Re-purposing Technology Lesson Plan

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TE 831

Summary Box

Lesson title: Stories from Graphs using CBRs

Prepared by: Jennifer Heckman

Subject area: Mathematics

Technology used: Calculator-Based Ranger (CBR)

Length of lesson: 90 Minutes

Suggested grade level: 7th-9th grade

Lesson Objectives: *The student will be able to:*

-Recreate a graph by the students' movements and a CBR

-Write a story about a given graph

-Draw a graph given a story

Student NETS Standards Alignment:

-Student NETS 1a – Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Apply existing knowledge to generate new ideas, products, or processes

-Student NETS 3d - Students apply digital tools to gather, evaluate, and use information. Students will process data and report results.

Materials:

-CBRs
-TI-83 Calculators
-Overhead
-CBR presentation frame
-CBR activity packet with practice work

Lesson Procedure:

Before -

1. Students will work on the problem of the day. The problem of the day will include a story in which students will create a linear graph. (Nick is given $50

to spend on a vacation . He decides to spend $5 a day. The amount Nick has left and the number of days are related.) As the class goes over the answer, teacher will point out the labels and what the axes mean to the story.

2. Teacher will review the objectives and schedule for the day's lesson.

3. So what is a CBR? Teacher will introduce the CBR. The Calculator-Based Ranger collect distance, velocity, and acceleration data while connected directly to a TI graphing calculator.

4. Teacher will use "Stick Pick" app to form groups of 3 randomly. Each group will get a CBR and a calculator. Each person will get their own activity packet.

5. Read over how to set up the CBR. Tell students that every group with have a different graph on the calculator so remember to sketch that graph first.

During -

1. Students will go out into the hall and use the lockers as the "origin". Students will sketch their first graph and try to match the graph on the calculator using the CBR and having the student move towards and away from the locker.

2. Students will see how walking towards, away, left, right, standing still, and what speed does to change the graph.

3. Once students get close to matching the graph they will write down what movements were made to make the graph. Students will do this 4-6 times

4. Groups will then check with teacher summarizing what they have learned so far. If students are able to explain what movements and speeds to what, the students are ready to move on.

5. Students will then begin part II. Each group member will try to walk each story given to them. If a student makes a mistake, he/she should still draw it and make suggestions on what to do next time.

After -

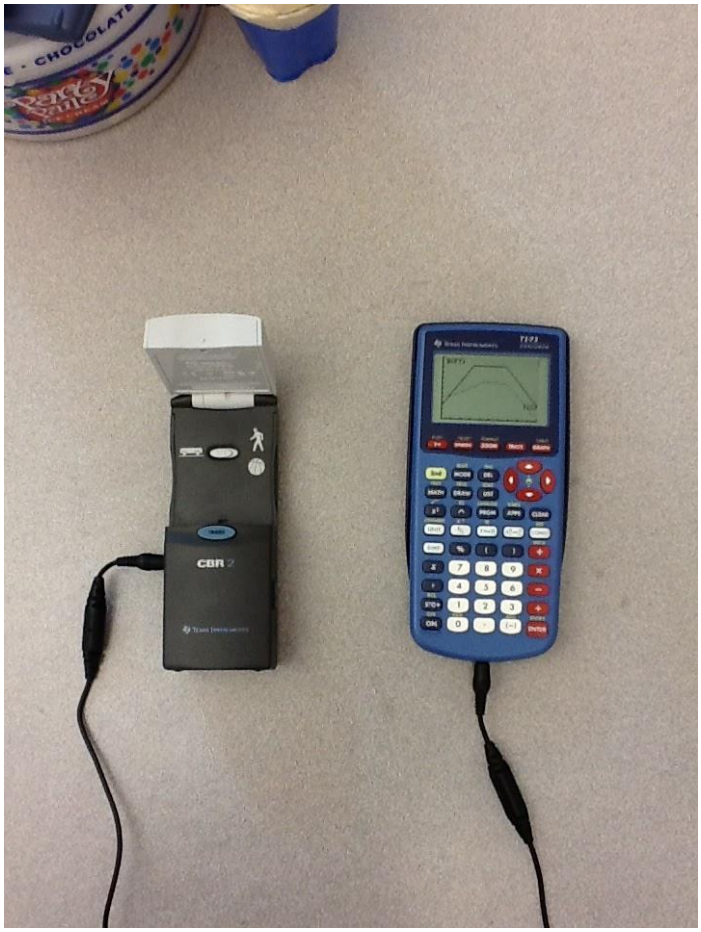
1. When students complete the activity, they can start on their practice work, parts III and IV, while waiting for other groups to finish.

2. Once all groups are finished with the activity, the class will do a wrap up by demonstrating what was concluded. Teacher will put a graph up on the overhead, using the CBR, Calculator, and the presentation frame. A student will

volunteer to verbalize and walk how to recreate the graph. Teacher will discuss and adjust any misconceptions students might have.

3. Ticket out: If you were given any graph could you make a story that describes what happens. How would make a horizontal line in a story?

Additional Resources:



CBR Activity Packet:
https://drive.google.com/a/jordandistrict.org/file/d/0B_A851wLohazc0V0bjJ1bktlZm8/edit?usp=sharing

Reflection

I completed my re-purposing technology lesson last week and my students loved it.

Towards the end of the year I am always getting down to the wire of fitting in the

curriculum I am supposed to teach. This then affects how I teach these concepts. I could

have taken the easy way and just told my students what means what. Instead, this

technology allowed students to experiment and discover what an increasing, decreasing, and a horizontal line means to a time and distance graph. Students walked through many trials with the CBR, discovering and making many mistakes, some being not holding the CBR still, trying to go in a circle, even trying to go "up hill" instead of walking away from an object. The CBR also gave the students a way to recollect. When reviewing for the final test, students were given a graph and they had to create a story to go with it. I was then able to help students by asking a simply question, "To get that line, what actions did you take with the CBR?" Students were able to answer the question quickly and correctly, which in turn made it easier for the students to come up with creative stories.

TPACK played a major role in my decision to use the CBRs. I decided to look at the content, pedagogical techniques, and what technology I could use best to teach my students. I already knew what content needed to be taught so the major decisions were how and with what. I decided I wanted to allow my students to do some hands-on discovery. Discovery grants for a more meaningful way to learn and understand. Knowing that students could go in the wrong direction or not even participate, I made sure not only to give beginning directions and have a check point where they can show me what they are learning, but stay on top of my classroom management skills to keep students on track. My choice of technology helped with the discovery and the classroom management. The CBRs create a unique way for students to pull graphs and stories together; students were physically able to "walk" a story which in turn helped them develop strategies to create their own stories. The CBRs helped with classroom management because the CBRs were brand new to the students so I had almost 100% engagement, students where learning a new concept and learning a new technology.

Some areas of constraints I ran into were when students figured it out quicker than others or the CBRs were not functioning well. I decided to have students check with me after the activity to make sure they hit every circumstance they could run into on a graph. The students did not get the same graph to copy on the CBR. The program creates a random graph; luckily I only had 1 or 2 groups that did not get to discover (in the same graph) how to "walk" two different slopes. In this case, at the check point I would ask the group questions to have them inquiry about how they would do this. Once I was positive that everyone in the group knew the key terms and actions, the group could continue on to their practice work. Another problem was, if a student was in the middle of a graph and somehow changed the screen on to a different screen, the student had to start all over on a new graph creating another random graph, not the same one.

I was surprised to see that after I did a small demonstration on how to start the program (and it was written on their activity packet), many students did not have trouble and kept on task. Students were also excited to present what they learned on the overhead during the wrap up of the activity. Hands went flying up to stand up in the front of class the make the graph that the CBR created for them. It was also interesting to hear the discussions of why students could not make an "O" or "N" with the CBR. Students kept saying "you can't go backwards." I had to ask them questions to extend that notion. "I can't walk backwards? What is the reason why the graph can't go backwards and vertical?" Students then came up with the notion they could not go back in time or be in multiple places at once. When students came up with this idea I had a big smile on my face knowing what they were going to explore next year with discrete and continuous lines. I am excited to tell the 9^{th} grade teachers to mention the CBRs when going over the

story and graph concepts. I know for most students a connection will click just by saying CBR activity.

Deciding to use discovery and the CBRs for this concept made it much more powerful than memorization. Technology seems to bring more excitement and engagement. Even the use of the "Stick Pick" app, randomly choosing names for groups at the beginning of this activity, had the student on the edge of their seats to find out who was going to be in their group. By using the CBRs, students got to see a piece of technology that they use almost every day, the calculator, being taken a step further. Many technologies, just like our brains, could be used for so much more than what we do with it now. The CBRs were useful with this activity but they can also be used in science classes, with velocity and acceleration data. This lesson opened my eyes in multiple ways, though students struggle with discovery techniques, students understand clearer in the end, and the use of technology makes class thrilling. Technology brings motivation to me and my students. This lesson has made me want to develop more understanding of what technologies can help my students learn and has made me develop more pedagogy techniques revolving around a student centered environment. Students learned so much with the lesson, not only about stories and graphs, but about new technology, or how much more an "old" technology can do. It is my goal next year to try to create more inquiry based activities with the use of new technology the students might not have used before.

Jennifer -
Your re-purposed lesson plan--on Stories from Graphs Using CBR's--

represents outstanding and exemplary work. It demonstrates knowledge of the content and technology. The lesson meets all the requirements, it is thoughtful, and it provides clear articulation of all parts of the lesson plan (i.e., summary box, lesson objectives, Student NETS standards, materials, procedures, and additional resources). The reflection section is clear, articulate, responsive to all prompts. The lesson's design indicates that your learning and understanding of self and student engagement/learning is active and clear. The project contains no errors in grammar, punctuation, and spelling. Sources are clearly cited and digital citizenship is exemplified in this lesson's design.

Rubric rating: 4.0
Total points: 300/300