Multicultural Content in Math

Intro:

For my curriculum project, I decided to create a curriculum that incorporated multicultural content into a math classroom. I chose this specific topic because during my observation hours at Moylan (ELAMS) and also based off my own personal experience, I realized that multicultural content that pertained to race, social class, and language, was never really included in math classes. This type of content can easily be included in English and History classrooms via books and important historical events, however, math is a less flexible subject.

Despite this, I still believed that it was impossible to completely separate multicultural content and math. It would also be unacceptable to convey to students that these two subjects could never be associated with one another since that is false. There are many ways that content that has to do with people’s different cultures, races, languages, backgrounds, etc. can be displayed and taught in math classes, so choosing what type of content to talk about and in which type of math class to show it was particularly difficult. Eventually, I thought it’d be best to not simply display content that was historical or information like national statistics but instead information that was more relatable to the students’ lives and therefore more interesting to them and hopefully enlightening as well. Finally, I came to the conclusion that the unit I’d teach would
present multicultural information about their neighborhood through bar graphs and pictographs which is a required math lesson in the third grade.

**Context:**

This lesson plan is designed for third grade classrooms due to the math component of the curriculum which is specifically for third grade students. The information shown and explained in this unit comes from the students really analyzing their neighborhood which is a vital skill for all students to learn and I believe that third graders are very capable of doing this. However, students will not only analyze their neighborhood but they will also compare their neighborhood to other neighborhoods therefore this unit can truly be taught in any classroom, so long as it allows students to expand their knowledge and gain a better perspective of the world. I also believe that this unit would be most successful in a school located in a low-income and/or culturally diverse neighborhood. This is due to the multicultural content in the unit, however, this is not to say that this can not be taught in neighborhoods that are predominantly white or that are of high-income. Simply put, I believe that the information that would be explained in this unit would make a larger impact on students who actually live the inequalities that we discuss in the classroom.

**Objectives:**

- Students will interpret and represent data using bar graphs and pictographs.

This objective is part of the Connecticut Common Core Math standard for third grade. This objective also reaches the first two levels of Bloom’s taxonomy which are 1) recalling basic information and 2) explaining said ideas. This material is not entirely new to the third graders but they are grasping this information in a more complex way. Instead of simply learning about bar
graphs and pictographs, they are taught to explain them, meaning they must know what information is being given to them through this graphs, and they also learn to show data by producing their own graphs.

- Students will use bar graphs and pictographs to depict data from their own lives.

Part of the first object includes having students make their own bar graphs and pictographs but I wanted to focus specifically on students using data from their own lives and not data that’s fictional or random that is given to them. Like I said before, this will allow students to learn more about their surroundings that they perhaps never have learned about before and then implement that information onto their own graphs. So hopefully since this data is so relevant to their lives, they are more drawn and engrossed in this material.

- Students will compare data from their neighborhoods and to data from other neighborhoods.

This objective takes the curriculum to the next step. Students shouldn’t be limited to just the information around them, although it is very important information. Students should be encouraged to look at surroundings other than just theirs so that they gain a larger perspective of the world and to avoid the bubble mentality where students are ignorant to everything outside of their neighborhood. This objectives reaches the fourth level of Bloom’s Taxonomy which is analyzing and drawing connection among ideas by comparing and contrasting the data. 

- Students will analyze and discuss the similarities and differences between the two data sets.
In addition to comparing and contrasting this data, and to bring the curriculum full circle, students are urged to justify the comparisons and similarities that they find which will allow them to have a meaningful and insightful discussion about their findings.

**Activities:**

This curriculum is designed to take place over five days or classes. On the first day, the teacher will re-introduce and review the subject of bar graphs and pictographs to the students. The teacher will begin the class by asking questions to refresh students’ memories about the subject, such as “what is a bar graph/pictograph? How are they different? What is a y axis? What is an x axis? How do we labels the axis? Etc.” Then, the teacher will read and display a prompt for a bar graph and the numbers that go along with the prompt, for example, “a game company asked people at the mall which game console they owned. Seven people said PS3, nine people said Wii, ten people said Gameboy, three people said PS Vita, and five people said Xbox 360”. As a class, the students will have to create the bar graph based off the information they are given. The teacher facilitates the process and guides them towards the correct answer. Each student will have an opportunity to come up to the board to draw a part of the graph whether it be the x axis, y axis, the categories, etc. and the teacher can use as many graphs as needed so all the students participate. When the graph is completed, students will use the bar graph they created to answer questions on the graph that the teacher will ask such as “how many people owned a PS3? Did fewer people own a PS Vita or a Wii? What is the combined number of Wiis and Gameboys owned? How many more people owned a Wii than owned a PS Vita?”. Then the teacher will repeat the following steps except using a pictograph rather than a bar graph.
On the second day, students will partake in a TGT (Teams-Games-Tournament) cooperative learning strategy to further apply their knowledge with even less guidance from the teacher. Students will be divided into mixed ability groups of three. The groups are mixed ability so that students who need more explanation on a question can ask students who understand the material better. Vygotsky suggests that this type of interaction is especially effective in developing knowledge and skills. After the groups are formed, the teacher will display (or hand out) a picture of a bar graph or pictograph. Then, the teacher will ask a question about the graph (i.e. how many more red cars were there in the parking lot than green cars?) and each group has a mini board or a paper to write their answer down. All the prompts, example graphs, and graph questions come from published worksheets online for this material. The group discusses the answer to the question for a limited amount of time. A student in the group is responsible for writing down the correct answer and this responsibility rotates to every student with every question that is asked. After time is up, the student whose turn it is writes their answer down and if they are correct, they gain a point for their team. This method clearly demonstrates the students’ understanding of the material while also adding a competitive and fun element to the learning process. On the first and second day of this curriculum, the focus is on Bloom’s Taxonomy levels regarding understanding and applying the information.

On the third day, the teacher will introduce the Final Project Presentation that all students must complete. This is a group project and students will work in the same groups from the TGT lesson because they are familiar with each other already and hopefully know how to work well together. The students will have to make a poster showing their own bar graph or pictograph that they created together. Half of the class will do bar graphs and the other half will do pictographs.
For the project, the teacher will provide topic questions/prompts that have to do with multicultural content that will guide students in finding their data. Some examples for the topic questions are “what other languages do you speak? Where are you from? How many other countries have you visited? How many electric devices does your family own?”. Each group will have to pick a question provided, the winning team from the tournament the class before can choose their question first and the group with next highest amount can choose and it continues until the last group chooses. After explaining the project, the students will gather in their groups and select one person in their group to be the surveyor. This person must survey every student in their class to get the data for their graph; by surveying their own classmates, the information from the bar graph or pictograph becomes more relatable and understandable since it’s from their own lives. While the surveyors of the groups are doing this, the rest of the teammates will begin brainstorming ways to create their graphs by finding their categories, quantities, etc. Then, the entire group will have the rest of the class to create their poster and if they are not done they must do it for homework. Students are encouraged to think creatively and create a bar graph or pictograph that is unique by using pictures, drawings, symbols, colors. The students are also required to think through their results. The teacher will give the groups a short questionnaire to help them with this step, the questionnaire will asks questions like, “which category has the most amount of votes? Why do you think that is? Which category has the least? Why do you think that is? If there are equal categories, why are they equal? Etc”. This will help guide the discussion in the next class. However, creating the poster achieves the create level of Bloom’s taxonomy where students produce new or original work.
On the fourth day, each group will present their project to the class. The group will have to go in front of the class and display their poster of their graph, read their topic question, explain why they designed the graph the way they did, and lastly, using the questionnaire, they will offer possible explanations for the outcomes that they got. For example, if a group’s topic question was “how do you get to school?” and most kids responded with taking the bus, a group’s explanation could be, “most kids might take the bus to school because their families don’t have a car”. Another example is if a group’s topic question has to do with languages that students can speak and many spoke Spanish, an explanation can be that most kids that speak Spanish were born in a different country. Although these answers aren’t entirely accurate, it allows students to think of reasons as to why things are the way they are. Students may even learn new things about their classmates. They may know that many of their classmates speak Spanish at home, but maybe they don’t know why other than the basic reason that they were taught the language. After the group gives their explanation, the discussion is open to the entire classroom to share their justification for the group’s final results.

On the fifth and final day, students will compare the data that they found to data that answers the same topic question but from a different neighborhood. This day in particular requires a lot of effort from the teacher. The teacher will have to contact another teacher in a different neighborhood, for example if this is taking place in a Hartford third grade class maybe the teacher can reach out to a third grade class in Avon. The teacher will have to gather the data, using the topic questions that her students chose, from a different classroom. After receiving this data, the teacher will have to create bar graphs or pictographs to display the data. Then in the class, the teacher will present this data to the students by showing it next to the same graph from
their classroom. The class will look at the two graphs placed alongside each other and observe the similarities and differences and then, in discussion form, the students will share the comparisons and similarities that they found with the entire class. After, similar to their projects, students will have to justify and explain not only the outcomes from the new data but also the differences and similarities between the two data sets. Since this is a more complex question, students can talk to the person sitting next to them first and answer the question then come back together to the class and share with the class. Again, the teacher will facilitate and guide the discussion and maybe ask more discussion questions but the discussion will be run by the students. By seeing the same data from a different neighborhood nearby with perhaps different outcomes, they are able to observe differences and similarities between the neighborhoods. This is so the students are not confined to just their neighborhood but also realize that other neighborhoods are different or similar in certain ways and this helps the students gain awareness about the world around them so they’re not ignorant to different perspectives or backgrounds. This lesson is to make students aware of inequalities, if they are shown, but not to discourage them. It’s important that students are also aware of their advantages, such as being bilingual, and they are encouraged to find solutions to some inequalities that they notice from the graphs. This day is centered around the analyze level of Bloom’s taxonomy where students draw connections among data found in their neighborhood and other neighborhoods.

**Evaluation:**

Each day builds on the last to fortify the students’ understanding of the material and connect it with the real world. Using Bloom’s Taxonomy, the students go through different levels such as remembering, understanding, applying, analyzing, evaluating and creating. These
levels are very similar to the objectives for the curriculum which hope that students will interpret and represent data, compare and contrast data, connect data to their own lives, and analyze and evaluate the data and its outcomes.

Students will be evaluated in two different ways, one is for the project while the other is for their participation in discussion (on the last day). Students will be told ahead of time that they are being graded and how they are being graded. For the project, students will be given a rubric ahead of time that will evaluate their basic understanding of the material. The categories that this rubric will include are presentation (title, creativity, organization), accuracy (correct x- and y-axis labels, appropriate units of measure, units labeled correctly, legend (if pictograph)), and analysis (display a great amount of effort in finding justifications for their data’s outcomes and are able to present those justifications). The rubric will range from one being poor to four being exemplary and each column will have specific descriptions of what each rating means specifically for each category. As for the discussion evaluation, this is based on teacher observation during the discussion. The teacher evaluates the students’ understanding through observing insightfulness, curiosity, and thoughtfulness shown in comments and/or questions.
## Appendix

### Rubric:

<table>
<thead>
<tr>
<th>Presentation</th>
<th>1 (Poor)</th>
<th>2 (Fair)</th>
<th>3 (Good)</th>
<th>4 (Exemplary)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>No title.</td>
<td>Title is very basic.</td>
<td>Title is relevant to the data but lacks creativity.</td>
<td>The title is creative and is relevant to the data.</td>
</tr>
<tr>
<td><strong>Organization</strong></td>
<td>Content is confusing and misplaced.</td>
<td>Content is generally organized but has some flaws.</td>
<td>Most of the content is well organized.</td>
<td>All of the content in the graph is organized.</td>
</tr>
<tr>
<td><strong>Creativity</strong></td>
<td>Project shows no creativity or originality.</td>
<td>Project shows an attempt at creativity.</td>
<td>Project shows some creativity and originality. The material is presented in an interesting way.</td>
<td>Project shows considerable originality and creativity. The material is presented in a unique and interesting way.</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correctly labeled x- and y-axis</td>
<td>X and y axis are not labeled.</td>
<td>X and y axis are labeled but not correctly.</td>
<td>X and y axis are generally correctly labeled but have a flaw.</td>
<td>X and y axis are correctly labeled.</td>
</tr>
<tr>
<td>Appropriate units of measure</td>
<td>Units of measure are not shown.</td>
<td>Units of measure are not appropriate.</td>
<td>Units of measure are correct but contain some flaws.</td>
<td>Units of measure are all correct.</td>
</tr>
<tr>
<td>Units labeled correctly</td>
<td>Units are not labeled.</td>
<td>Units are not labeled correctly.</td>
<td>Units are labeled correctly but there are some errors.</td>
<td>All units are labeled correctly.</td>
</tr>
<tr>
<td>Legend (for pictographs)</td>
<td>There is no legend.</td>
<td>There is a legend but it is not used accurately.</td>
<td>The legend is used accurately.</td>
<td>The legend is creative and used accurately.</td>
</tr>
<tr>
<td>Discussion</td>
<td>Students do not present justification for data outcomes.</td>
<td>Students show an attempt at finding and presenting justifications</td>
<td>Students present reasonable justifications.</td>
<td>Students display an ideal amount of effort to present reasonable and insightful justifications.</td>
</tr>
</tbody>
</table>
Questionnaire:

Name: __________________________
Topic Question: __________________________

1. Which category is the largest?

2. Why do you think that is?

3. Which category is the smallest?

4. Why do you think that this?

5. Do any of your categories have the same amount?

6. If so, which ones and why?

7. Any other questions/comments about your graph.