Silent Squares

Group Cooperation, Systems Principles, Interdependence, and Universality

Overview

This activity is a variation of "Broken Squares," an activity developed at the Stanford University School of Education in the Program for Complex Instruction. That version primarily emphasizes the development of norms for classroom behavior and to build students' cooperative learning/working skills. Silent Squares emphasizes this outcome but extends the activity to facilitate students' discovery and development of a variety of systems principles with universal applications.

This activity is highly constructivist in design. Students are introduced to the activity as simply a fun game, a game that they can learn from. Systems principles and understanding of interdependence emerges from students' reflection on their experience in the game.

Topics

- Ethics, values, community behavior, cooperation vs. competition
- Interdependence between elements within a system
- Universal principles that govern many systems

Big Ideas

- Isomorphic relationships—process and function aspects of elements in one system can correspond to or be the same as the process and function aspects of different elements within an entirely different system.
- Universal principles that govern success of systems generally, an important idea socially, that things that appear different on the outside actually have much in common, e.g. the different cultures, races, religions share a common humanity, love of family and physical needs.
- Pay attention to other's need first, and your needs will be met, i.e. your self-interest will be served by serving others' self interest.

Contexts for Use

- As a prelude for any lesson or activity where students work in cooperative groups.
- To establish systems principles for lessons that build on those ideas.

Grade level: adaptable for grades 2-12,

Objectives

Activity/Strategic

- Perform a game with follow-up reflection to establish systems principles.
- Create foundational understanding of systems for application to all study.

Student Learning

- Definition of a system, and principles for sustainable system functioning
- Development of cooperative group norms and skills
- Introductory level understanding of the big ideas stated above.

Preparation: Prerequisites and materials

- Create envelopes with puzzle pieces for teams of four in the class. Cut out templates. Each envelope should have all the pieces from one 4-square template. Each group of 4 students will receive one envelope.

- No prerequisites

Process

Part 1: Playing the Game

1. Introduction to students
   Explain to students:
   "Today we are going to play a game. The purpose of this game is to have fun of course, but we are going to get more than fun from the game. The game has some very interesting and important ideas to teach is about how the world works.

   Our game is what we call a "simulation" of something in the real world. Do you know what a simulation is? <<discuss>>
   A simulation is like a model. What is a model? <<discuss>>

   We will learn about something called "systems thinking," but you don't have to worry about that right now. We will use some of the terms, but they are just part of the game. We will learn what the words mean after we play when we think about how we played the game and what happened. Right now, don't worry about any of that, just pay attention to what happens and have fun!"

2. Various parts of the game represent some systems concepts as shown below. Explain to students that you will call them "elements" (they don't need to know the meaning of the word, its just part of the game, its what you're calling them), that the puzzle pieces represent energy, matter and/or information, and that their team is going to be called a "system."

Game		Systems Term
Puzzle piece	⟷	energy, matter or information
Player (student)	⟷	element
Team	⟷	system

3. Pass out envelopes, one to each group.
4. Students open envelopes on cue and distribute pieces, all like letters to each person. Each player should each have 3 pieces. Note that the letters have no role in the game other than to distribute the pieces. Letters must remain face up during the game however.
5. Students need to pass pieces to each other as necessary to achieve the goal stated below. Note that using the word "trade" implies a dynamic that is not accurate, i.e. that when a piece is given another must be given in return. The game proceeds with students (elements) passing pieces to each other until success is achieved.

Goal for system success: Each element of the system must have their own perfect square created from the pieces.

Game Rules:
1. **Silence, no talking**
2. **No pointing or other hand signals (no footsies, no blinking codes, etc.)**
3. **Each player puts together his or her own square**
4. **No taking, only giving, <u>one piece at a time</u>**

Students are not competing with other groups (systems).
The only advice you should give is the guideline:

NO ONE IS DONE UNTIL EVERYONE IS DONE

Resist giving any advice beyond this guideline initially!! It is extremely important not to do their learning for them. Let them struggle. They will eventually discover what they need to do to reach success, and these actions and strategies will be the focus of the debriefing and reflection. Depending on the ability or grade level you are working with you can make modifications.

Modifications for K-3:
1. Use squares with only two pieces.
2. Provide more support and advice during the process
3. Modify debrief questions—make them very simple and related to the experience

Part 2: Debrief and Development of the Big Ideas

The debrief process is critical to reaching the understanding of the big ideas that can transfer to subsequent units. Follow it as closely as possible.

Step 1. Brainstorm/observation List #1
Explain to students:
"Now we are going to capture our experience from the game and learn what it has to teach us. Let's make a list. I want you all to just reflect on what just happened in the game. What did you experience?
Ask the students:

What actions did elements take that caused your system to fail?

(If that feels too negative, you can emphasize what caused success, but often the failure approach elicits more responses).

Create a list on the board. It should look something like this:

The system will fail if elements:
- don't trade enough
- don't have enough pieces (energy/matter/information)
- keep more than they need
- don't notice the needs of others
- quit playing or give up
- don't think, lack skill or ability
- give too much
- give away what they need themselves
- give pieces that other elements don't need
- become self absorbed or selfish

Step 2. Define a system:

Explain to students that we haven't really defined a system yet, so we'll use a simple definition to get started. Write it on the board. Explain that the word "elements" can be just thought of as "things," and "interact" means to "act between," and goals are tendencies—they are what the elements want to do.

SYSTEM: A group of elements that interact with goals.

Step 3. Brainstorm List #2—examples of systems

Make a list, next to the brainstorm list #1, of things, groups, etc. in the world that would fit the definition of a system as it was just given. Students may be hesitant at first, but once they get going it's hard to stop them, it can turn into a fun game itself. Just spend a few minutes on this to get a list of about 15 or so. An example of a systems example list is shown below:

Science	Solar system	Talking
Climate	Water cycle	Muscles
Electricity	Web of life	Clubs
Computers	Eco system	The NY Jets
Phone company	Trains	Military
Human body	Busses	Cells
Nervous system	Relationships	Laws/government
Nations	Sewage	Families
Money	music	Our school
Our classroom	Our town	The school district
The cafeteria		And…

Step 4. Apply squares principles to systems of the world

Now comes the key moment of the entire lesson. Pose the pivotal question:

Do the actions for system success and failure that we observed in Silent Squares apply to the success and/or failure of all the systems on our list?

Students will vary in their response, and initially many won't quite know how to approach the question. GIVE THE QUESTION SOME HANG TIME!! Whatever you do, don't rush this.

Choose a particular system and put it to the test to see if it fits the systems principles from Silent Squares. Identify the elements of the system, and make analogies. (eg. The elements of our classroom are books, desks, the students, materials, the teacher, etc.) Point out that the word "element" is a general term. In this analysis the elements of the chosen system correspond to the players of the game. Lead to the general conclusions:

- **We discovered that many different systems in the world share some of the same rules (or "guidelines") for success. Many of these rules are the same rules we discovered for Silent Squares!**
- **We learned about how thousands of systems work (our list) in just one lesson.**
- **When we learn about things from a systems point of view, we learn something about how all things work.**

The above ideas are core understandings of isomorphism

Step 5. Apply the systems principles to the Strongest Tree and Biography of a Tomato, or use the principles as themes through the year for many other applications.