

Life of Pizza Pie: The Implications of Sub-Group Comparisons in Education

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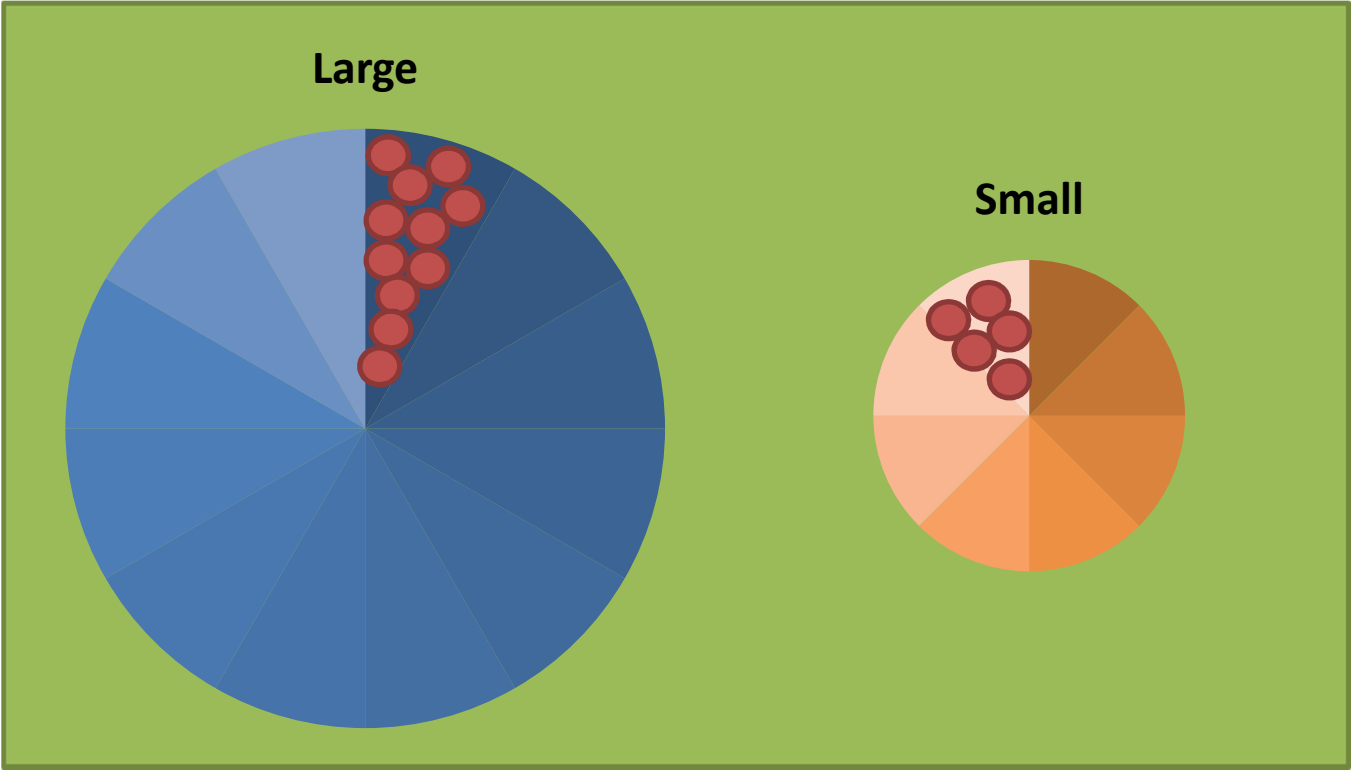
March 17, 2013

What is a pizza? Most would agree that a pizza pie consists of dough, cheese, and sauce. These popular food items can come in a variety of sizes with a myriad of topping options. The quality of each pizza may be determined by the quality of the chosen ingredients and how the selected toppings complement one another. For each pizza, one may choose any number and type of toppings depending on the size and taste of the individual creating the order. Internationally, you will find a variety of pizza shops and restaurants that carry their own beliefs on what makes a delectable pizza and harbor distinct differences in pizza development. Based on this, people may be guided to select different restaurants in search of the perfect pie. Depending on experience, an individual may choose to change any aspect of the pizza to develop a more delicious creation but to still remain a pizza it must consist of the initial three elements: dough, cheese, and sauce.

The Tale of Two Pizzas

Pizza design can be a very personal experience. Thin crust or deep dish? Pepperoni or peppers? Red sauce or white? One person's ideal may not match another's; however, one might be easily tempted to be adventurous, selecting toppings never once tried. Others may take the safe route and cling to what is known and comfortable.

Visualize now two unassuming pizzas, both with similar attributes. Both pizzas are composed of the three basic elements of which all pizzas are comprised. These two pizzas are also similar in the topping selected: pepperoni. The only immediately noticeable variance would be the size; one pizza is an extra-large, 16-inch pizza and the other is a small, personal 6-inch pizza. Both are covered in pepperoni, however, given the size difference the number of pepperoni slices differs as well. For the purpose of this illustration, there are 12 slices on the large pizza and 8 slices on the personal pizza. Proportionally, each topping amount is appropriate given the size of each pizza and without knowing the size of each pizza one may come to the conclusion that the pepperoni distribution is unequal or inequitable. (See Figure 1).



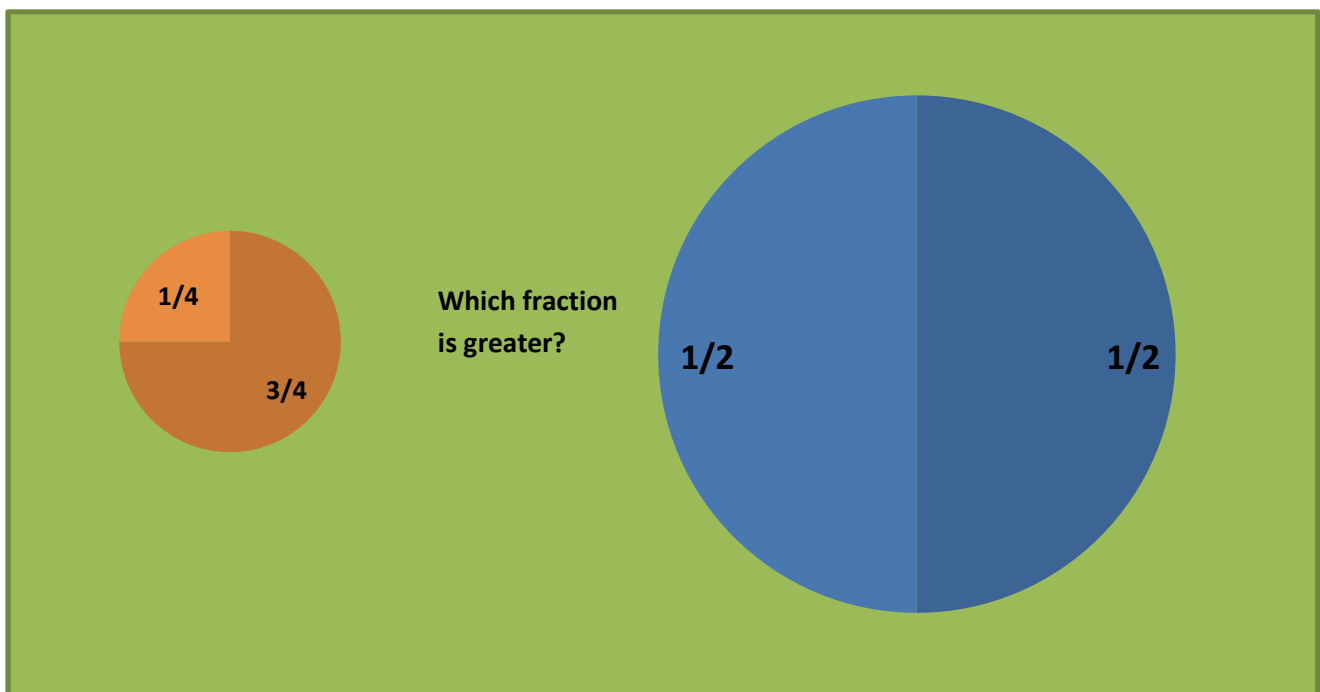
Approximate number of pepperoni on the 16-in. large pizza=132 pepperoni	Approximate number of pepperoni on the 6-in. personal pizza=40 pepperoni
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(Figure 1)

Without noting the size of each pizza, one may make a case of injustice stating, “Out of all the pepperoni proportioned, the personal pizza received only 23% of the pepperoni, while the large pizza received 77% of the pepperoni,” or “The personal pizza has 13% of its pepperoni on one slice while on the large pizza you will find 8% of its pepperoni on one slice. What a disparity! Something must be done.”

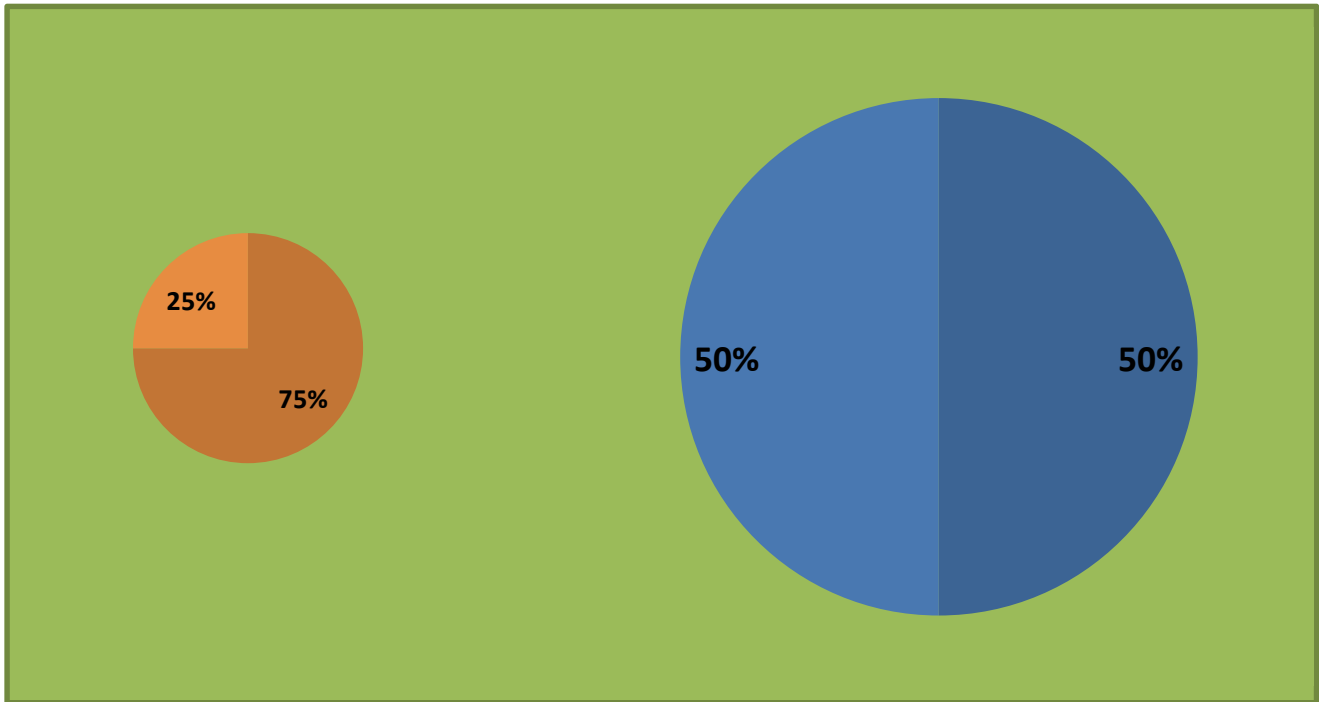
“Pizzas” in Education

One of the first lessons that should be taught when beginning classroom instruction on fractions is that you cannot compare groups of unequal size. Three-fourths is larger than one-half only if we are comparing groupings of the same size otherwise there is no comparison (See Figure 2).



(Figure 2)

Now, let's view this similar situation as percentages (See Figure 3).



No Child Left Behind and Response to Intervention

With the passing of No Child Left Behind (NCLB) legislation and implementation of Response to Intervention (Rtl), creation and presentation of data has moved out of the hands of educational researchers to school administrators and classroom teachers. NCLB requires the publishing of school grades and performance outcomes sorted by subgroups for review by the larger community. Rtl additionally requires that educators and administrators implement three tiers of interventions for students struggling in academic or behavior expectations all the while collecting and reporting data before a child can be referred for additional services (Harris-Murri, King, Rostenberg, 2006, p. 782). Some, not all, educational professionals have a decent grasp on the creation of graphs, averaging standardized assessment scores, and plotting improvement by

individuals and subgroups. Additionally, not all community members are able to accurately and critically analyze the data that is presented.

Subgroups in Data Analysis

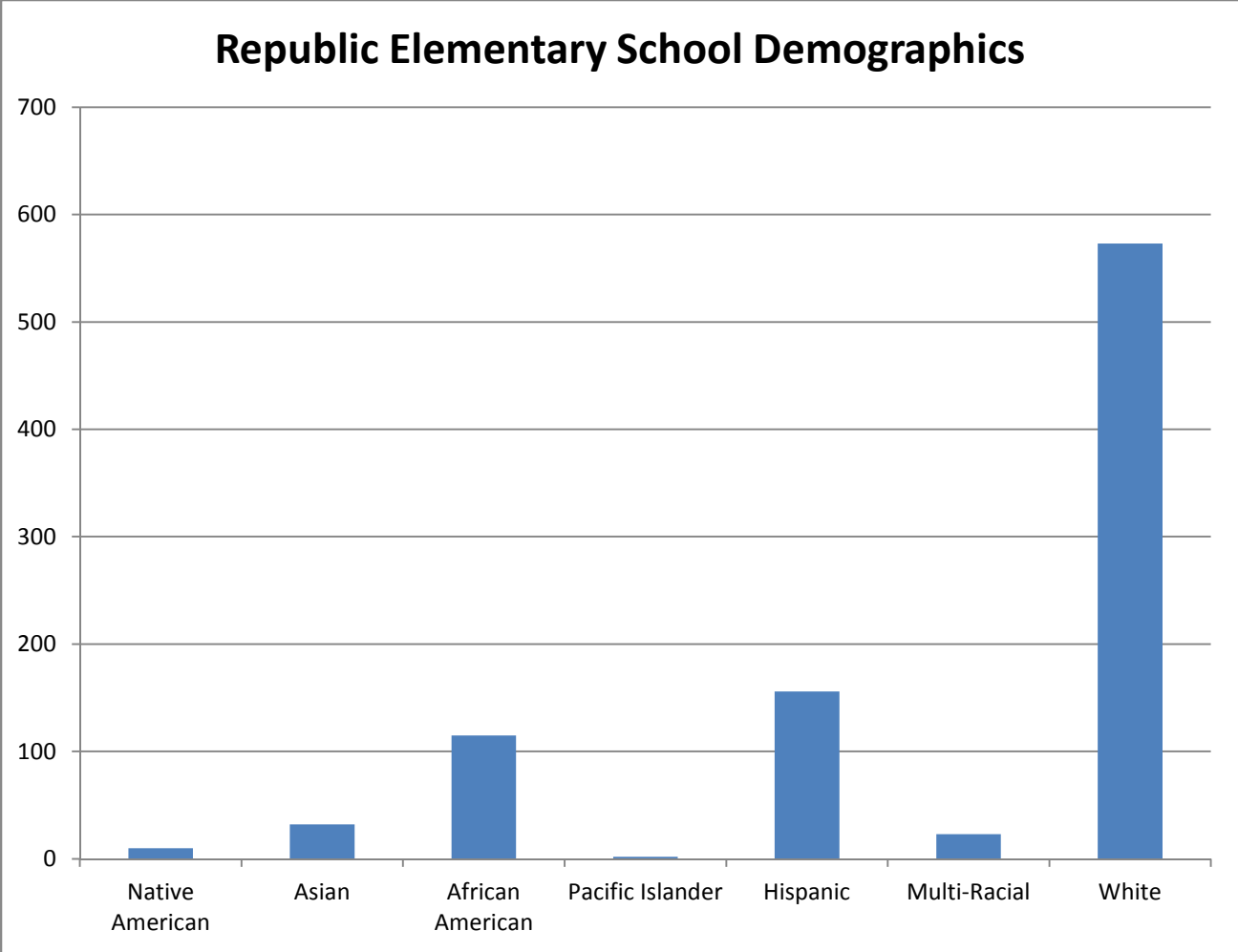
The United States population is currently estimated to be 313,847,465 (indexmundi.com, 2012). Nation-wide the demographics are estimated to be 79.96% white, 12.85% black, 4.43% Asian, 0.97% Amerindian and Alaska Native, 0.18% Native Hawaiian and other Pacific Islander, 1.61% two or more races (July 2007 estimate) and in 2009, 79.57% white, 12.91% black, 1.03% Amerindian and Alaska Native, 4.56% Asian, 0.19% Hawaiian and other Pacific Islander, 15.77% Hispanic (considered an ethnicity not a race), and 1.73% two or more races (census.gov, 2009). In the Kindergarten through 12th grade educational setting, the population was estimated to be 62,122,000 and the demographics were estimated in 2008 to be 59% were non-Hispanic white, 15% black, 5% Asian, and 18% Hispanic (census.gov, 2009).

Race/Ethnicity	2007 US Population	2007 Population Numbers	2009 US Population	2009 Population Numbers	2008 US School-Age Population	2008 School Population Numbers
Amerindian/ Alaska Native	0.97%	3,044,321	1.03%	3,151,000	1.23%	767,000
Asian	4.43%	13,903,443	4.56%	14,014,000	4.26%	2,646,000
Black	12.85%	40,329,400	12.91%	39,641,000	15.25%	9,474,000
Hawaiian/ Pacific Islander	0.18%	564,926	0.18%	578,000	0.22%	139,000
Hispanic		No Data	15.77%	48,419,000	20.74%	12,884,000
Two or More Races	1.61%	5,052,945	1.73%	5,324,000	2.99%	1,856,000
White	79.96%	250,952,433	79.57%	244,298,000	76.37%	47,236,000

*Keep in mind that these estimates are based on the United States Census and that numbers may not be reported by some households.

Based on this information, the school-age population is somewhat comparable to the national demographics although some subgroups will be more concentrated in various areas across the country. Using the above school-age population percentages, let us apply them to a school setting knowing full well that various schools will vary by demographics but that these percentages are a depiction of the national demographics.

Republic Elementary School (a pseudonym) has 750 students of which 1.23% (10 students) are Native American, 4.26% (32 students) are Asian, 15.25% (115 students) are African American, 0.22% (2 students) are Pacific Islander, 20.74% (156 students) are of Hispanic descent, 2.99% (23 students) are Multi-Racial, and 76.37% (573 students) are white.



Republic Elementary School is our metaphorical pizza shop. Each subgroup serves as an example of each size of pizza. A percentage of one group will not equal the same percentage of another group due to the different sizes. This causes dilemmas and misconceptions when comparing percentages from different groups. For example, cited in a study by Vincent, Sprague, & Tobin (2012) compares disciplinary suspension data between African American and White students stating that 42.8% of black students and 15.6% of white students on average have been suspended. These percentages make it appear as if a larger number of black students are disproportionately suspended over their white counterparts. However, looking at the actual number of students using the

sample population numbers from Republic Elementary School, this would mean 50 black students and 90 white students. Given the group size, there are clearly more individual white students involved in suspensions than their black peers.

Using this example, let's observe it as a pizza comparison (See Figure 4).

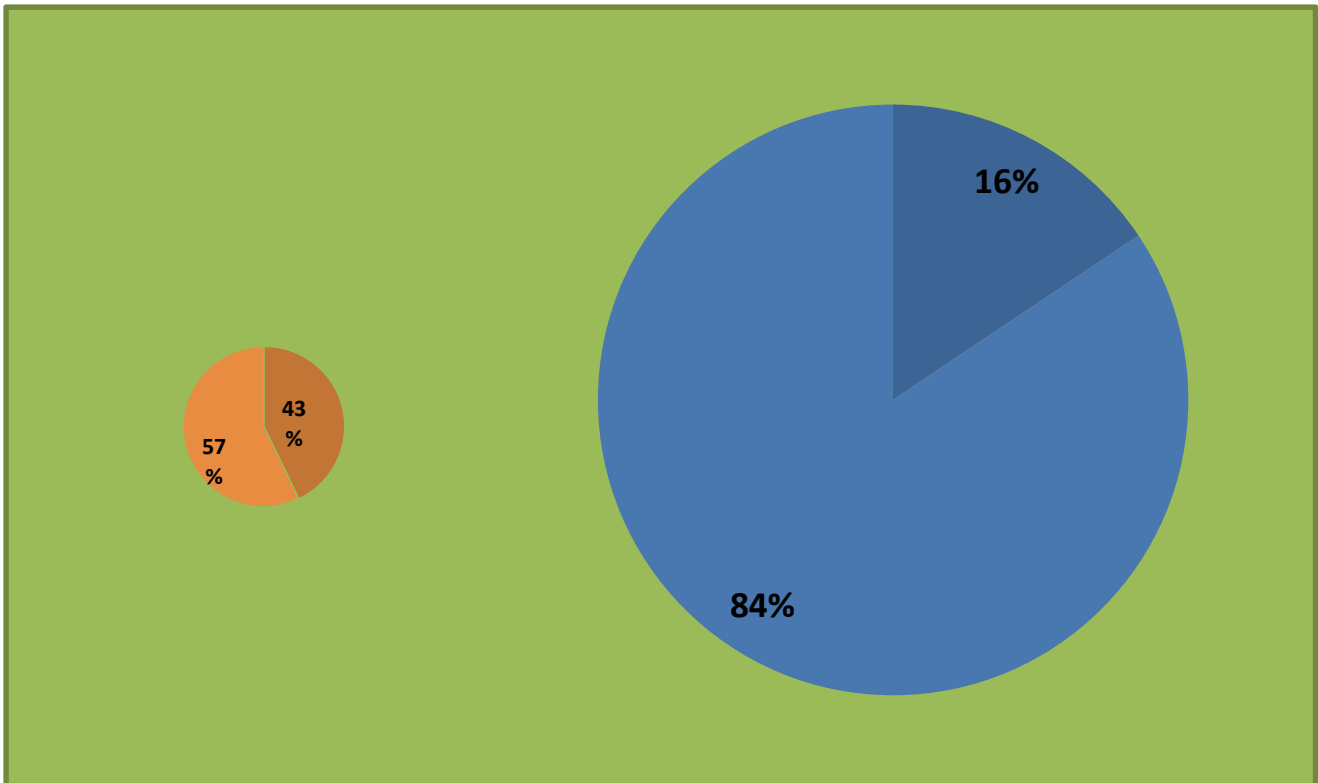
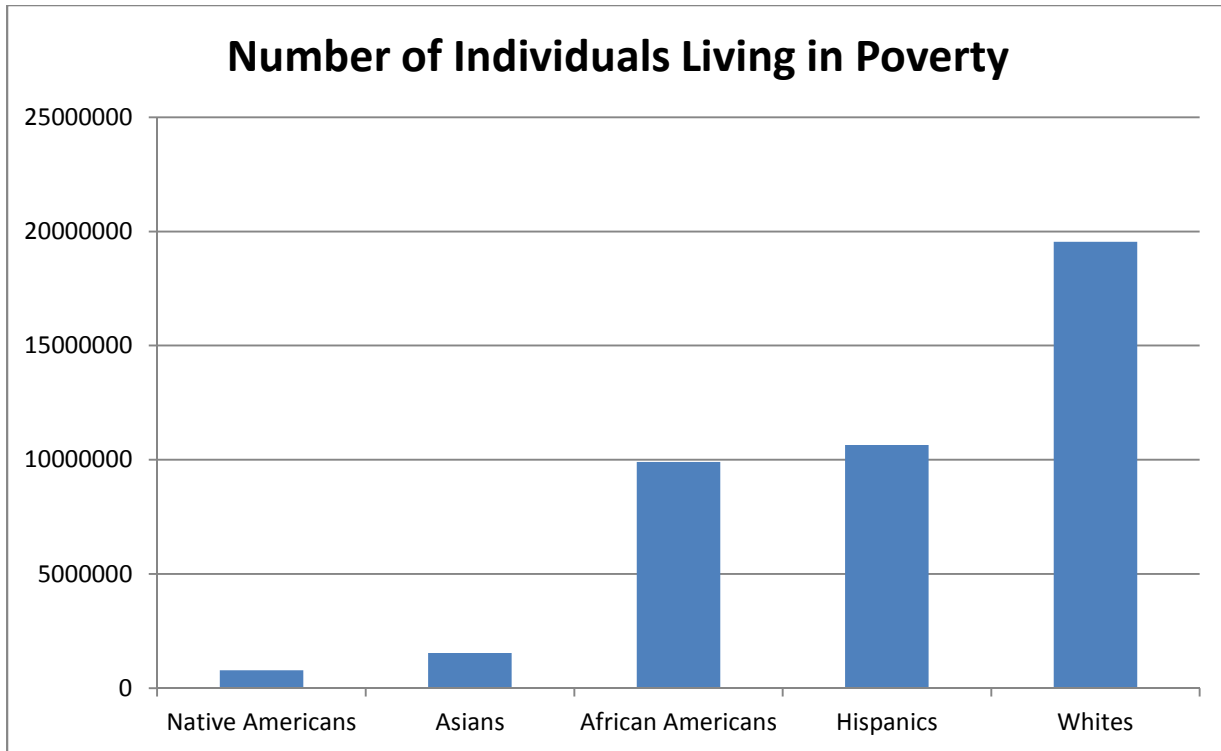
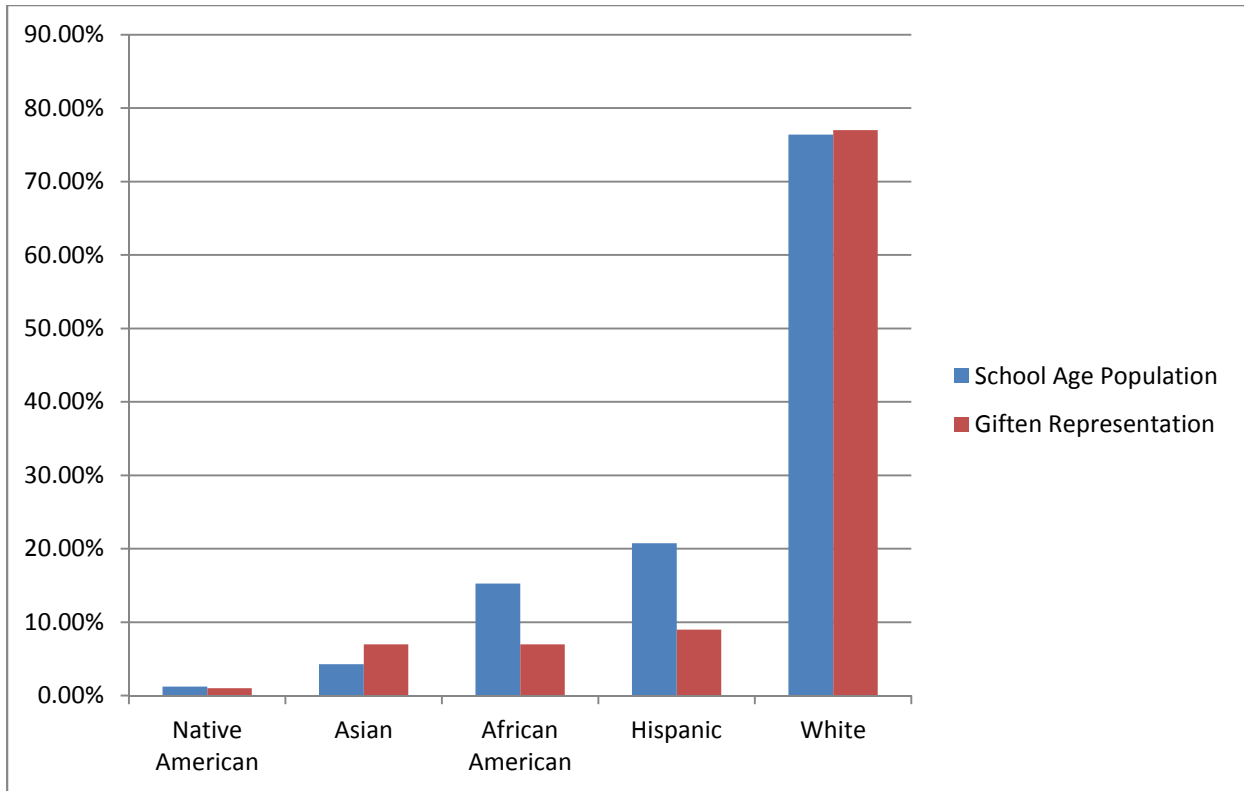


Figure 4: This visual serves as a visual representation and is not exact in scale proportion.

Another example would be data comparing subgroups living in poverty. Strand & Lyndsay (2009) give comparisons across subgroups living in poverty and state that in the United States there are 25% Native Americans, 11% Asians, 25% Blacks, 22% Hispanics, and 8% Whites living below the poverty line (p. 175). Again, noting the sizes of each of these subgroups the numbers of individuals living in poverty for each subgroup may be quite surprising.



Yet another example would be a study stating how there are too few students of color admitted into gifted programs. In an article by Burney & Beilke (2008) variations in student representation in gifted programs is noted to be 1% Native American, 7% Asian, 7% Black, 9% Hispanic, and 77% White. Although I do believe that improvement is needed in these numbers, they are not as dismal as they may first appear. Given the overall demographics of the country and the public school system, these percentages fall more closely in line with our current population than you might first believe. By comparing the percentages of representation in gifted programs with the percentage composition of our diverse American population, Native American and White students are not overrepresented when taking into consideration the size of the entire group. Yet the educational system would benefit from determining the reasons behind the underrepresentation within each subgroup rather than comparing across the subgroups.



Although it is recognized that there is an obvious disparity within several subgroups it is unreasonable to expect one of the smaller subgroups to meet the same percentages as the largest subgroup. There are approximately 3-million gifted students in the United States (NAGC, 2008). Using the aforementioned percentages this would mean that of all the gifted students 30,000 are Native American, 210,000 are Asian, 210,000 are Black, and 2,310,000 are White. If we attempted to grow all groups match the percentage of the largest group (77%) these number would match or exceed the number of the entire population.

Implications for Educators

Examples such as the ones cited are numerous in educational research. As educators, administrators, and policy makers work to improve education for all students we must become wise about how data is presented and used in educational research. Data can

be easily used and misconstrued to forward a specific agenda or to sell an education program. This fact is spoken of in detail in Reading Educational Research: How to Avoid Getting Statistically Snookered (Bracey, 2006) and When Can You Trust the Experts? How to Tell Good Science from Bad in Education (Willingham, 2012).

Furthermore, several authors examine the tendency for experts to attempt to apply group results to individuals which is poor statistical reasoning (Sowell, 2011; Strand et al. 2009). Often data will be presented in an attempt to support theoretical reasoning that compares percentages and averages across different subgroups. As previously present, without careful consideration this information can be deceiving. Information we may obtain from administrators, researchers, and policy makers about subgroups in our society are not necessarily applicable to individual students. In order to be the change agents within our educational communities it is essential to shift from analyzing subgroups of students to realizing the individual differences each child brings to the educational arena.

Implications for Teaching Each Student

I move to change some wording that has become commonplace in many educational settings. Initially, when one states that we should strive for the academic success for all students, most individuals would agree with this sentiment. To better define a goal for American education, I believe that changing one word would assist with a needed transition. We should strive to the academic success for “each” student. Any teacher that has been involved in education during the past thirty years has been exposed to various educational theories that denote the need to address individual learning styles, modalities, intelligences, as well as strengths and weaknesses. No matter the gender,

race, ethnicity, socioeconomic status, or any other subgroup children may be assigned to, every child is different. Once our society effectively transitions from viewing students as members of a group to seeing them as individuals we will begin to make progress. Only by building on the strengths of individual students as well as addressing their needs will we be able to make strides toward success for each child.

Conclusion

All pizzas are composed of the same structural elements. Even if some pizzas may appear to be the same and can belong to a specific group, each pizza is ultimately different. We as human are similar in that fashion. No matter our differences we are all composed of the same basic elements yet each and every one of us is different.

Although we may identify with a variety of groups within our society it is important to acknowledge our individual differences if we are to break through a variety of societal and educational barriers.

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