Field Version of UMF Unit-Wide Lesson Plan Template

Name: Rachel Yorke	**Program:** Secondary Ed	**Course:** 460
Lesson Topic/Title: Graphic Data Representation		
Lesson Date: 3/2/17	**Lesson Length:** 2 days	**Grade/Age:** 8th

Learning Objectives (Targets):

Students will understand that relationships and patterns in data can be interpreted and represented through graphs, pictures, and other visuals, as well as through measures of center and spread.

Students will be able to read and collect information from graphs, construct graphic representation of data, and recognize what measures and representations are appropriate for a given set of data.

Content Standards:	**Content Standards Alignment & Justification:**
CCSS.MATH.CONTENT.6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots. CCSS.MATH.CONTENT.6.SP.B.5.C Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.	Students will be given direct instruction on constructing different types of graphs and they will be given a reference sheet for a summary of each different graph type and their use. Together we will dissect the different graph types and practice reading them by answering different questions. We will also examine them further by considering the context for the data and brainstorming why patterns in data may exist. Students will also practice displaying univariate data graphically. Depending on the variable and context, students will use their graph reference sheet to determine the best way to display the data, then they will construct the graph.

Assessment:	**Assessment (Data & Student Feedback):**
☐ Pre ☑ Formative: Formative assessments will be used throughout the lesson. Students will be given an exit ticket at the end of the lesson that covers histograms, stem and leaf plots, and qualitative and quantitative variables. I will also be using whiteboards to check for understanding. ☐ Summative ☑ Student Self: Students will determine what types of graphs they need more practice with, and then they will select which IXL they will complete based on that.	Formative: Students will be given an exit ticket that asks them to construct a stem and leaf plot and a histogram from a given set of data. On the pre-assessment, it was evident that the students have not had much practice with histograms and stem and leaf plots, so it is very important that they demonstrate their understandings once the lesson is finished so that I can judge their understandings. Students will also use whiteboards to respond to questions projected on the board. The questions will be about different graph types and will require students to make inferences from them. They will write the answer on an individual whiteboard and hold it up for me to see. From a quick glance around the room, I will be able to tell if most of the students are understanding the content. I will then explain the correct answer. Student Self: Based on students' performance during the whiteboard activity, they will determine what areas of data representation they need more practice in. The students will then select the appropriate IXL to give them more practice with construction and interpretation of that specific type of graph.

Integration of Other Content Areas: (If appropriate)

Writing: Students will be using their math journals as an opportunity to practice written communication skills. In addition to helping me understand what my students are thinking, including writing in the math class supports mathematical reasoning and problem solving, while also giving students more opportunities to internalize effective communication.

Economics: The students will look at their stock performance and make the connection between line graphs and displaying small changes over time.

Instructional Strategies to Differentiate Whole Class Instruction:

The lesson begins with whole group direct instruction. I verbally communicate the different types of graphs and their uses to the students, while also providing them with pictures and descriptions of each graph type to use as a reference. During the slideshow, when students are using whiteboards, I read each question out loud, followed by an explanation regarding the correct answer. Students are then provided with a choice as to which IXL they would like to complete. They are given six different practice options, suggesting that they select the practice option for the type of graph interpretation and construction that they feel least comfortable with. Students will also have several opportunities throughout the lesson for individual practice.

Modifications / Accommodations / Extensions For Individual Students with Identified Needs:

Modifications: Some students in the C may have difficulty with examining a data set and creating a graph from it. For these students, the data will be displayed in a table to help them better recognize what type of graph they need to use and how they will graph it.

Accommodations: There are a few students in each class who have ADHD. They sometimes have difficulty focusing and following directions. In the B group, students *C, D, and B* often need subtle reminders to stay on task. I typically will walk up to their desk and just tap it and that usually works. In the C group, students *A and C* also tend to get off track very easily. To accommodate these students, I will be explicit, yet simple and structured in my delivery of the content. The lesson also includes a hands-on activity to vary the pace of the instruction which should help in keeping students' attention. Also in the B group, *D* has a hearing impairment. *D* has been moved to the front of the room so they can hear my instructions and follow the lesson easier. In the A group, student *E* has Tourette Syndrome. This student's biggest difficulty is with writing and completing tasks within the given time frame. To accommodate this, I have ensured that all of the work that is done in this lesson is either hands on or done on the computer. By doing this, this particular student does not need to write by hand. In addition, time frames for all of the tasks are flexible. If students do not complete something in class, they are allowed to complete the tasks later at their own pace. Students also have assigned seats to prevent anticipated behaviors and to easily refocus students who have difficulty with staying on task.

Extensions: Some students may quickly grasp the content. To provide an additional challenge, students can look at comparative bar and line graphs on IXL. These would require students to examine two sets of data in the same graph and compare them.

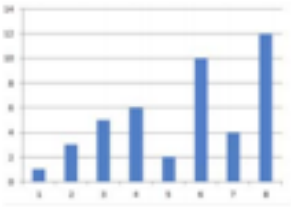
Technology Integration: (if appropriate)
Students will use IXL on their laptops to practice creating and analyzing graphs.

Materials and Resources for Lesson Plan Development
Graph type reference sheet
White boards
Projector
Notes
Student laptops

Teaching & Learning Sequence:
Day 1: (53 minutes)
Hand out graph type reference sheet and go over each type (10 minutes)
*Discuss bar graphs and example
*Discuss histogram and example
*Discuss line graphs and example
*Relate to stock market project and how students use line graphs to display trends over time.
*Discuss stem and leaf plots and example
Project examples of graphs and have students answer questions using whiteboards (30 minutes)
IXL on constructing and analyzing graphs (13 minutes) They can use GR 7 BB.5-BB.10, BB. 14

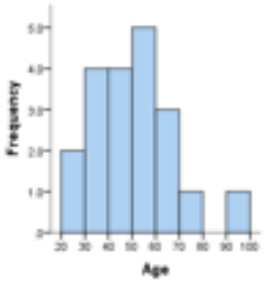
Day 2: (53 minutes)
Review previous day's content (5 minutes)
* Discuss different graph types
* Discuss what variable types can be used for which graphs
* Answer questions
Example data set constructing histogram and stem and leaf plots (15 minutes)
Finish IXL on constructing and analyzing graphs (23 minutes)
Exit ticket (10 minutes)

Content Knowledge Notes: ***(if applicable/instructor discretion)***



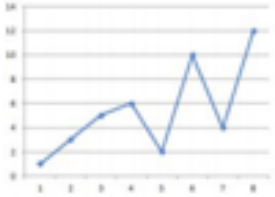
Bar Graph

Bar graphs are very versatile graphs and can be used for many things. They can be used to display data between different groups or compare results for different categories. When displaying trends over time, bar graphs are better for comparing larger changes or differences in data. Bar graphs can also display numerical data that falls into categories (discrete variables). Shoe size is an example of a discrete variable.



Histogram

Histograms can often be confused for bar graphs. Though they look similar, they are used to represent different types of variables. Histograms are used to represent numerical data over intervals (continuous variables). Age, height, and weight are all examples of continuous variables.



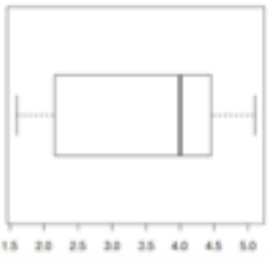
Line Graph

Line graphs are best used to display trends or changes over continuous periods of time. They are better than bar graphs for showing small intervals of change.

Stem	Leaves
2	0 3 5
3	1 2 6
4	0 2 3 4
5	0 3 6 7 8
6	1 2 5
7	3 4
8	2
9	
10	2 5

Stem and Leaf Plot

Stem and leaf plots are tables that split each data point into "stems" (first or first few digits of a number) and "leaves" (last digit of a number). Stem and leaf plots are similar to histograms because they show the shape of the distribution and use intervals. Instead of using bars to show frequency, stem and leaf plots use the actual data entries. For example, the first row of the stem and leaf plot to the left represents the numbers 20, 23, and 25.



Box Plot

Box plots are used to show the basic shape of a data set. It simply displays the five number summary of any *numerical* set of data (minimum, first quartile, median, third quartile, and maximum.) Box plots are useful in identifying outliers and comparing different data sets.

Common Core Teacher Standards (CCTS) Alignment & Justification *(Field/Student Teaching Only)*

Standard #4 Content Knowledge: *The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners.*

In order for me to effectively reach my students and create meaningful lessons, I must have a deep understanding of the content and patterns within the content. Building lessons that are representative of the nature of the discipline are critical in developing students' mentalities toward it. In addition, by having a deep understanding of my discipline, I am able to offer appropriate extensions, modifications, and accommodations that still target the objectives.

Description: This lesson used a combination of techniques to express univariate data graphically. Students were given a reference sheet which explained each type of graph and its use. They were also taught multiple ways to use each graph and draw inferences from them.

Performance 4(a)

Effectively uses multiple representations and explanations that capture key ideas in the discipline, guide learners through learning progressions, and promote each learner's achievement of content standards.

Rationale: Graphically expressing univariate data is a great topic to offer student choice with. Bar graphs are especially flexible in their use, allowing students to visualize and express the content in multiple ways. Students were also given multiple techniques for reading and making inferences with data. In doing this, the lesson allowed each student to use their preferred method to reach the target.

Standard #9 Reflection and Continuous Growth: *The teacher is a reflective practitioner who uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (students, families, and other professionals in the learning community), and adapts practice to meet the needs of each learner.*

To me, this standard means that I must constantly be gauging my effectiveness as a teacher and reflecting on my lessons in order to evaluate how well I am meeting the needs of my students.

Description: Students used whiteboards during the lesson to respond to a number of questions on the projector. Students were also given an exit ticket to demonstrate their understandings for this particular lesson.

Essential Knowledge 9(h): *Understands and knows how to use learner data to analyze practice and differentiate instruction accordingly.*

Rationale: With the A group, this lesson only lasted one day because the students showed me that they understood the material well, allowing me to skip to box plots. With the B and C groups, the results of the whiteboard activity showed me that students still needed more practice with histograms and stem and leaf plots. This guided my instruction for the following day, prompting me to show students an example of constructing a histogram and a stem and leaf plot from a data set. The results of the exit ticket showed me that the students then understood how they can be used and read, allowing us to move onto the next lesson.

Post-Lesson Reflection:

Overall this lesson went as planned and was packed with information that really honed the students' univariate statistical skills. It used a range teaching strategies including direct instruction, independent work, and discussion. The use of white boards changed the pace for the students and allowed for a fun way for them to demonstrate understandings.

The results of the lesson's assessments were extremely beneficial in guiding my planning over the course of the two days, allowing me to target the specific types of graphs that needed more attention and practice. Histograms and stem and leaf plots were the two things that the students had not been familiar with, but by the end of the lesson, almost all of the students were able to correctly construct and label both types of graphs.

If I could do the lesson again I would probably spend more time on the different types of graphs and making inferences from them. Given the time span and main target for the unit, that being scatter plots, this lesson was practical in building students' basic statistical skills. If I had more time, I would put in more activity based learning to supplement the direct instruction.