

Cooperative Learning &
Mathematics



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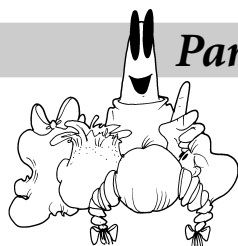
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Table of Structures



Lessons

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19, 20, 21	•	<i>Categorising</i>
2, 5, 13, 14, 15, 20	•	<i>Co-op Co-op</i>
7, 9, 14, 17, 18, 21	•	<i>Corners</i>
1, 9, 15, 17, 18, 19	•	<i>Direct Instruction</i>
7, 8, 9, 20	•	<i>Formations</i>
2, 3, 4, 5, 6, 9, 11, 13, 14, 15, 16, 17, 19, 20	•	<i>Group Discussion</i>

Lessons

9	•	<i>Inside-Outside Circle</i>
4, 10, 15	•	<i>Line-Ups</i>
19, 20	•	<i>Modelling</i>
1, 2, 3, 7, 11, 12, 16, 18, 19, 21, 23	•	<i>Numbered Heads Together</i>
1, 2, 8, 11, 17, 22, 23	•	<i>Pairs Check</i>
11, 13, 14	•	<i>RoundRobin</i>
2, 6, 9, 10, 11, 14, 18, 19	•	<i>RoundTable</i>
3, 11, 15, 21, 22, 23	•	<i>Send-A-Problem</i>

Lessons

19	•	<i>Similarity Groups</i>
6, 20	•	<i>Simultaneous Sharing</i>
1, 3, 4, 5, 6, 7, 8, 9, 10, 12, 16, 17, 18, 19, 21, 22	•	<i>Team Project</i>
4, 5, 7, 9, 10, 12, 16, 17, 18, 22, 23	•	<i>Think-Pair-Share</i>
	•	<i>Three-Step Interview</i>
1, 8, 9, 12	•	<i>Trade-A-Problem</i>
8, 9, 15, 21	•	<i>Two-Box Induction</i>
13	•	<i>Value Lines</i>

Part I



Cooperative Learning Structures

The following section identifies each of the Cooperative Learning structures used in this book. Each structure contains a brief description, the steps to follow, any variations and/or cautions, and ideas specific to maths.

The brief description gives an overview of the structure and its usefulness in the classroom. The structures can be grouped according to their predominant use: Classbuilding, Concept Development, Cooperative Projects and Practice.

Classbuilding

Classbuilding structures promote networking among all the students in a class and create a positive context in which teams can learn. Classbuilding structures used in this book are:

Corners

Formations

Inside-Outside Circle

Line-ups and Value Lines

Similarity Grouping

Concept Development

Concept Development structures provide the opportunity for students to create and exchange unique, novel ideas to low consensus questions. Concept Development structures used in this book are:

Brainstorming

Categorising

Group Discussion

Think-Pair-Share

Three-Step Interview

Two-Box Induction

Cooperative Projects

Cooperative Projects involve task specialisation within and between teams. Each student makes a unique contribution to the team and each team makes a unique contribution to the class. Cooperative Project structures used in this book are:

Co-op Co-op

Team Project

Practice

Practice structures help students develop mastery of academic content. These structures are useful in dealing with high consensus materials, such as knowledge and comprehension. Practice structures used in this book are:

Numbered Heads Together

Pairs Check

RoundTable/RoundRobin

Send-A-Problem

Trade-A-Problem

Simultaneous Sharing

It is highly recommended that teachers incorporate Simultaneous Sharing of team ideas and responses as much as possible. Simultaneous Sharing provides a time efficient mode of student response and a large variety of ideas are

made available to all students. Another benefit of Simultaneous Sharing is the large amount of student involvement and interaction in comparison to the mode of sharing when the teacher calls on one student at a time. Simultaneous Sharing structures used in this book are:

Blackboard Share

Carbon Sharing

Carousel Share

Class Notebooks

Gallery Tour

Roam the Room

Stand Up and Share

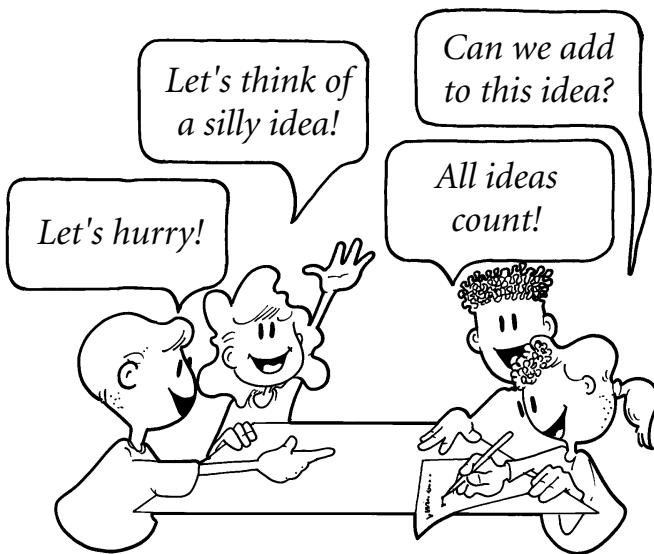
Teams Consult

Teams Tour

The steps to follow are listed under each structure. It is important for the teacher to preview the steps in order to give clear directions to the students.

Variations or cautions are included for some of the structures. These are special hints that come in handy while using the particular structure. For example, when using Three-Step Interview, it is important to have the students proceed step-by-step through the structure as a class, rather than racing through on their own time schedule.

Brainstorming



You can find **Brainstorming** in Lessons 14, 15, 20

Steps

- 1 The teacher assigns roles based on the 4-S's of Brainstorming. The roles and some things that students might say in the roles are:
 - Speed
"Let's hurry."
"Quick! More ideas!"
 - Suspend Judgement
"All ideas are great."
"Another fantastic idea."
 - Silly
"Let's have some crazy ideas."
 - Synergy
"Let's have some ideas like that!"
"Let's change that to..."
- 2 The teacher assigns a Recorder who will write each response on a different piece of paper (to facilitate sorting later).
- 3 The teacher announces the topic and the students begin.

Brainstorming encourages creativity and allows for collecting many possible answers. The team throws out as many ideas as possible while a recorder records each idea on a small piece of paper. An effective form of Brainstorming includes roles being assigned to each team member. The roles correlate to the four S's of Brainstorming.

Speed—work fast, under time pressure, to come up with as many ideas as possible. The team member assigned this role would say such things as, “We only have one minute left. Let’s hurry! Let’s get quicker with our responses.”

Suspend Judgement—no evaluation of ideas. The team member assigned this role would say such things as, “All ideas count. Let’s not talk about the ideas now.”

Silly—all ideas are relevant and are included. The team member assigned this role would say such things as, “Let’s think of some silly ideas.”

Synergy—to build on other ideas. The team member assigned this role would say such things as, “What other ideas does that give you? Review the list to help you think of other ideas.”

Recorder—to record the ideas as quickly as possible, each idea on a separate piece of paper. Assigning this job to the Speed Captain or the Suspend Judgement Captain facilitates the Brainstorming.

Variations

RoundTable Record

Rather than have only one member on the team be the recorder, have the team Roundtable Record. Using the small pieces of paper in the centre of the table each person, in turn, records an idea. Continue for several rounds.

Think-Pad Brainstorming

Rather than placing the paper for recording in the centre of the team, each team member is given a set number of pieces of paper. The teacher announces the topic and the number of responses for each round. Each student responds to the topic and puts his or her responses in the centre of the team.

Class Brainstorming

Class Brainstorming allows the whole class to participate in the brainstorming sessions. This is especially helpful in the primary years when the students are not independent writers. It can be left unstructured so that anyone responds at any time. To help elicit responses from all students, set a series of time periods up with only certain team members responding during those time periods. For example, for the first minute only team member #1’s can respond, the second minute only team member #2’s, the third minute only team member #3’s, and the fourth minute only team member #4’s.

Brainstorming



Brainstorming

Activities

1. Statistics

Brainstorm topics for a survey.

2. Statistics

Brainstorm titles for a graph.

3. Estimation

Brainstorm ways to use estimation.

4. Measurement

Brainstorm items to measure.

5. Measurement

Brainstorm reasons to measure the area or perimeter of objects.

6. Number Sense

Brainstorm as many ways as possible to express the number 6.

Example: $5 + 1$, $18 \div 3$, 3 sets of ears, 1 hand plus a thumb.

7. Geometry

Brainstorm a list of objects which are rectangular solids (spheres, cubes or cylinders).

8. Algebra

Brainstorm equations.

9. Logic

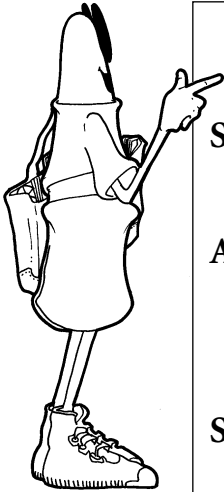
Brainstorm items to categorise.

10. Patterns

Brainstorm patterns (AB, ABBA, ABC, etc.) to construct with concrete objects.

Zoo Animal Survey

Years P-1



Lesson-At-A-Glance

Strand:

Statistics

Academic Skills:

- Collect data through a survey
- Construct a graph
- Analyse and interpret a graph

Structures:

- **Value Lines**
- **RoundRobin**
- **Group Discussion**
- **Co-op Co-op**

Materials:

- Zoo Animal Survey handout—1 per student
- Chart paper—1 per group
- Yellow and blue crayons—1 each per student
- Glue or paste
- Scissors—1 per student
- Yes/No Response Cards handout—1 each per student

Time:

Two maths periods

Lesson Sequence

1 Line up by agreement/ disagreement to a statement using **Value Lines**

Give each student one Yes card (happy face) and one No card (sad face). Tell the students that you are going to make a statement and they are going to choose one of the cards to show how they feel about the statement.

The statement will be about pets. Have the class name some animals which are good pets. List the choices on the board. For example, dog, cat, bird, fish, snake, etc. Make the statement, “The best pet is a cat!” Have each student pick up a card which shows how they feel about the statement. Have the students holding **Yes** cards line up in one line and those holding **No** cards in another line.

Tell the students to think about why they feel the way they do. Have them find a partner in their line and share their feelings about the statement. Choose a student from each line to share with the whole class.

Compare the two lines by having the students answer the following questions or ones similar to these:

1. How many students said yes?
2. How many students said no?

3. How many more students in this line than that?
4. How many girls said yes?

Have the students return to their seats for a new statement. Follow all of the above steps for a second line up in a new category. Sample statements could be:

1. Your favourite fruit is the banana.
2. The best subject in school is maths.
3. The best day of the week is Saturday.
4. The prettiest colour is blue.

When the second line up is finished, explain to the students that it was easy to see how everyone in the room felt about the statements because they could actually line up. Sometimes you want information from other people who cannot be here, so we ask them a question and record their answers on paper. Then we can make a graph of their answers. Explain that they will be asking friends and family members to answer a question about zoo animals.

2 Name zoo animals using *RoundRobin*

Have the students work in groups of four and take turns naming zoo animals. Have the groups contribute zoo animals named in the Roundrobin to be listed on the board.

3 Choose one zoo animal for a team survey using *Group Discussion*

Have each team discuss which animal they would like to use in the statement “Your favourite animal in the zoo is the _____.”

When each team has come to consensus on the animal, give each team member a

Zoo Animal Survey handout and have them complete the blanks.

4 Conduct a survey and graph the results using *Co-op Co-op*

For homework, each team member will ask five friends or family members to respond to the statement “Your favourite zoo animal is the _____” by writing their names under a yes or no symbol. The five people surveyed may not be members of the class.

The next day have each team member colour the signed symbols yellow for Yes and blue for No and cut them out. Team members discard the unsigned symbols. Give each team a piece of chart paper with the statement written at the top and Yes and No columns labelled at the bottom. Each team member will glue their responses in the appropriate column. Each team will report their results to the class.

- **Team member #1:** Total number of “Yes”
- **Team member #2:** Total number of “No”
- **Team member #3:** The difference between “Yes” and “No”
- **Team member #4:** Total number of girls surveyed



When all the students have completed their reports, the students could make up

Lesson 13

word problems to compare two of the graphs. Some examples are:

1. How many people altogether said “Yes” on graphs #3 and #4?
2. How many more people said “No” on graph #5 than on graph #2?
3. How many people in all said monkeys and giraffes were their favourite animals at the zoo?

Individual Accountability

Ask each student to answer questions about a new graph the class has constructed. **Examples:**

1. Did more children choose milk or orange juice as the drink they like better?
2. How many children chose milk?
3. How many more children chose orange juice than milk?

Lesson 13