co-operative learning have been established by researchers, proper implementation is the key to positive outcomes (Rappaport et al., 2017).

Along with ineffective execution, some limitations of using group work have been recognized. A very common complaint is free-riding by group members. If all members do not contribute evenly, some of the group members will have to work in excess to finish the task while receiving the same grade as their peers, which may lead to an unpleasant group experience (Hall & Buzwell, 2013). In addition, due to the social nature of co-operative groups, the personalities of the group members impact member interactions and team performance as a whole (Barrick, Stewart, Neubert, & Mount, 1998; Van Vianen & De Dreu, 2001). The team composition and team member interactions impact the effectiveness of the group. Group work has to be purposefully integrated into the curriculum and the teacher or instructor should be prepared to facilitate the group activities. Including group work as an afterthought in an attempt to make the course engaging may hurt learning more than it may benefit it.

Researchers have consistently found that group work improves academic outcomes, but there is a gap between research-based, co-operative learning practices and those implemented in the classroom (Sharan, 2010). Teachers may be reluctant to implement co-operative group work in class because of a lack of understanding or training (Gillies, 2008). Researchers suggest there be extensive training for preservice teachers and in-service teachers to be able to implement co-operative group activities. There is a need to explore the experiences of preservice teachers during group activities throughout their training as these experiences shape their perception of effective group work their attitudes to it. The purpose of the current research is to explore the experiences of preservice teachers within co-operative learning groups in a mathematics classroom. Further, the experiences of students during formal co-operative learning is compared with students involved in informal co-operative learning.

RESEARCH QUESTIONS

1. What kind of group work experiences do preservice teachers have during their mathematics courses?
2. How do preservice teachers' experiences in formal group work vary from informal group work?

METHODOLOGY

In order to answer the research questions, a qualitative methodology was adopted for the current study. Two sections of a problem solving in mathematics course for preservice teachers were the focus of the current study. The problem solving course was designed to prepare elementary and middle school teachers. The two sections, taught by Dr. Sunshine and Dr. Daisy (psuedonyms), were specifically chosen as they differed in their implementation of group work.

Data collection

To compare student experiences between the two sections of problem solving, two types of data were collected: class observations and student interviews. For each section of the problem solving course, three class observations were conducted throughout the semester. The course instructors and the researcher agreed on dates for class observations, which were scheduled such that both sections could be observed during the same week. During the class observations, the researcher took notes on the general classroom functioning, group work dynamic, and student interactions with the instructor and peers.

At the end of class observations, students were recruited for a personal interview with the researcher. A semistructured interview protocol was used to investigate the students' perceptions of mathematics and group work (see appendix A). Seven students participated in the study, and pseudonyms were chosen to mask the identity of the interviewees. Two of the participants, Danny and Deb, were from Dr. Daisy's class. Five of the participants, Sue, Stella, Sasha, Simon, and Star, were students in Dr. Sunshine's class. Each interview lasted between 30 and 60 minutes. The participant's responses, both verbal and nonverbal, were noted during the interview. Then, a transcript was written up for the interview based on the field notes.

Data Analysis

The class observations and student interviews were analyzed to compare the similarities and differences between the problem solving sections. Further, a thematic analysis was performed based on the student transcripts. Finally, a comparison between student experiences in Dr. Daisy's and Dr. Sunshine's class was performed. The results and observations gathered from the interviews are presented below.

FINDINGS

The two sections of the problem solving course varied in terms of physical organization and group work structure. Though the course objectives were the same, the students' experiences were vastly different. A clear distinction between the experiences of students involved in co-operative learning and informal group work was identified. Students engaged in co-operative group learning experienced a strong sense of community within the classroom, were exposed to diversity in mathematical perspectives, and were more confident in the subject.

Physical organization

The two sections differed in the physical organization of the class, by virtue of classroom assignments. These were administrative decisions

that were not made by the instructors. Dr. Sunshine had large classroom where the desks could be easily moved around the classroom and were arranged to seat students in groups of four or five. The chairs and desks. The classroom had two doors along the left side wall. A large projector board was present at the front of the classroom. The right side wall was covered with a smart board in between two large white boards. A podium was provided at the front right corner.

Dr. Daisy had a smaller classroom with one door at the back of the room. The desks were arranged in rows with chairs attached to the desks. The chairs and desks could not be moved to create a different configuration. A large projector board was at the front of the classroom and partly covered two green chalk boards. The right side wall was covered with white boards. A podium was provided at the front left corner of the room.

Group organization

Group projects were a part of the problem solving course, and students in both sections were required to work in groups for a class presentation assignment and a final lesson plan assignment. While the project objectives were the same, the group assignments were implemented slightly differently by Dr. Daisy and Dr. Sunshine. In Dr. Daisy's class, students used a sign-up sheet to choose their dates of presentation, and as a result group members were usually physically distributed around class. The group members worked together only for the assigned project. In Dr. Sunshine's class, three or four students who sat at a table usually signed up to work as a group for the assignments. The group members in Dr. Sunshine's class worked together during every class hour and also on the assigned project.

Class dynamic

Both Dr. Daisy and Dr. Sunshine invested time and energy in getting to know their students. The students appeared to be comfortable with their instructors and showed no hesitation in approaching them with questions. Both instructors started class with student presentations and then moved on to the lesson.

Dr. Daisy's class. Before the beginning of class, Dr. Daisy walked around the room greeting his students and discussing their work. He made it a point to acknowledge students who had exceeded expectations on the assignments. During class, Dr. Daisy usually discussed some sample problems and then asked students to work in pairs or in groups.

For example, in one of the class periods, Dr. Daisy asked the students to pose a two-step problem with a given scenario. He asked the class to split into seven groups and provided them with ten minutes to complete the task. As students were not already arranged in groups, there was slight confusion over the organization of groups. Dr. Daisy helped to rearrange groups so that students were distributed evenly. Dr. Daisy then labeled the board with group numbers and groups wrote their problems. The students received a candy when they finished writing the problem on the board. He made use of the ample white board space allowing multiple students to write their solutions side-by-side for comparison.

Dr. Daisy was respectful while addressing student mistakes. When a group wrote a two-step problem, "Joe set his marbles on the table. Mary set her 8 marbles on the table. The total amount of marbles is 15. Then 5 marbles rolled off the table. How many marbles did Joe have?" Dr. Daisy explained how their problem is "wrong in the context of the task," as the problem could not be considered a two-step problem because "the first sentence is already giving the answer." The students immediately agreed with Dr. Daisy.

The group work during Dr. Daisy's class was informal but was constrained by time. Given the short time frame, the groups could not effectively establish promotive interactions or a sense of positive interdependence. Though the students were engaged in the activity, the students could not experience the five basic elements of co-operative learning. Moreover, the groups for the group assignments were usually different from the in-class groups.

Student Profiles. Two students, Danny and Deb, from Dr. Daisy's class volunteered to be interviewed. Danny started college as a math major wanting to teach high school, but at the end of her sophomore year, she decided to change to middle school education. She always loved math, understood how it worked, and was confident about solving problems. Deb wanted to teach middle school math and science. Though she was struggling in mathematics in elementary school,

she enjoyed calculus and problem solving. She described her thinking as "very mathematical."

Dr. Sunshine's class. Dr. Sunshine often used activities that required students to work in groups at their tables. Alternately, depending on the nature of the lesson, she asked students to share their answer with the class. Students used the white board to write their solution or a document camera to demonstrate their solution if it involved manipulatives.

For example, during one of the class periods, Dr. Sunshine did a mathematical logic activity with her groups. Each group member was given a clue to create a specific shape with unifix cubes so that the group would have a solution only when all the group members shared their clues and work together. The groups were allowed to work together first while Dr. Sunshine and her teaching assistant walked around the room to answer any questions. When the groups solved their problem, their answer was checked and a new problem was given. Finally, Dr. Sunshine shared her experience with using the same activity in an elementary school. She advised that elementary students need plenty of direction when using manipulatives and that using an easier problem in the middle helps frustrated students stay motivated.

In Dr. Sunshine's class, the group activity required all group members to participate as each member had a unique clue to solving the problem. There was a sense of individual accountability and positive interdependence to solving the problem. The scenario required the students to communicate their thoughts with their group members. Finally, Dr. Sunshine and her teaching assistant interacted with the groups to guide them and check their solution, which gave them an opportunity for group processing. Thus, Dr. Sunshine's group activity contained all the basic elements of co-operative learning.

Student Profiles. Five students (Sue, Stella, Sasha, Simon, and Star) volunteered to be interviewed from Dr. Sunshine's class.

Sue was pursuing a 4+1 master's in education degree with an emphasis on 4th–8th grade. She did not enjoy mathematics in elementary school because of "bad teachers," but she started to enjoy it by high school as she taught herself. She made the decision to be a teacher to make math less scary for children.

Stella started college as an education major but wanted to see if nutrition would be a more suitable choice. After switching to nutrition, she decided she wanted to be a teacher and choose the elementary education major. While math wasn't her favorite subject, the education classes and field observations helped her feel more confident in the subject.

Sasha started college as a biology major wanting to be a dentist, but she always had teaching as a backup option. After taking some education classes and participating in field observations, she decided to take up elementary education. While Sasha enjoyed mathematics and knowing that there is one right answer, she struggled with calculus. She viewed solving problems as interesting and fun.

Simon wanted to be a teacher but was discouraged by the rigor of the program at a different university. After transferring, she picked the EC-6 education major. Mathematics used to be her least favorite subject, but her father, a math wiz, helped her understand the concepts.

Star started as a nursing major and then switched to speech pathology. Mathematics was her favorite subject growing up because her mother was a mathematics teacher. She compared mathematics problems to solving a mystery.

Student Experiences

The difference between formal and informal co-operative group work was evident during the student interviews. While there were five participants from Dr. Sunshine's class, only two students participated from Dr. Daisy's class. Participants from Dr. Sunshine's class were enthusiastic about working in groups during the problem solving class. On the other hand, students from Dr. Daisy's class felt that they worked in pairs rather than as a group during the problem solving course.

The students' perception of group work varied depending on the problem posed to the class section. Student definitions from Dr. Sunshine's students represented a communal aspect or process oriented view. For example, Stella explained that group work to her means to

> *collaborate with peers to solve a problem or assignment while sharing our ideas or ways of thinking enabling us to understand different concepts and learning differently than we normally do. It creates a positive atmosphere where we feel included and*

our voice is heard. In a large classroom, we may feel insignificant or unnoticeable, but if we engage in groups, it's more likely that our voice is heard.

However, Dr. Daisy's students' interpretation of group work was outcome oriented. For example, Deb described group work as "two or more people with the same goal such as a project or an assignment."

The organization of the groups during class impacted the students' view of group work. Having plenty of structured group member interaction during class helped Dr. Sunshine's students develop a co-operative learning environment. On the other hand, limited face-to-face interaction of the group members during Dr. Daisy's class led them to view group work only as a means to complete an assignment.

Formal co-operative learning

Dr. Sunshine's class structure involved the elements of co-operative learning as outlined by the co-operative learning theory. Students from Dr. Sunshine's class, as a result of working in small groups during class, reported that they experienced (a) strong community within the classroom and (b) diversity in perspective. Because of the structured group work during class, they reported that they had a good understanding of the math concepts, were more comfortable and confident with the subject, and enjoyed learning.

Community within the classroom. Even with the wide acceptance of small group learning, the students seldom experienced the full effect of co-operative learning. Stella remarked that group work is not used the same way in other classes as used by Dr. Sunshine. In other classes, they were "often asked to turn to [their] partners and discuss," but as a part of Dr. Sunshine's class, all five participants reported that they formed strong connections with their small-group members. Simon described that the constant communication among the group members established comfort among the table groups. Working with the same group of people "for a prolonged period of time help[ed] in getting to know people at a different level" (Sue). Further, working together and arriving at a solution gave the group members a sense of accomplishment (Stella).

As a result of the peer bonding, students viewed the classroom as a safe space to discuss their thoughts and ideas. Sasha remarked that "seating

in a group helps students share, because sharing with the whole class may seem intimidating." All five participants agreed that within the groups, the group members would not unfairly have judged them in case they were wrong. Highlighting the supportive environment within the classroom, Sue remarked, "everyone has been there being wrong at some point." As a result, the group members not only shared their ideas more readily, but they also learned to correct respectfully their peers (Sasha).

A sense of community made learning more enjoyable for the students. Star commented that working in small groups helped her think critically and made the activities fun. Stella, similarly described the benefits of group work, "group work helps you understand and enjoy learning. Saying and repeating helps me learn and remember . . . When I solve a problem while interacting with friends, I'm more likely to remember the process I use."

The physical organization of the classroom played an important role in shaping student experiences. Stella observed that the setup of the classroom affected student participation. Sasha, comparing seating arrangements, commented, "In classes that are seated in rows, I would probably interact with one or two people sitting next to me, but, when I work in groups, I get to work with one more person and it makes a difference." The organization of Dr. Sunshine's classroom, similar to that of an elementary classroom, was conducive for small group activities.

Diversity in perspective. The students in Dr. Sunshine's class, unlike in their other math classes, were able to effectively engage with their peers, which allowed them to experience diverse perspectives. Typically, in other classes, students "don't have an idea about how the others are doing or their level of understanding," but the constant interactions within their small groups exposed them to different thought patterns and explanations.

Working in small groups in itself was a source of motivation for students to begin the solution process. As group work provides a "bridge to get to work" (Sue), the constant exchange of ideas triggered new approaches to the problem. Addressing the merits of peer interaction, Stella commented, "group work gets the wheels in our brain turning better than a lecture type class can." Sometimes, a stray idea

may help students understand the ideas better, "if I'm not getting something, someone may share and then it clicks" (Simon).

Most of the participants noticed that at least one of their group members would solve the problem differently than the rest of the group. "Once most of us got a question wrong because we read it one way and only one person got it right because she understood the question differently." (Stella). The diversity in perspectives led to multiple ways of explaining problem solutions. As compared to the instructor's thought process or view point, an explanation by a peer may sometimes be more relatable to students. While Star felt that "explanation from same age people may make more sense," Stella thought the "ways another peer explains maybe better than how the professor explains."

Finally, the preservice teachers from Dr. Sunshine's class were optimistic about using group work in their future classrooms. They acknowledged that direct instruction was necessary for introducing math concepts, while sometimes individual work could be used for assessments (Star). On the other hand, group work would help students to "come (out) of their shell" (Simon), "get familiar with" their peers (Sue), and "understand and enjoy" learning (Stella). Further, Sasha explained

> If one of the group members did not understand, then the others might be able to help him/her understand. If none of them understand, then they can discuss and let me know that they did not understand. They are less likely to tell me if they think they are the only one who did not understand. It's a win either way.

Informal co-operative learning.

Dr. Daisy's class structure involved informal co-operative learning. In addition, the physical classroom structure affected student participation during group activities. As a result, Danny and Deb could not adequately answer question about group activities during the problem solving course. Instead they shared their experience working with their neighbors during class. Even though they worked as groups for class presentations, they used applications such as GroupMe or Google Slides to

chunk their project into individual bits (Deb). As a result, face-to-face interactions between the groups were limited.

Both Danny and Deb had a neutral attitude towards working in groups. Danny initially hated group work, because she did not like to depend on someone else for her grade. But working in group projects was inevitable as an education major, so she got more comfortable with the idea. Deb felt that getting to know students in her class helped her feel less anxious, but she thought that "sometimes getting to know your group members well might not be useful because we get talking on tangents." Danny was willing to use group work in her future classroom as a way to familiarize her students with each other or to provide differentiated instruction for groups of students with similar learning needs. Deb was skeptical about using group work for certain activities as "one of them could do it [work] and the rest would copy the solution. It's hard to say who's doing the work," but she believed group work was beneficial for students to see different perspectives.

DISCUSSION

The positive outcomes of group work and the integration of co-operative learning are well-researched and established. However, there is a consistent gap between research and practice (Gottschall & Garcia-Bayonas, 2008). In an effort to explore group work practices in a mathematics classroom, the current study compared preservice teachers who were involved in formal and informal co-operative group work.

In agreement with previous research (Feichtner & Davis, 1984; Oakley, Felder, Brent & Elhajj, 2004), long-term groups, working together for several weeks, appeared to be effective learning environments. Preservice teachers who were part of a formal co-operative learning group experienced a strong sense of community within the classroom, which facilitated discussion and knowledge sharing among the group members. The group members reported being more comfortable and confident in the subject as a result of being involved in formal co-operative groups. In addition, they were more optimistic about using group work in their future classrooms. On the other hand, students who were involved in informal co-operative learning during class did not perceive themselves as a part of a group. Due to limited face-to-face interactions

and the short span of informal group activities, an effective co-operative learning environment could not be established.

Based on the findings of this study, we suggest that prolonged face-to-face interactions between the group members are essential to establish co-operative learning groups. Given the technological advancements, group assignments can often be completed without considerable interactions between the group members. Allocating class time for the group members to become familiar with each other may have far reaching consequences for establishing functional co-operative groups.

DISCLAIMER

This study does not evaluate the effectiveness of the instructors but merely studies the experiences of the students while they participate in group activities.

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