Comparing groups: Rubric

http://topdrawer.aamt.edu.au/Statistics/Assessment/Assessment-tasks/Comparing-two-groups

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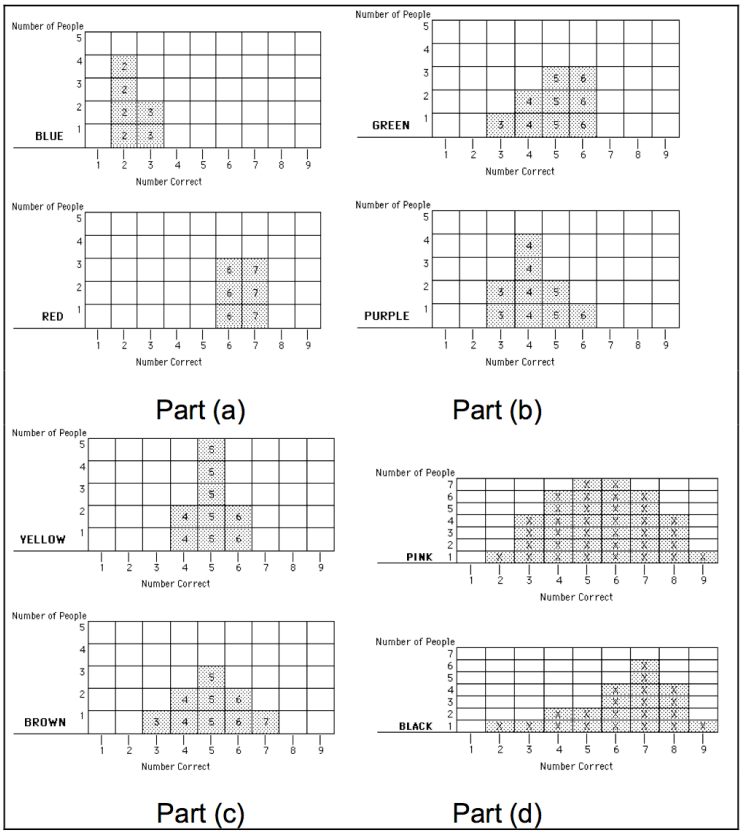
There are six levels in the rubric presented here, with the first three covering increasingly complex reasoning for sets of equal size [as in parts (a), (b) and (c)] and the second three covering increasingly complex reasoning for sets of unequal size [as in part (d)].

Students have little difficulty with the story being told in the graphs. All students conclude that the Red class did better than the Blue class in part (a). Similarly for the Green and Purple classes in part (b), most students conclude that the Green class did better by considering the shape of the graph or by calculating totals. Part (c) is more problematic because although the totals for the Yellow and Brown classes are the same and each is symmetric in shape, one distribution is more spread out than the other. Finally part (d) presents two classes with different numbers of students, where the larger Pink class has a lower mean score than the smaller Black class. The visual appearance of the graphs, however, can be misleading because of the larger bulge in the middle of the Pink class with higher frequencies than the Black class.



Successful strategies for comparing groups of equal size	
Code 1 A single feature of the graph is used in simple groups comparisons, often focusing on 'more'.	[The Red class did better because] Red got more points. [The Brown class did better because] Brown got a 7 and no one else did. [The Pink class did better because] Pink has got more. [The Pink class did better because] Pink is nearly filled right up to the top.
Code 2 Multiple step visual comparisons or numerical calculations are performed in sequence on absolute values for simple groups comparisons.	[The Green class did better because] By adding the scores up … [Purple] added up to 34 and … [Green] added up to 36. [The Yellow and Brown classes are equal because] By adding them up they both got 45. [The Pink class did better because] Pink got 198 and Black got 130. [The Green class did better because] There are more 6s and 5s than … over in the Purple class. [The Pink class did better because] Just by looking at it you can tell a lot more but 9 and 8 are a lot like the same but then, the 6 and 5 and 4 and just all the rest are much bigger than these ones down here [Black].
Code 3 All available information is integrated for a complete response for simple group comparisons; appropriate conclusions are restricted to comparisons of groups of equal size.	They're even [The Yellow and Brown classes]. These people, the Brown class, they had kind of more people in the 6 and 7 in the higher scores, but these people [Yellow] had a lot more people in the middle, which kind of added up, so they're even. Well by looking at it, you can sort of see that it's kind of even, because it's kind of the same. There's those there and those there … they add up to the same as those two … 5 and 5 is 10, and 7 and 3 is also 10, so if you moved those two [3 and 7] up there [5 and 5] they're the same … so they're even, the Yellow and Brown class.
Successful strategies for comparing groups of unequal size	
Code 4 A single visual comparison is used appropriately in comparing groups of unequal size.	[The Black class did better because] Black have a higher amount for the number of people. I think that Black would have done better. For the amount of people in their class, they have got a higher number, a highest percentage or something.
Code 5 Multiple step visual comparisons or numerical calculations are performed in sequence on a proportional basis to compare groups.	[Writes 198/36 = 5.5 for Pink and 130/21 = 6.19 for Black] This one's [Black] got a higher average … Because there's a higher number of people in the [Pink] class then it would make the average lower because you are dividing by more. But they scored more so it really doesn't change it. So I think they are comparable. The people in this class [Black] have done well for how many people there are, whereas this one [Pink]: more than probably about half of them are on the lower side, whereas this class [Black] hasn't got as many people on the lower side, more on the higher side.
Code 6 All available information, from both visual comparison and calculation of means, is integrated to support a response in comparing groups of unequal size.	[Calculates the means for each group and concludes that Black has the higher average.] So that [Pink] is an average of 5.5 and I suppose I would expect that because obviously there is the same amount of people between 5 and 6 and so most of them are in 5 and 6 so you would probably expect that … So their [Black] average is just a little bit higher, 6.2. Even though they had less people it still averages, so you work out the average so it's still fairer … that makes it equal averaging, but these people [Black] had a little bit higher, which I expected because they had more people in 7. Actually they didn't have more people in 7, they had less people that got lower. [Points back and forth between the two graphs throughout the discussion.]