Group Roles and the Interdependence Theory

Brad Stewart

The Interdependence Theory

The theory works on 5 key elements: the perception of feeling linked to other group members while working on a common goal, individual accountability, face-to-face encouragement of group members ideas, interpersonal and small group skills to enhance abilities to solve conflicts, and group processing in evaluating the work done by ones group. My intervention was to see if assigning roles had an influence on how students felt they participated in accomplishing a goal.

The Intervention

My idea for an intervention was to create student led group work activities in which students were responsible for working together on a series of STEM activities. I would hold these interventions during my science classes on Friday. Students understood that these activities would not be a continuation of prior lessons. The STEM activities were designed and chosen so that students would not need prior knowledge of science concepts in order to find success. I picked two STEM challenges that were similar in that students only needed the materials that I would be giving them.

The first STEM activity was given to students and roles were NOT introduced. The groups would get 45 minutes to plan, create, and discuss. The second STEM activity was given one week later and roles were introduced. The groups would get 45 minutes to plan, create, and discuss. At the end of each 45 minute session students were given a survey to complete that focused on participation.

STEM Activity 1

Students engineers design and construct buildings to withstand earthquake damage using toothpicks and marshmallows. They experiment to see how earthquake-proof their buildings are by testing them in an earthquake simulated in a pan of Jello. (I made one huge tray of jello the night before!) Building needed to be able to stay intact after being shaken inside the pan of jello.

Each group will need: 20 toothpicks, 20 marshmallows, and a recording sheet. Along with a limited amount of materials, buildings needed to be at least 2 toothpick levels high. Buildings also needed to contain at least 1 triangle and at least one square.

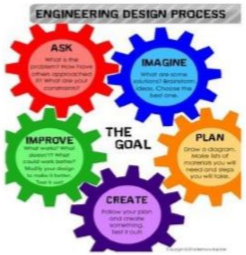
Once materials were handed out to each group they were given 45 minutes to work. 10 minutes was dedicated to complete the “Before” section of the recording sheet. 25 minutes was dedicated to the building and testing (jello shake). 10 minutes were dedicated to the “After” section of the recording sheet. As students worked on planning and creating their buildings, I was looking for how students were participating with each other. I tried my best to act more as a facilitator. If students had questions I made sure to direct them back to asking their group.

Student Record Sheet

BEFORE

Name(s):

What is the Problem?



Possible Solution(s):

Materials:

Sketch or Describe Plan:

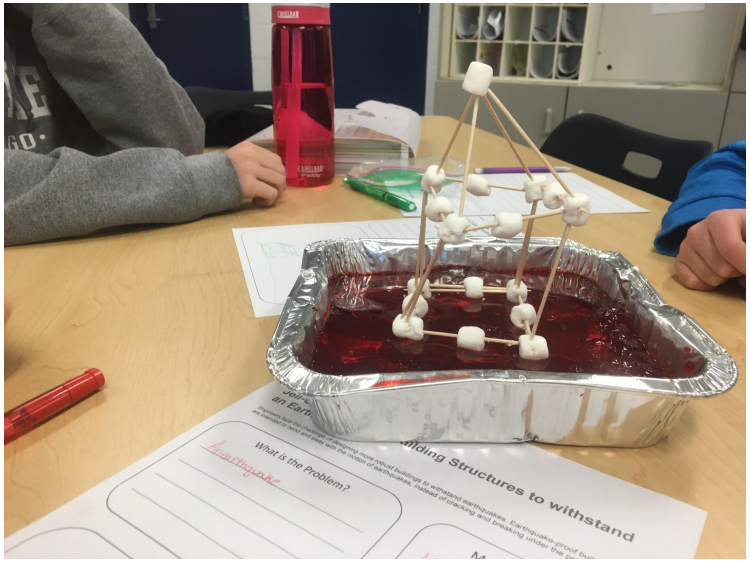
AFTER

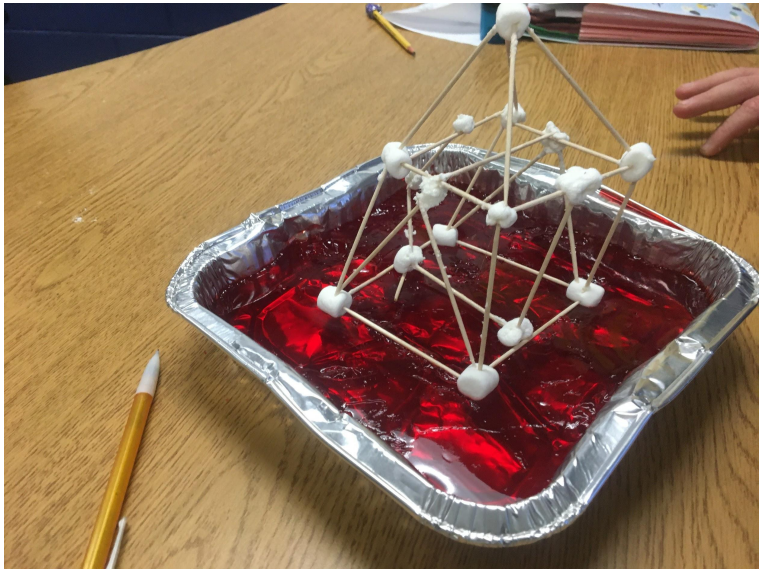
What worked well?

Improvements made:

What did you learn?

Student Work





Stem Activity 2: With Designated Roles

Students design and create model beam bridges using plastic drinking straws and tape as their construction materials. Their goal is to build the strongest bridge with a truss pattern of their own design, while meeting the design criteria and constraints. They experiment with different geometric shapes and determine how shapes affect the strength of materials. The bridges need to be able to hold a cup filled with 500 grams without breaking.

Each group will need: 10 straws, 10 tooth picks, masking tape, modeling clay and a recording sheet. Bridges needed to have a truss pattern and be one straw length long and ½ a straw length wide.

Once materials were handed out to each group they were given 45 minutes to work. 10 minutes was dedicated to complete the “Before” section of the recording sheet. 25 minutes was dedicated to the building and testing (holding weighted cup). 10 minutes were dedicated to the “After” section of the recording sheet. As students worked on planning and creating their bridges, I was looking for how students were participating with each other. Again, I tried my best to act more as a facilitator. If students had questions I made sure to direct them back to asking their group. This time however, they had a group role that were introduced before the beginning of the class.

Group Roles

Each role was handed out randomly. Student received a piece of paper describing the roles and we went over what was being asked of each member.

Peacekeeper. This person monitors airtime of people in the group— this person is allowed to control who has "the floor" with the goal of ensuring that everyone gets a chance to talk and that everyone takes time to listen. This person also makes sure everyone gets a turn to use the materials.

Progress monitor. This person asks others to periodically take the measure of the group's progress. • Asks: "What can we say we've accomplished so far?" • Asks: "What do we still need to know/do to accomplish this task?" • Asks: "What can we now add to our explanation that we didn't have before?" This person also needs to keep an eye on the clock.

Big ideas person. The BI person pulls the group (occasionally) back to the scientific purpose of the activity (often a group will get too wrapped up in the rote execution of the directions). • Asks: "What is the Big Idea we are trying to understand? This person will also need to be asking why certain decisions are being made.

Questioner. This person asks probing questions during the activity. These folks listen for questions posed by other group members and then re-voice the questions to make sure that the whole group takes a moment to hear and entertain questions from everyone. • Asks: "What does it mean that ____?" • Asks: "How do we know that_____?" • Paraphrases what other have said: "So, what I think you are saying is… Is that right?" • Asks: "What would happen if we changed ____?" • Asks: "What's your evidence?"

Student Record Sheet

BEFORE

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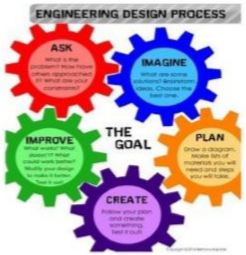

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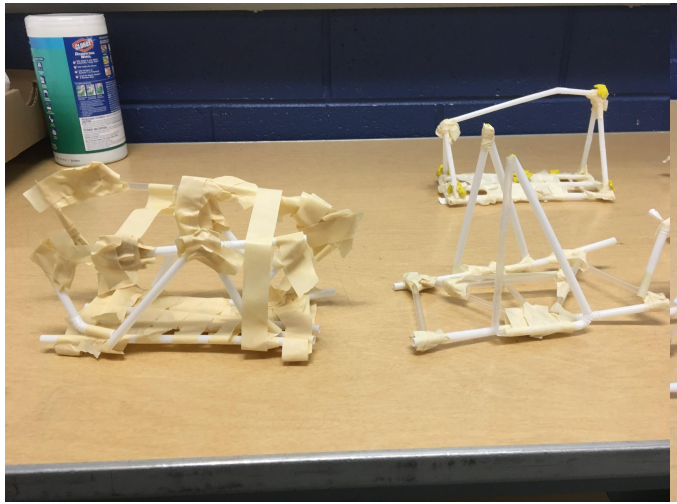
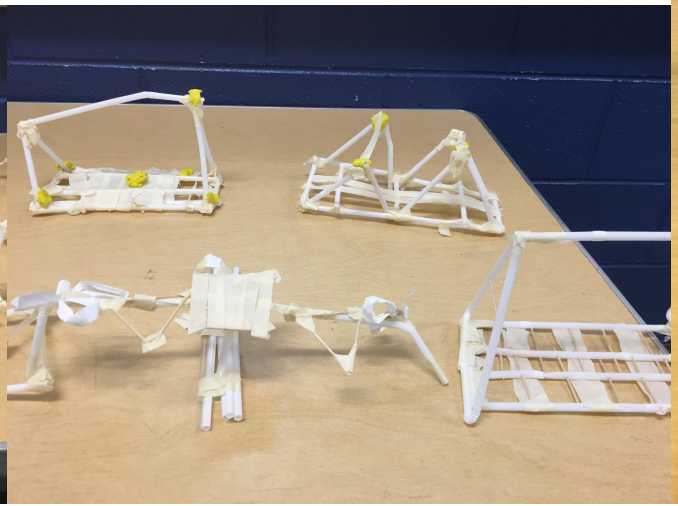
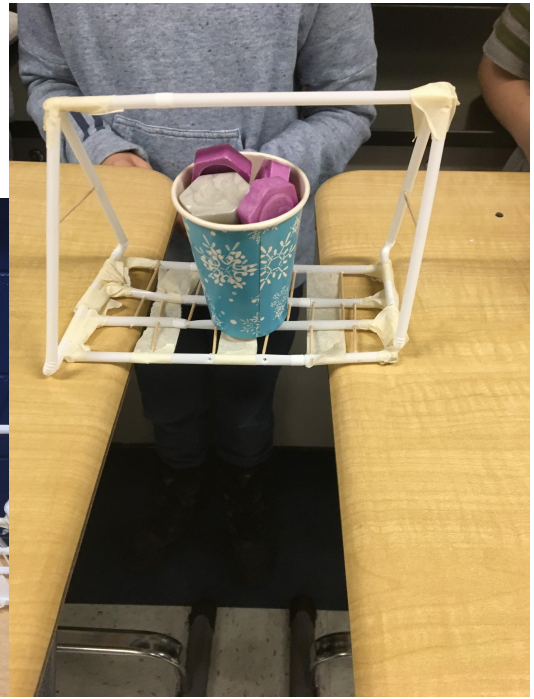
Student Work







Google Classroom Survey

After the completion of each STEM activity. Each student was asked to complete a survey on google classroom. I created a survey that included a series of multiple choice questions with the theme centered around participation. The questions did not ask about whether they were able to create a building or bridge. The survey was multiple choice with choices being 1-5. An example would be “Do you think you worked well with others?” Answering with a 1 indicated that the student felt they did not work well with others at all whereas answering with a 5 indicated they most definitely worked well with others.

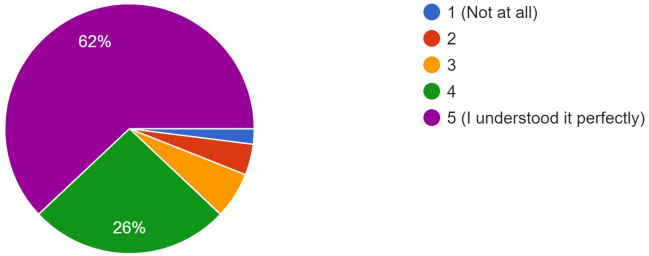
In the next set of slides. I will reveal a side by side comparison of the results of the surveys given after both stem activities.

Survey Results

STEM 1

Did you understand the goal of the activity?

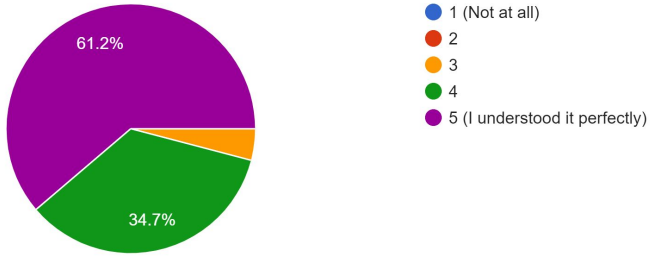
50 responses



STEM 2

Did you understand the goal of the activity?

49 responses

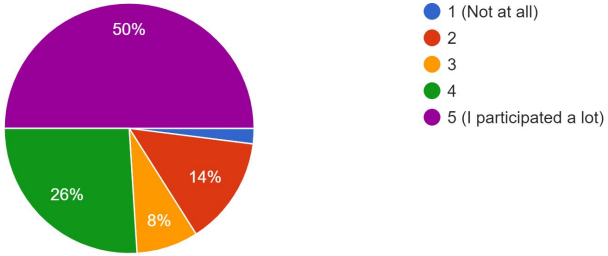


Survey Results

STEM 1

How well do you think you participated in the group?

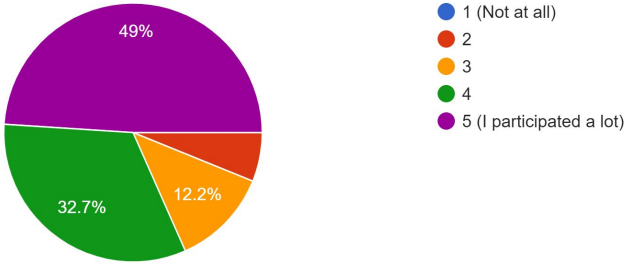
50 responses



STEM 2

How well do you think you participated in the group?

49 responses

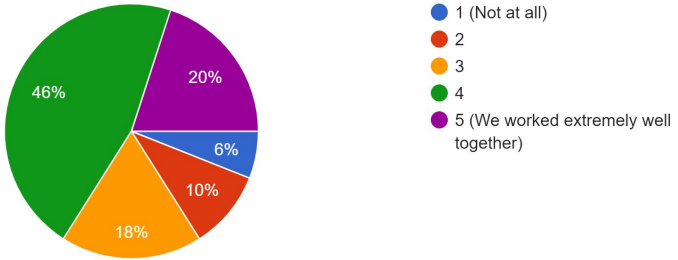


Survey Results

STEM 1

How well do you think your group participated as a team?

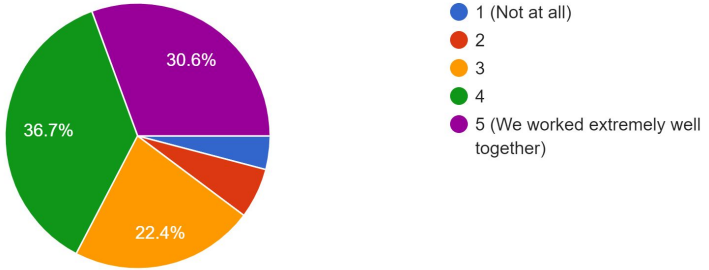
50 responses



STEM 2

How well do you think your group participated as a team?

49 responses

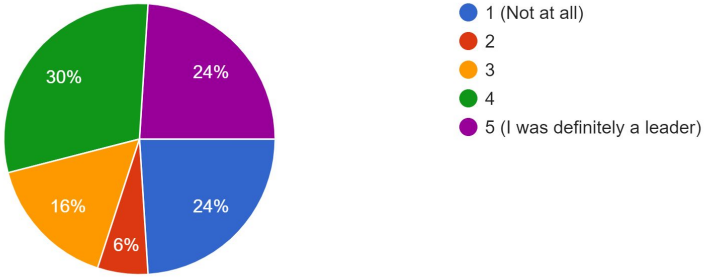


Survey Results

STEM 1

Do you think you were a leader in the group?

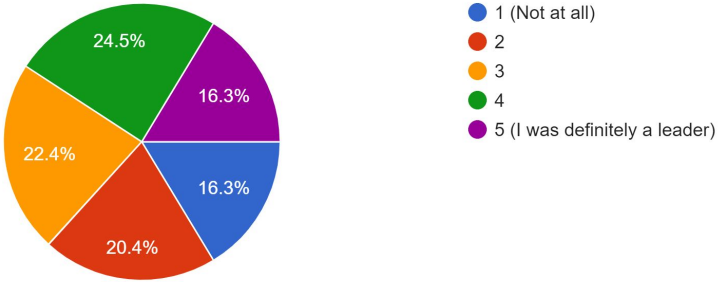
50 responses



STEM 2

Do you think you were a leader in the group?

49 responses

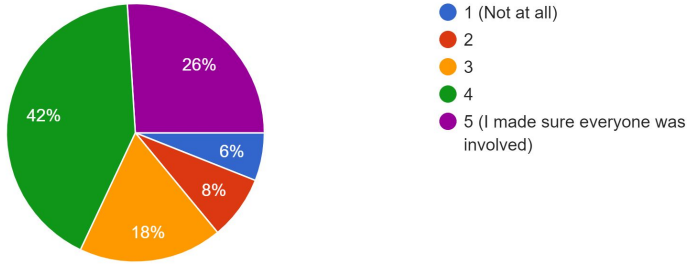


Survey Results

STEM 1

How well did you attempt to make sure everyone was included in the activity?

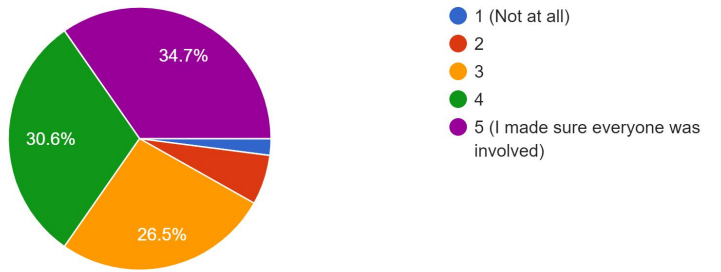
50 responses



STEM 2

How well did you attempt to make sure everyone was included in the activity?

49 responses

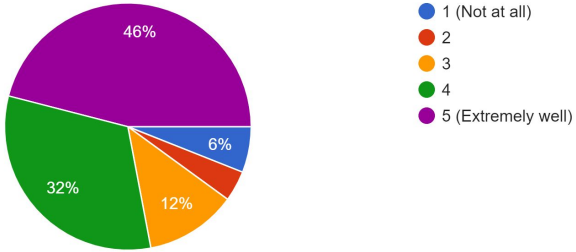


Survey Results

STEM 1

How well did you listen to other group members ideas?

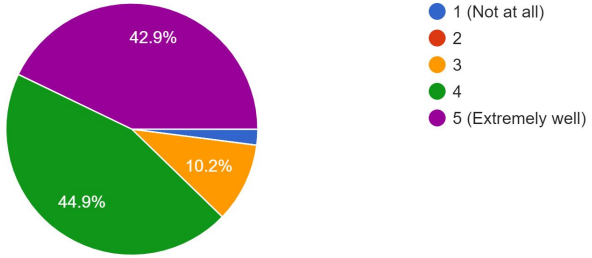
50 responses



STEM 2

How well did you listen to other group members ideas?

49 responses

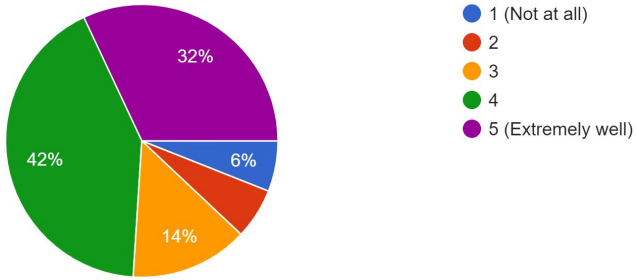


Survey Results

STEM 1

Did everyone get to talk and be heard in the group?

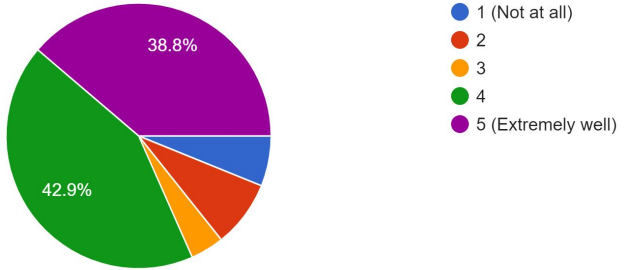
50 responses



STEM 2

Did everyone get to talk and be heard in the group?

49 responses

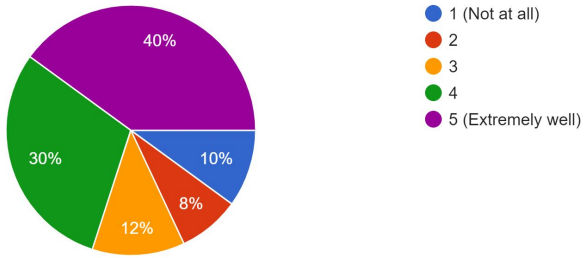


Survey Results

STEM 1

Did everyone get to work with the hands-on materials?

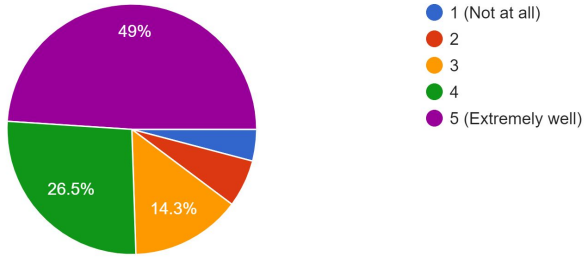
50 responses



STEM 2

Did everyone get to work with the hands-on materials?

49 responses



Conclusion

The results of the survey proves that participation amongst individual members went up when groups were introduced. With the exception of the question asking whether or not the student felt like a leader in the group, there were more 4s and 5s in the STEM with group roles. The numbers were not drastically different, but they did improve. However, there are many factors that I think play a role in the way students participated. One aspect I tried to keep the same was the members of each group. Aside from some students being absent, I made sure to keep the groups the same. The only thing that changed here was the roles in which the members were assigned. The roles were also handed out randomly, I would be interested how students would respond if they received a different role. Another aspect I would like to note is the materials and goal of each activity. STEM one asked students to create a building out of just toothpicks and marshmallows. This building needed to survive after being set in a tray of jello and being shook. A lot of the buildings looked very similar. The way I explained the directions and the restrictions may have played a part in manipulating how the groups went about working on the activity. STEM 2 involved more materials. This led to more variety in end products. As you can see in the pictures, the bridges all looked different.

Moving forward, I would be interested to see if students feel as if they are participating more within a group of peers when group roles are introduced. I have plans for many more STEM activities in the future and will be eager to analyzed how roles influence collaboration.

References

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Forslund Frykedal, K., & Hammar Chiriac, E. (2018). Student Collaboration in Group Work: Inclusion as Participation. International Journal of Disability, Development & Education, 65(2), 183–198. https://doi-org.proxy2.cl.msu.edu/10.1080/1034912X.2017.1363381

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