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The Effects of Group Design on Gifted Students in Cooperative Learning

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The Effects of Group Design on Gifted Students in Cooperative Learning

Abstract

This study investigated the effect of grouping styles, heterogeneous and homogeneous, on gifted students during science cooperative learning activities. A total of 48 students, 24 students from two different fourth grade general education classrooms within the Canandaigua City School District participated in the study. The two classrooms selected were of a fourth grade team with clusters of gifted and talented students. A total of 21 males and 27 females participated in this study. Of the 48 students, 38% were classified as gifted within the MST area(s). Direct teacher observation, questions, and surveys were used to collect data during this study. On the whole, gifted students within the heterogeneous group offered a slightly higher percentage of cognitive input compared to gifted students within the homogeneous group. Perceived positive attitudes about group members were slightly higher for gifted students within a homogeneous (gifted student group) compared to perceived positive attitudes about other group members within a heterogeneous group students. When data was analyzed regarding attitudes toward cooperative learning, gifted students expressed a more favorable attitude toward cooperative learning when in a homogeneous gifted group compared to those in a heterogeneous group.

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Thesis

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Table of Contents

Abstract	1
Introduction	4
Review of the Research Literature	6
Methods	8
Results	17
Conclusion and Discussion	19
References	21
Appendices	22

achievement levels (Parke, 1992). Thus, developing the most effective lesson plan and mode of instruction involves an analysis of student abilities, one's instructional plan, grouping methods, and student performance. More specifically, the needs and performance of gifted students during a cooperative learning activity under two different grouping designs, within various inquiry based science classes, will be investigated.

This study investigated the effects of homogeneous and heterogeneous ability groups on gifted students within various cooperative learning activities. The following areas would be considered during this study: engagement during group work time, student attitude of cooperative learning prior to and after a cooperative learning activity, and perception of the peer cooperative learning group before and after the cooperative group work activity is completed. In order to investigate these areas, the study will look closely at these three areas using direct teacher observations, student questionnaire, and preference scale. In conclusion of the study, results will offer insight as to which grouping model offers a more positive learning experience for the gifted learner.

Methods

This section describes the basic methods and procedures used in this study. It includes a description of the participants, the study design, measures used, and procedures used in the delivery of the study.

Participants

A total of 48 students, 24 students from two different fourth grade general education classrooms within the Canandaigua City School District participated in the study. The two classrooms selected were of a fourth grade team with clusters of gifted and talented students. A total of 21 males and 27 females participated in this study. Of the 48 students, 33% were classified as gifted within the MST area(s).

The sample is predominantly White, with one Asian student in the group. Within the gifted population, 11 males and 5 females were identified as gifted. Students were identified as gifted via various assessments given at the end of third grade using a variety of criteria.

Design

Within each science class two different types of groups were formed. Cooperative groups were either all gifted (homogeneous gifted) or mixed ability (heterogeneous grouping including 1 gifted and 4 or 3 non-gifted students). Two homogeneous groups of gifted students were assigned, one in each science class. Once those two groups were constructed, the remaining gifted students were randomly assigned with other students to construct heterogeneous groups.

Table 1.1 Science Cooperative Learning Groups

	Number of Students	Class A	Class B
Homogeneous (Gifted)	5	Group 1	Group 1
Heterogeneous	5	Group 2	Group 2
Heterogeneous	5	Group 3	Group 3
Heterogeneous	5	Group 4	Group 4
Heterogeneous	4	Group 5	Group 5

Instruction for the students was in accordance with the 4th grade science curriculum and NYS Standards. The unit of study covered during this study was titled Structures of Life, a science inquiry unit focusing on plant and animal life. Within this unit of study, students were to work in cooperative groups consisting of 4-5 students. Each cooperative learning session would revolve around answering an investigation question developed during previous lessons/inquiry questions students in the class generated. For example, students noticed plant seeds swelled after soaking in water during a previous investigation. Thus during the following lesson, students investigated how much water was absorbed by a lima bean within a cooperative group learning activity.

Measures

The impact of the grouping style on cooperative learning was assessed using measurements of engagement, attitude toward the cooperative learning activity after following completion of the activity, and perception of peer relations prior to and after the completion of the cooperative learning activity. Each will be described as follows:

Engagement

Engagement was assessed through direct teacher observations focusing on cognitive input. Cognitive input was noted, counted, and the frequency within each group was recorded. The areas of input included: verbal responses within group discussions pertaining to academic tasks and asking relevant questions related to the learning task at hand. During the direct teacher observational period, the teacher would spend 5 minutes on each target student noting behaviors and responses. A total of 25 minutes would be needed to assess each group. All observations were noted on the engagement observation form as depicted in Appendix A.

Perception of Peers within the Cooperative Group

Student perceptions of peers were assessed through the Student Perceptions Questionnaire which was designed for this study. This instrument asked each student in each cooperative learning group to rate the group members with regard to 5 characteristics on the pretest and 8 characteristics on the posttest. Pretest characteristics included the following:

1. How friendly the group members are
2. How smart the group members are
3. How good of a team the members are
4. How much they would play the group members

For the posttest, one other characteristic was added:

5. How much they would like to be with the same group members during another group activity

This science curriculum is expected to be taught by teachers at the elementary level at Canandaigua City School District where this study was conducted. The experimenter assumed the role of the teacher and observer while in the classroom teaching two consecutive lessons to Class A. The experimenter assumed the role of solely an observer while in the classroom for the two consecutive lessons taught to Class B by another teacher. The specific procedures which were implemented each day of the 4 day study are described in more detail below.

Day 1:

Prior to delivery of the science lesson, the teacher/experimenter distributed the Student Perception of Peers Attitude Questionnaire (Pre Activity) and asked students to answer the questions on the questionnaire. The teacher/experimenter read the directions and each question to the class. This procedure was implemented to ensure that all students understood what was being asked of them. The Student Perception of Peers Attitude Questionnaire is shown in Appendix B. Students were also asked to complete the Student Attitudes Toward Cooperative Learning Scale (Pre Activity). The teacher/experimenter followed the same procedure by reading the statements to the class. After students had completed the questionnaire and scale, the forms were collected and the teacher/experimenter began the instructional delivery of the lesson.

The science inquiry lesson focused on investigating the effect water has on the seeds by systemically finding out how much water lima beans soak up in a day. Students had been assigned cooperative learning groups and were asked to get into their groups. Homogeneous and heterogeneous groups were formed prior to this

lesson. However, this information (group design) was not shared and/or explained to students. Once assembled in their groups, students were reminded of “cooperative group work rules” as taught during previous group work lessons. The rules that students were expected to follow were:

1. Each group is responsible for working as a team.
2. Each team member is expected to give suggestions and to help problem solve in order to successfully meet the demands of the investigation.
3. Each team member is expected to listen when another team member is speaking.
4. Each team member will help each other learn.
5. Each team member will complete investigation worksheet.

Once rules were reviewed, students moved to their cooperative group work stations.

Students were then instructed to read investigation inquiry question, How Much Water Can A Lima Bean Absorb?, and were to begin the investigation using materials provided by the teacher/experimenter within the next 20 minutes.

While students worked on the investigation, the teacher/experimenter conducted direct teacher observations in order to collect information on student engagement. The teacher/experimenter’s observation schedule was as follows:

Time	Group Type	Student Type
5 minutes	Homogeneous	Gifted
5 minutes	Homogeneous	Gifted
5 minutes	Heterogeneous	Gifted
5 minutes	Heterogeneous	Non-Gifted

Results

Gifted students within the heterogeneous group offered a slightly higher number of cognitive input responses compared to gifted students within the homogeneous group. Gifted students within the homogeneous group offered an average of 3.875 cognitive input responses within five minutes and gifted students within the heterogeneous groups offered an average of 4.375 cognitive input responses within the five minutes.

Perceived positive attitudes about group members were slightly higher for gifted students within a homogeneous group compared to perceived positive attitudes about other group members within a heterogeneous group for gifted students.

Perceived Positive Attitudes Mean Scores

Variable	Homogeneous Group Mean Score	Heterogeneous Group Mean Score
Friendly	3.125	3.125
Smart	3.875	2.75
Teammate	3.375	2.375
Like	3	2.75
Play/Recess	3	2.25
Same Group	3.625	2.25

The ratings presented on the table show more favorable ratings given by gifted students in the homogeneous group, meaning the gifted children generally view their group members of similar intellectual ability more favorably than students of varying ability levels. The only variable with no difference present was the friendly variable. The greatest difference in results was presented with the same group variable. Gifted students in the homogeneous group were more likely to want to be in the same group than gifted students in the heterogeneous group.

When data was analyzed regarding attitudes toward cooperative learning, gifted students generally expressed similar attitudes toward cooperative learning when in a homogeneous gifted group compared to those in a heterogeneous group. There were two statements which there was a slightly higher agreement rate with gifted students in the homogeneous group compared to gifted students in the heterogeneous group. These two statements were: Science group work is fun. and Knowing how to work with others is important.

Percent of Students in Agreement of Cooperative Learning Statements

	Homogeneous	Heterogeneous
I learn a lot from working with others.	63%	63%
Science group work is fun.	88%	75%
Schools should teach students how to work in groups.	88%	88%
I want to work in groups more often.	75%	63%
Knowing how to work in groups is important.	75%	75%

Discussion and Conclusion

Although research has found that students generally learn more and have more positive notions of themselves and other group members after the involvement in cooperative learning, not a lot of research has been conducted regarding the effects on the gifted population. Because of the lack of research, Robinson has suggested that the implementation of such an instructional strategy is unwarranted and potentially harmful (Robinson, 1990). The research conducted in this study was conducted to provide others with further evidence as to the effectiveness of cooperative learning with gifted students.

This study was an attempt to answer the question: What type of grouping formation, heterogeneous or homogeneous, is a more effective grouping formation within a cooperative learning setting. Based upon results of the study it is difficult to determine which grouping style (homogeneous or heterogeneous) is more effective for the gifted student. However, it appears gifted students within both grouping styles were engaged in learning. Based upon observations, gifted students offered cognitive input and mutually supported one another and encouraged other group members regardless of grouping pattern. It does appear gifted students in the homogeneous group had a slightly higher rate of perceived positive attitudes about group members compared to gifted students within a heterogeneous group. Gifted students in both homogeneous groups and heterogeneous groups appeared to enjoy cooperative learning activities, although students in the heterogeneous group were less interested in working in cooperative groups again compared to students in the heterogeneous groups.

This study has proposed a meaningful way to look at data from groups within a science class. It has provided a method of investigating the impact of ability grouping on student engagement, peer perceptions, and perceptions of cooperative learning. There are still other possibilities to investigate. For example, what is the impact of a lengthier study? What is the impact on a larger population sample, possibly conducting a study across grade levels? What impact would occur if a variety (changing group members) of homogeneous groups were constructed and studied over a period of time? What impact would occur if the types of cooperative group activities were changed? What impact would occur if cooperative group work was assessed using rubric to assess cooperation, communication, and participation?

If grouping does not have a significant effect on the learning and student perceptions of gifted learners, choices regarding how to group students could possibly be based on considerations other than ability grouping. Such considerations could be: personality, gender, number of times working with the same group members, student needs, and student interest. The necessity of making educational choices should be based according to students' needs and what is being taught.

In summary, a goal for cooperative learning is for students to work together towards a common goal. The current findings showed student interaction and all groups were able to meet the goals set forth within the activity, regardless of grouping method used. There were no significant differences in engagement and thoughts pertaining to cooperative learning. However, there was a slight difference in students' perceptions of peers within their cooperative group.

Appendix A

Engagement Observation Form

	Day 1	Day 2
5 min.	Homogenous- Gifted Student 1	Homogeneous-Gifted Student 3
5 min.	Homogeneous-Gifted Student 2	Homogeneous-Gifted Student 4
5 min.	Hetergeneous-Gifted Student A	Hetergeneous-Gifted Student C
5 min.	Hetergeneous-Gifted Student B	Hetergeneous-Gifted Student D

* Offered verbal response pertaining to academic task

? Asked relevant question