U1L11 - Packets Unplugged Activity

Synopsis

This activity simulates issues of packets traveling on the internet with a paper-passing activity:
- Students pass pieces of paper (post its?) with writing on them to another student in the class
- Students cannot move from their seat - they only pass to someone within reach
- Teacher might provide some “interference” by grabbing post-its in transit and delaying or destroying them.

Setup

- Arm’s Length - Students cannot move during this, so each student needs to be within an arm’s length of at least one or two other students.
- Make an “H” - Cluster students in an “H”-like configuration - create two large groupings on different sides of the room. Place only a few students between the groupings that can “connect” one side of the room to the other.
- Addresses - Each student needs to have an “address” - the diagram at right shows students sitting at numbered tables, with each position at the table numbered as well. A student’s address can be [table number].[other number]. For example a student sitting at Table 1 might have the address 1.4. (It doesn’t matter what the other number is - you don’t have to use numbered positions as in the diagram - as long as it’s a number)
  - NON-TABLE ALTERNATIVES: if you don’t have tables to use, you can simply have students stand in this configuration. Drop pieces of paper on the ground with numbers and have students cluster around them.

Running the activity

Getting Started

- Ask students to make a simple drawing, or write a handwritten message on a piece of paper.
- Say: “You have just made a message that you are going to send to someone else on the other side of the room. However, we’re going to imagine that it’s too big to send all at once. So tear it into a few pieces (4 is fine)”
- Ask students to look across the room to find a partner - they can point at or make eye contact with someone. (Students in the middle should find partners who aren’t at the middle table)
- Once each student has a partner, ask students to tell their partner their IP address.
- Students should write their partner’s IP address on each piece of paper that makes up their drawing, clearly indicating that it is going to that address. For example “To: 4.2”.

Explain the Rules:

Goal: You are going to try to send your drawing to your partner across the room, and also to receive and re-construct your partner’s drawing.

- No moving - You may not move from your current position.
- Only one piece at a time - You may hand one (and only one) piece of paper at a time to any person who is within arm’s reach. You can’t pass a handful of paper to anyone.
● **Forward messages to destination** - If you receive a piece of paper that is not for you, you should hand it to someone who can get it closer to its intended destination. (This should be possible since the address has a table number on it. You may want to re-establish where each table is).

● **Collect all your pieces and reconstruct the drawing** - You are looking for pieces of paper with your address on it, and once you have them all to reconstruct the drawing your partner sent you.

● **Start and stop on my command** - When I say “GO” everyone start passing pieces of paper. And stop when I call “STOP”

**Ready, Set, GO!**

Call “GO”

There will probably be enough “traffic” going around for issues of delayed packets and dropped packets to emerge. But if you want to force the issue you can try a few of the following:

- As students are passing paper, teacher can participate or try to interfere by delaying and occasionally destroying pieces of paper.
- Teacher may also prepare a different drawing to send to one student, just to introduce some confusion.

Calling “STOP”

- You should ensure that at least one student was able to receive and reconstruct the image before calling STOP.
- 5 minutes is probably more than enough time for this paper-passing portion.

**Debrief**

Have brief discussion to bring out some of the things that happened during the activity especially to make connections to using the internet simulator.

**Questions:**

- For a student who was able to get the whole drawing - did the pieces of paper come to you in order? (Probably not) Why not?
- How did you know how to reconstruct the message or image? (if it was a drawing, the correct order was probably pretty obvious, but what if your message was a word like “dear”, which could also be reconstructed as “read”? How do you know which word the sender intended?)
- Did anyone not get all the pieces intended for them? What happened?
  - Note: the internet can be unreliable this way - packets may get dropped because of over-congestion, nature (power outage, squirrel eats wire), or even malicious acts.
- What happened at the table in the middle - what was that like? (lots of congestion?)
- What do you think this has to do with the internet and how it works?

**Foreshadow problem for internet simulator:**

- The interesting question is: if you receive some but not all of the pieces of a message, what can you as the recipient do to fix it? What should the protocol be?

**Connections when you “plug it in”**

- You can set up the internet simulator with the same router numbers as in the unplugged activity.
- Students can use the same partner on the simulator as they did in the unplugged activity.