

Appendix A- Interventions- Cooperative Training Exercises

Broken Circles, Broken Squares

LEARNING TO COOPERATE

The most basic lesson that students must learn when working in groups is to be sensitive and responsive to the needs of other members of the group. They must also learn that they are part of an interdependent group. What happens in the group is important for them. There are two specific norms that express these ideas simply:

- 1. *Pay attention to what other group members need***
- 2. *No one is done until everyone is done.***

This is so different from conventional classroom behavior and so necessary for successful cooperative learning that we recommend that each class start out with one such activity. We present two activities that can develop these norms: Advanced Broken Circles and Broken Squares.

The instructions to the participants and suggested discussion given below are those of the developers of Broken Circles, Nancy and Ted Graves (Graves & Graves, 1985). Broken Circles is based on the Broken Squares game invented by Dr. Alex Bavelas (1973).

The class is divided into groups of 3-6 persons. Each person is given an envelope with different pieces of the circle. The goal is for each person to put together a complete circle. In order for this goal to be reached, there must be some exchange of pieces. Group members are not allowed to talk or to take pieces from someone else's envelope. They are allowed only to give away their pieces (one at a time).

Instructions to the participants:

Each of you will be given an envelope containing two or three pieces of a puzzle, but don't open it until I say so. The object of this exercise is to put these pieces together in such a way that each member of your group ends up with a complete circle. There are a few rules to make the exercise more fun.

1. This exercise must be played in complete silence. No talking.
2. You may not point or signal to other players with your hands in any way.
3. Each player must put together his or her own circle. No one else may show a player how to do it or do it for him or her.

4. This is an exercise in giving. You may not take a piece from another player, but you may give your pieces, one at a time, to any other members of your group, and other group members may give pieces members of your group, and other group members may give pieces puzzles. Instead, hand the piece to the other player, or place it beside the other pieces in front of him or her.

Now you may take the pieces out of your envelope and place them in front of you, colored side up. This is a group task, and you will have 10 minutes to make your circles.

Remember, the task is not finished until each of you at your table has a completed circle in front of you. When all of you have finished, raise your hands. (If one group finishes before the others, suggest that they try to discover if there are any other ways they could put the pieces together to form different circles.

Discussion

When all groups have completed the task or the allotted time has ended, the teacher should help the participants to identify some of the important things that happened, analyze why they happened, and generalize to other group learning situations. The following questions can serve as a guide to the discussion:

- What do you think this exercise was all about?
- How do you feel about what happened in your group today?
- What things did you do in your group that helped you to be successful in solving the problem?
- What things did you do that made it harder?
- What could the groups do better in the future?

Help participants to be concrete about what they did, abstract about the general implications of what they did, and the lessons they learned for the future. In the discussion be sure to come back to the two key behaviors that make a group successful: **1. Pay attention to what other group members need. 2. Work together, no one is done until everyone is done.** Point out when groups report these kind of behaviors or when they decide these behaviors would help them do better in the future.

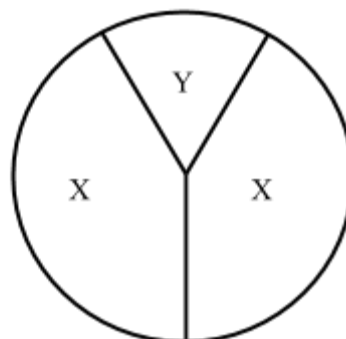
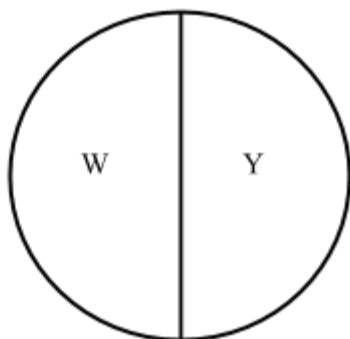
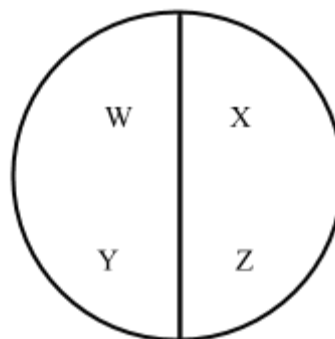
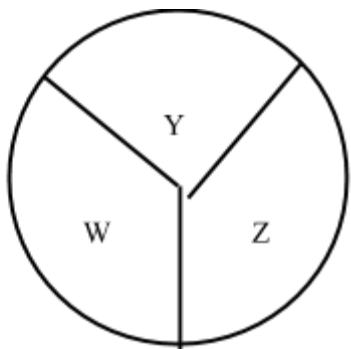
Instructions for Making a Set of Broken Circles

Below are the patterns for the Broken Circles. Make one set of six circles for each small group using heavy cardboard. The circles can be any size. However, all the circles within the set should be the same size.

Each **set** of six circles should be a different color. This way, each small group will be able to work with pieces that are all of the same color, and different from any other.

SIMPLE BROKEN CIRCLES

This pattern is suitable for children 8-10 years old in groups of four. Sort the pieces into four envelopes marked W, X, Y, and Z. The figure below indicates one solution. Ask the groups that finish first, "How many *other* ways of forming four circles can you discover?"



Master Designer

Materials:

This game requires a set of geometric shapes. Each player needs to complete set, but one person in each group takes the role of observer and does not require a set. A total of five persons per group is recommended by smaller groups are acceptable. The shapes should be made out of some sturdy material such as oaktag. In addition you will need some cardboard or other dividers that can be stood on a table. The idea is that each player can see the the other members of the group over the dividers but cannot see what the others are doing with their pieces.

Rules and Discussion:

One person plays the role of the master designer. This person has to instruct the other players as to how to replicate a design he or she has created with the pieces (all or part of them), but the master designer cannot do this task for them. Players cannot see what the others are doing; nor can they see the design of the master. However group members may ask questions of the master designer. This illustrates an important new behavior:

- ***Help others to do things for themselves.***

The group is dependent on the master designer for explaining how it should be done. This is the second new behavior:

- ***Explain to others by telling how.***

When any member of the group feels that he or she has figured out the master design, the designer is asked to check the solution. If the master designer says it is correct, then that player too is to help others in the group by explaining how. This rule illustrates another important new behavior

- ***Work together, everybody helps.***
- ***Encourage other members for ideas and suggestions.***

Make up a bring chart with these three behaviors and display it prominently in the classroom.

One student plays the role of the observer for each round. The observer watches the group and checks off every time he or she sees two of the three new behaviors occur. These are:

- ***Help others to do things for themselves.***
- ***Explain to others by telling how.***
- ***Work together, everybody helps***

After the exercise ask each observer to report how many times he or she saw each new behavior. The observer may be able to give some good examples of what was seen. Follow the discussion to the one described in detail for Broken Circles.

Guess My Rule

Objective

This is a game developed to illustrate reasoning skills. Students must deduce a central principle that accounts for all of the different-colored sizes and shapes that may be placed in the center of the ring. Someone holds a card, called a Rule Card, on which the central principle, such as “Only red shapes,” is written. The rule card holder tells the players whether or not their choice of a playing card fits the rule.

Materials

Each group of five (three players, one rule card holder, and one observer) will need to have a set of rule cards a large circle of yarn, and a special deck of playing cards. Each playing card displays one of four different shapes (circle, square, triangle, diamond) in one of three sizes (large, medium, and small) and one of the three colors (red, blue, and green); making up one card for each possible combination of shape, size, and color results in a deck of 36 cards. Outline the particular shape in the right size and color on the front of each card, and repeat the color on the border of the card. (it is much easier to draw the shapes on uniform cardstock than it is to cut out cards in each shape, and the deck made with uniform cards is also much easier for the students to manipulate.) For each group of players you will also need to make up a set of rule cards. These are the cards with the central principle that the players deduce.

Rule Cards for “Guess My Rule”

1. Only triangles
2. Only smallest shapes
3. Only BIGGEST diamonds
4. Only red shapes
5. Only blue rectangles
6. Only red and blue circles

* on the cards draw the shapes and outline the shapes in the appropriate colors

Instructions to Students

This reasoning game is called “Guess My Rule” and is played with this special deck of cards. As you can see, there are four different shapes in the deck: a circle, a square, a triangle, and a diamond. Each shape comes in three sizes: big, medium, and small. And each size in each shape comes in three different colors: red, blue, and green. There are many ways to sort these cards into categories. I want you each to think of a way. Here I have some rule cards that have on them different ways to sort the deck into various categories. The object of “Guess My Rule” is for you to try to reason out which rule card I am holding. We will put the playing cards in the center of the table, and you will each take turns picking one card. If the card you’ve picked fits my rule, I will say “yes,” and you can put it in the yarn circle. If the card you’ve picked doesn’t fit my rule, I will say “no,” and you can put it outside the yarn circle. Each person can only pick one card at a each turn. Once you’ve found a couple of cards that fit the rule you can try to reason out what my rule is, but you can only try to guess my rule when it is your turn to pick a card.

(The teacher takes one group and plays one simple round with the teacher a rule card holder. The other students gather around to each.)

As you can see, this is a game that requires reasoning and some very careful thinking. Many of the things you will be doing at learning stations will require reasoning and thinking. When people have such a difficult problem to solve, one thing they can do is **find out what others think**.

We are going to practice **finding out what others think**. When it is your turn and you have an idea what the rule is, ask the two other players in your group what they think about your idea. You might say, “I think the rule is all blue shapes. Do you think that’s the rule?” If they say yes or no, ask them to **tell why by giving reasons** they think that. After you listen to what they say or if they don’t know, ask the other person the same questions, then make your own decision about what you think is the rule and ask the rule card holder.

Discussion

Have the students practice asking each other what they think and why they think so. Discuss with them why it is important to try to tell why. This is an important new skill. The third rule is also important preparation for working at learning stations. Because each student is responsible for his or her own report, it is important that all the students feel responsible for making their own decisions about what to do after consulting others.

All of these new behaviors ***Find out what others think and Tell why by giving reasons***) should be printed on a chart and prominently displayed.

As in the previous skillbuilder, there should be an observer. The two behaviors an observer can hear and see are:

- ***Finding out what others think***
- ***Telling why by giving reasons***

The person who is the observer should have a simple check sheet parallel to the one for Master Designer, but with the new behaviors on it.

You are now ready to have each group play the game and take turns with the various roles. One person is the rule card holder, one is the observer, and the other three are players. After each round, other group members get to be rule card holder and observer. The new rule card holder picks up a new card from the deck, which is face down.

After the game, have the observer's report how many times they say the new behaviors on the round they scored. Ask the students to discuss whether or not it was helpful to them to get other people's opinions. See if you can pick up some good examples of students telling "why" if they don't come up with these themselves. Have them comment on what it is to hear opinions different from one's own and to have to consider those ideas before making up one's own mind. Ask them if they know of any other situations that is like this. Point out that they will have to do this at the learning stations.

EPSTEIN'S FOUR-STAGE ROCKET

Pretest:

Explain to the class that in order to prepare for the group work they need to learn what it takes to have a good group discussion. Divide the class into five person groups. Give the groups a highly interesting task to discuss. (Two sample discussion tasks are given after this discussion.) The teacher circulates, listening, observing, and taking notes on examples of good and bad discussion technique. The groups are allowed to discuss for five minutes.

Practicing the four stages:

After the pretest, hold a group discussion on what makes for good discussion and what the barriers are. Tell the class that they are going to practice four skills that are necessary so that a discussion can take off like a rocket (use an illustration of a rocket with four stages) by following the instructions given below.

Stage I: Conciseness-"Getting quickly to the point and not beating around the bush." Select a timekeeper who will watch the clock and keep time for the group. Keep on discussing the subject for five minutes. The timekeeper makes sure that each person talks for only fifteen seconds.

Stage II: Listening-"***Paying attention to what is being said.***" Select a new timekeeper. Keep on discussing the same subject for five more minutes, again making sure that each person talks for only fifteen seconds. This time, however, each person must wait three seconds after the person before has spoken before he or she may speak.

Stage III: Reflecting-"Repeating out loud to the group something of what the person before you has said." Select a new timekeeper. Keep on discussing the same subject, making sure that each person talks for only fifteen seconds and that he or she waits three seconds after the person before has spoken before he or she speaks. In addition, everyone who speaks must begin by repeating to the group something that was said by the person who spoke immediately before. This is called reflecting. The person who had spoken before has to nod his or her head to mean yes if he or she thinks this reflection is right. The new speaker may not continue until he or she correctly reflects what the person before has said.

Stage IV: Everyone contributes-"All the people in the group have to speak." Select a new timekeeper. Keep on discussing the same subject for five more minutes. All previous rules apply, as well as a new one. No one may speak a second time until everyone in the group has spoken.

After each stage ask each timekeeper to report on how well their group did on the skill being practiced. The timekeeper may have other observations to make about how difficult it was and what happened. Remind the class why each skill is important.

Posttest Select a person as observer who has not yet had a chance to play a role like timekeeper. Hold five more minutes of discussion without having to observe the rules but trying to use the skills of conciseness, listening, reflecting, and contributions by everyone. Observers will note down every time they see good examples of each of these behaviors. You may want to create a scoring sheet. After the posttest, ask observers to tell what they observed. Also ask the whole class what were some of the differences between the pretest and the posttest. Note: Unless the class has had some previous experience with discussion, you will find that they will finish discussion tasks very rapidly. You will need to have alternative questions or tasks prepared.

Tasks to Discuss:

SPACESHIP

The object of this activity is to select seven persons to go into a spaceship for a voyage to a new planet. You have just been alerted that a giant meteor is on collision course with the planet earth and will smash into the general area of the United States. Therefore, it is very likely the end of human civilization as we know it. The spaceship has the capacity to set up life on a new planet. Eleven persons have been chosen by lot to go on the ship; however, an error was made, and now it turns out that there is only room for seven. Your group must decide which seven persons will go to start life on the new planet. Remember, only seven persons can fit in the ship. You must have an agreement of the entire group before a selection can be made.

1. A 30-year-old male symphony orchestra violin player.
2. A 67-year-old male minister
3. A 23-year-old engineer and his 21-year-old wife (they refuse to be separated)
4. A 40-year-old policeman who refuses to be separated from his gun

5. A male student of your own age from your school
6. A 35-year-old male high school dropout, recently arrested for armed robbery
7. A 32-year-old female sixth-grade teacher
8. A 40-year-old female doctor (medical)
9. A 50-year-old female artist and sculptor
10. A 25-year-old male poet
11. A 1-year-old female child

ALLIGATOR RIVER

Once there was a girl named Abigail who was in love with a boy named Gregory. Gregory had an unfortunate accident and broke his glasses. Abigail, being a true friend, volunteered to take them to be repaired. But the repair shop was across the river, and during a flash flood the bridge was washed away. Poor Gregory could see nothing without his glasses, so Abigail was desperate to get across the river to the repair shop. While she was standing forlornly on the bank of the river, clutching the broken glasses in her hand, a boy named Sinbad glided by in a rowboat. She asked Sinbad if he would take her across. He agreed on the condition that while she was having the glasses repaired, she would go to a nearby store and steal a transistor radio that he had been wanting. Abigail refused to do this and went to see a friend named Ivan who had a boat. When Abigail told Ivan her problem, he said he was too busy to help her out and didn't want to become involved. Abigail, feeling that she had no other choice, returned to Sinbad and told him she would agree to his plan. When Abigail returned the repaired glasses to Gregory, she told him what she had had to do. Gregory was so mad at what she had done he told her that he never wanted to see her again. Abigail, upset, turned to Slug with her tale of woe. Slug was so sorry for Abigail that he promised her he would get even with Gregory. They went to the school playground where Gregory was playing ball and Abigail watched happily while Slug beat Gregory up and broke his new glasses.

Rank these characters from "best" to "worst" Abigail, Gregory, Sinbad, Ivan, Slug. Give reasons for your decisions.

Appendix B- Data Collection Instruments**Classroom lesson presented before and after intervention****Duck**

In DUCK, students share knowledge on a topic and learn more about that topic their peers.

Set up: Small groups

Subjects: Any

Materials: Sticky Notes, DUCK Station

Procedure:

1. At the beginning of or during a unit of study, the teacher chooses a topic for students to share knowledge on and read a short text on the subject as a group.
2. Form small groups, provide 4 sticky notes and DUCK instruction sheet.
3. Groups complete the DUCK activity, following the direction on the page.
4. Afterwards, two small groups join together to discuss. Any knowledge gained is written in the K section on activity sheet.

U
We both understand...

D
We discussed...



Topic: _____

K
Knowledge from
another group:

C
We're curious about...

Survey #1
Student Small Group Work Survey

Name _____

Please mark an "X" on the line to the left of the choice that is most like how you feel about each question. Remember, this is not a test. There are no right answers. I want to know what you think.

1. How many times did you have a chance to talk during our small group work today?

- _____ a. None
- _____ b. one to two times
- _____ c. three to four times
- _____ d. five or more times

2. If you talked less than you wanted to, what were the main reasons?

- _____ a. I felt afraid to give my opinion.
- _____ b. Somebody else interrupted me.
- _____ c. I was not given the chance to give my opinion.
- _____ d. I talked as much as I wanted to.
- _____ e. Nobody paid attention to what I said.
- _____ f. I was not interested in the problem.
- _____ g. I was not feeling well today.

3. Did you get along with everybody in your group?

- _____ a. With a few of them
- _____ b. With half of them
- _____ c. With most of them
- _____ d. With all of them
- _____ e. With none of them

4. How many students listened to each other's ideas?

- _____ a. Only a few of them
- _____ b. Half of them
- _____ c. Most of them
- _____ d. All of them, except 1
- _____ e. All of them

5. How many times did members of your group praise each other for good ideas or suggestions?

- _____ a. None
- _____ b. one to two times
- _____ c. three to four times
- _____ d. five or more times

6. Do you feel like you are an important member of your group?

- _____ a. yes, very much
- _____ b. yes
- _____ c. kind of
- _____ d. not really
- _____ e. no
- _____ f. no, not at all

Survey #2

Student Group Assessment Survey

1. What are three ways your group did well in working together today?
 - 1.
 - 2.
 - 3.
2. What problems did you have in working together?
3. What could you do to help your group work together *even better* next time?
4. What is one thing you learned from the your group that you probably would not have learned on your own?
5. What is one thing your group learned from you that they probably would not have learned without you?

Appendix B- Data Collection Scoring Rubrics**Survey #1****Student Small Group Work Survey Rubric**

Student name _____

Circle points according to survey

1. How many times did you have a chance to talk during our small group work today?

- | | |
|----------|------------------------|
| 0 points | a. None |
| 1 points | b. one to two times |
| 2 points | c. three to four times |
| 3 points | d. five or more times |

2. If you talked less than you wanted to, what were the main reasons?

- | | |
|----------|---|
| 0 points | a. I felt afraid to give my opinion. |
| 0 points | b. Somebody else interrupted me. |
| 0 points | c. I was not given the chance to give my opinion. |
| 4 points | d. I talked as much as I wanted to. |
| 0 points | e. Nobody paid attention to what I said. |
| 0 points | f. I was not interested in the problem. |
| 0 points | g. I was not feeling well today. |

3. Did you get along with everybody in your group?

- | | |
|----------|-----------------------|
| 1 point | a. With a few of them |
| 2 points | b. With half of them |
| 3 points | c. With most of them |
| 4 points | d. With all of them |
| 0 points | e. With none of them |

4. How many students listened to each other's ideas?

- | | |
|----------|--------------------------|
| 0 points | a. Only a few of them |
| 1 point | b. Half of them |
| 2 points | c. Most of them |
| 3 points | d. All of them, except 1 |
| 4 points | e. All of them |

5. How many times did members of your group praised each other for good ideas or suggestions?

- | | |
|----------|------------------------|
| 0 points | a. None |
| 1 point | b. one to two times |
| 2 points | c. three to four times |
| 3 points | d. five or more times |

6. Do you feel like you are an important member of your group?

- | | |
|----------|-------------------|
| 5 points | a. yes, very much |
| 3 points | b. yes |
| 1 point | c. kind of |
| 0 points | d. not really |
| 0 point | e. no |
| 0 points | f. no, not at all |

_____ Combined Score

Teacher Group Work Checklist Rubric

Scoring given:

- 3- Frequently observed
- 2- Sometimes observed
- 1- Rarely observed
- 0- Never observed

Exhibits attentiveness	_____ combined score
Shares the workload	_____ combined score
Paraphrases/elaborates others' ideas and opinions	_____ combined score
Contributes ideas and opinions	_____ combined score
Clarifies ideas	_____ combined score
Listens to others	_____ combined score
Encourages other members of the group	_____ combined score
Asks relevant questions	_____ combined score
Stays on task	_____ combined score
Helps to keep the group work focused and on task	_____ combined score
Reflects on progress	_____ combined score
Summarizes ideas	_____ combined score
Takes on various roles in the group as needed or assigned	_____ combined score
Take time to ensure that they all understand the task	_____ combined score

_____ all scores combined

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