THOMPSON RIVERS UNIVERSITY | Education & Social Work

Bachelor of Education (Elementary) & Bachelor of Education (Secondary) STEM Lesson Plan

Lesson Title: Fun with Data! - Data Detectives! Lesson # 2 Date: Feb.16th 2024

Name: Kyra Doehle Subject: Math Grade(s): 2

Rationale:

This lesson is important because it focuses on making learning about statistics super fun and engaging. By applying their prior learning about concrete graphs and data, students get to be creative and choose their own question to survey their classmates on, then construct their own pictograph using the data they collected. Students are given choice, creative freedom, and encouraged to collaborate, all of which will help contribute to a positive mathematical mindset.

Core Competencies:

Communication	Thinking	Personal & Social
I communicate purposefully, using forms and strategies I have practiced.	I can ask questions and consider options. I can use my observations, experience, and imagination to draw conclusions and make judgments.	

Big Ideas (Understand)

Concrete items can be represented, compared, and interpreted pictorially in graphs.

Learning Standards

(DO)	(KNOW)
Learning Standards - Curricular Competencies	Learning Standards - Content
- Represent mathematical ideas in concrete, pictorial, and symbolic forms. - Connect mathematical concepts to each other and to other areas and personal interests.	• pictorial representation of concrete graphs, using one-to-one correspondence

Instructional Objectives & Assessment

Instructional Objectives (students will be able to…)	Assessment
• Come up with an appropriate question they would like to explore. • Survey their classmates to collect data based on the question they chose. • Create a pictograph to represent the data they collected using tally marks. The pictograph will use one-to-one correspondence.	• Conversation: Speak with the students about why they chose to explore the data set they did. Speak with them about what they are using to represent their data in their pictograph. Get the students to explain their pictographs to you while they work. • Observation: Ensure that students are interacting with their peers appropriately. Ensure students are collecting their data properly.

	• **Product:** The product will be the pictographs the students hand in.

Prerequisite Concepts and Skills:

- A prior lesson on data and graphing where they learned what a concrete graph is and practiced creating a pictograph with the whole class. (one-to-one correspondence)
- Knowledge of what a tally mark is and how to use them.
- Ability to ask their peers questions and stay on task while conversing.
- Basic addition skills

Indigenous Connections/ First Peoples Principles of Learning:

- Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place)

This lesson is experiential because it gets students to explore and create their own data sets and then create a concrete graph based on the information they collected. They also get to learn more about their classmates as they must survey them to obtain their data sets. This will help build on connectedness and community in the classroom as every student must converse with every student to get a complete data set.

Universal Design for Learning (UDL):

- Provide the example pictograph from last class for reference.
- Allow students to be creative in the way they build their concrete graph (pictograph), such as using manipulatives, drawings, or other ideas students may have.
- Allow students to choose their own questions that they are interested in to graph so they can connect to the learning.
- Spend only a maximum of 7 minutes at a time on teacher-directed lecture, this lesson has many movement and sharing breaks.

Differentiate Instruction (DI):

- Allow the student to present their data set to you using verbal, visual, or hands-on explanations.
- Have a pre-written data set for the student to use to create their concrete graph if the classroom is too over-stimulating.

Materials and Resources

- The pictograph compiled last lesson.
- Materials to create graphs.
- Worksheet to compile a rough copy graph and formulate their question.

Lesson Activities:

Teacher Activities	Student Activities	Time
Introduction (anticipatory set – "HOOK"): - Start the class by telling the students that we are going to be data detectives today! Tell them about how we are going to be collecting important clues, organizing them, and representing them in a special way! We are going to create	- Listening in their seats	3 mins

our own concrete graphs just like what we did as a class last time!		

Body:
- Facilitate a brainstorming session for students to decide what is something interesting they would like to know about their classmates. Collect ideas on the board for all students to see.
  o Ensure students are coming up with questions that have 3 different answers that their classmates can choose from. If a student has an idea for a question that wouldn't work, celebrate their inquiry, and try to steer their question in a direction that will work for the activity, like asking them why they think their question would or wouldn't work. Encourage collaboration and class-discussion while we brainstorm.
  o Some idea seeds you can plant while they think:
  ▪ Hobbies
  ▪ Fav. Foods
  ▪ Fav. Sports
- After the students have put their detective thinking caps on and have come up with a question, they want to explore have them write their question at the top of the worksheet you just handed out.
- After students have written down their question on the worksheet have them brainstorm the three different choices they will be surveying their classmates on. They will write those choices in the three spaces under options on their tables.
- Once they have their options written in their tables, briefly go over what a tally mark is (skip counting 5) and how we use a tally to collect data. Questions like:
  o What do we remember about tally marks?
  o What does one tally mark represent?
  o What does it mean when there is a line through four tally marks?
	- Brainstorming with the class
	
	- Filling in the important info on their worksheet and engaging in a discussion about tally marks
	  o Ensure students know that 1 tally mark is equal to 1 and when they get to 5 tally marks, they put the fifth tally through the group of four. Students may mix up when to put the tally mark as a slash or miscount their tallies when getting a total, so pay careful attention.
		5 mins
		
		10 mins

o How can we use tally marks to collect data easily and neatly? o (using the whiteboard) if I have (written a few tally marks) this written on my paper, what number does it represent? - Once students are reminded of tally marks, go over the expectations you have for when the students are milling about collecting their data. Ask them how they will know if they have collected all the data they needed to. o How would they know they collected all the data they needed? o How do they know when they have gotten an answer from everyone in the class? o How many students are in the class right now? o How can we use the number of students in class to get the number of total tally marks we should have on our pages when we are finished? What is the relationship between the number of students and the number of total tally marks we should have on our papers?	- Discussing the activity and expectations with the class. o Be sure that students understand they only ask each person in the class for an answer once. They should end up with the same amount of total tally marks as there are students in the class that day. o Ensure they know that total tally marks means adding up every tally mark on their page, not the amount of tally marks in each answer.	5 mins
- Allow students to move throughout the classroom and survey their classmates on the questions they decided on. As they are milling around observe the interactions between students and if they are staying on task and collecting their data effectively. Take this opportunity to converse with them about why they chose their question, and how they are using tally marks properly.	- Moving around the room collecting data from their peers.	10 mins
- Once you notice that approximately every student has collected an answer from every student get the students to sit at their desks quietly. - Draw their attention to the pictograph created last time in class. Ask them some questions about it: o What does each picture represent on the graph? o Why is it important to put titles on our graph? o What does this graph show us? o What option was the most popular? How do you know?	- Sitting at their desks discussing the pictograph created last class. o Ensure students know that one tally mark is equal to one classmate and also equal to one symbol on their pictograph (one-to-one correspondence)	7 mins

o What option was the least popular? How do you know? o Why did we choose these symbols/pictures to use on our graph? Do they make sense for what our graph is about? o What is some information this graph tells us? How do you know? o What are some important elements in this graph? - After the students have reviewed the pictograph, give some time to think, pair, share about what materials, pictures, and other elements they might use to make a pictograph using the data they collected today. - Put out some materials for them to use to construct their pictographs while they are discussing in their table groups: o Graph paper. o Crayons, Markers, other colouring utensils o Symbols and pictures to cut out and glue. o Other items students could use to create their pictographs. - After discussing their ideas with the class, instruct students to build their own pictographs using the data they collected. - Ensure students understand the instructions for creating a pictograph and leave the example up for them to reference. Go over any other important details they need to include that might not have come up in the discussion. - Let students start creating their pictographs. - Observe that students are staying on task, recording their data correctly, and using the materials respectfully. - Converse with students while they work, ask them about what they are using in their pictograph and why. What elements they are including in their graph, what sorts of information their graph is telling them, and other questions to gauge understanding of the key points in graphing. - After students are finished their graphs gather everyone to their desks with their completed graphs.	- TPS about their plans for their pictographs - Constructing their pictographs	3 mins 20 mins

o If students are done early, they can add more elements and creativity to their graphs.		
Closure: - Have all students bring their graphs into a circle at the front of the room. - Congratulate everyone on being awesome data detectives and celebrate how great they were at collecting data and representing it in a graph to be able to share the information easily. - Have each student around the circle share their graph with the class. Go around the circle one at a time. Have them share one thing about their graph, some ideas are things like: o What was the question they were collecting data on? o What did you use as symbols in your pictograph? o What does each symbol on the graph represent? o What does your graph tell us? - After each student has shared their graphs with the class, briefly go over what a graph tells us with them again before thanking your data detectives for all their awesome work.	- Sharing their pictographs in a sharing circle	10 mins

Organizational Strategies:

- Use already assigned table groups for TPS and other group work.
- Set strong expectations for students while they are moving throughout the classroom.
- Do not put out pictograph materials until the students are ready to construct them.

Proactive, Positive Classroom Learning Environment Strategies:

- Use language that supports a positive mathematical mindset when conversing with students.
- Use questioning to encourage students to dig deeper in their thinking.
- Allow students to collect data on a topic they are excited about as long as it can be applied to the activity, and it is appropriate.
- Use a classroom management strategy that works to get your class's attention (ex. Waterfall, clapping, "if you can hear me..")
- Play calm music at a low volume while students are working if the students in your classroom are not distracted by it.

Extensions:

This lesson could be extended in many ways like:

- Using a science activity to collect data and then graph what they collected.

- Going into nature and collecting materials to create a pictograph exhibiting some data on something in nature. (ex. using real leaves in a pictograph showing how many leaves from each tree are found in a certain area)
- Using the graphs created to speak about using comparative language to describe the likelihood of certain things in the next lesson.

Reflections (if necessary, continue on separate sheet):