



Systems, Subsystems, Components and Influence

Goal: Students will understand the terms system, subsystem, component and influence and how they relate to each other.

Objectives: Students will...

- Identify a variety of systems they are familiar with.
- Develop a working understanding of the terms systems, subsystems, components, and influence

Materials (for a class of 30):

- 1 timing watch with second hand

Time Required: 1 – 45-60 minute class period

Standards Met: G3, G4, S3, S4, S5

Procedure:

IN CLASS

- Write the following definitions on the front board, an overhead transparency, or project them onto a computer whiteboard or projection screen.
 - System – a group of objects that are working together and have influence over each other.
 - Subsystem – two objects within a system that have direct influence on each other.
 - Component – any one part of the system.
 - Influence – to change or affect something in some way.
- Show how these terms relate to several common objects that the students can relate to in their lives. Try to use a variety of examples (see below).
 - A bicycle is a system (a group of objects that are working together), a subsystem of this system would be the tire and the rim (they directly influence (touch) each other – the pedals and the tire would not be a subsystem because they do not have direct influence (touch) on each other), a component of this system would be the handle bars (one part of

- the system), and what the system influences would be the speed at which the rider can get from point A to point B.
- The human eye is a system, a subsystem would be the retina and the optic nerve, a component would be the iris, and the eye influences an individual's perception of light and images.
 - Our democratic government would be a system, a subsystem would be U.S. Senators and lobbyists, a component would be the House of Representatives, and what it influences would be the liberties and rights of the people.
 - The school is a system, a subsystem would be the teachers and the students, a component would be math class, and what it influences is the ability of students to socialize with their friends.
- Explain to the students that they are going to play a game that will reinforce their understanding of these four terms.
 - Tell them that you are going to start the game by selecting one person at random within the classroom. That person must give you an example of a system. The person in the next seat must give a subsystem of the system that the first person has given, the third person in order must give a component of that system, and the fourth person must tell what that system influences. The next person repeats the process by giving a different system. There are several rules of the game that must be followed:
 - Each person has 30 seconds to give a correct answer...they may answer as many times as they wish during that time interval to come up with a correct response.
 - If a person cannot come up with a correct response within the time limit, they are eliminated from the game and the next person in order must answer the same question within a 30 second time limit.
 - The component cannot be part of the subsystem that was given.
 - Correct terminology must be used for all parts of systems (the students are not allowed to say things like "the object that connects to the thing.")
 - You will want to limit the use of parts like nuts, screws and bolts for mechanical devices and cords and wires for electrical devices.
 - If a student picks a system that no one can list a subsystem for, the student that named that system must come up with a subsystem to win the game otherwise the students that were eliminated by that system are back in the game and the person who gave the system is eliminated.
 - The game ends when only one student is remaining or until you get down to a predetermined number of students who are still in the game.
 - If time permits, play a second round of the game. The students will have a better understanding of the terms after the first round is over, and it will be very difficult to eliminate them during the second round.
 - Come up with some type of prizes for the students that remain in the game – no homework passes, extra credit points, etc.