

Background

- As final year students, we have constantly been reminded to get the balance right between exercise and our studies.
- Along with the obvious physical benefits, there are supposedly mental benefits associated with exercise.
- We want to test whether exercise, along with the change of environment associated with it, affects the concentration of students.
- Physical education (P.E) classes encompass both of these aspects we wish to test.
- Fifth Year students provide the ideal population for us as physical education features as part of their school time table.

The Test

- We will devise two tests of equal difficulty.
- These tests will comprise of a combination of challenging arithmetic, logical reasoning, and spatial reasoning questions.
- In order to keep variables fixed, the tests will both be given at the same time of day and a 16 minute time limit will be enforced.
- We feel this combination of question types will allow us to get a reasonably accurate measure of the student's concentration levels.

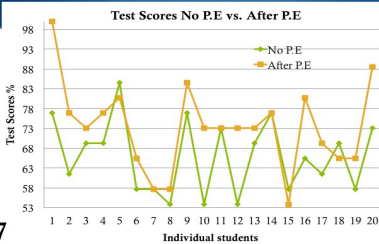
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Analysis 1 ctd.

- The basic measures of location (the mean, mode, and median) show that the students performed better after physical education, as the values are higher.
- The mean for the data after P.E however isn't the best representation of the data as the value is distorted by the presence of outliers (very high or low values, not typical of the other values).
- The range and standard deviation are larger for the data after P.E, due to the presence of exceptionally high values in this data set.
- This means that there is a greater spread of values in the second data set, i.e. on average the values are a greater distance from the mean.

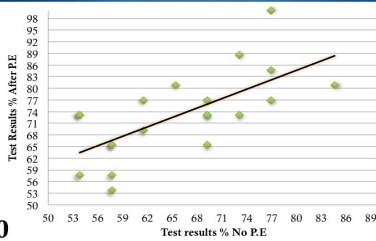
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Line Plot - results



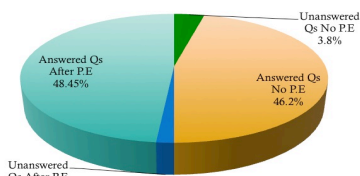
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Scatter Plot



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Unanswered vs. Answered Questions
No P.E and after P.E



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To investigate whether physical education class affects the concentration of 5th year students.

The Sample

- Our sample consisted of 20 fifth year students.
- These students were chosen from one class which was not made based on academic ability.
- The class was simply made from an alphabetical list.
- For these reasons we feel that this sample is quite a reliable source for our data and is good representation of the population of fifth year students.

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Analysis 2

- We chose to represent the results on a comparative bar chart.
- This form of graphical representation allows us to compare the results of the individual students.
- We also chose to represent the data on a line plot, as this allows us to see the results obtained by all the students more clearly.
- This graph allows us to visually compare the overall results better than the comparative bar chart.

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Analysis 2 ctd.

- Upon close inspection of both of these graphs, it is clear that the majority of students performed better after P.E.
- The line plot gives a good representation of the overall results. The orange line predominantly remains above the green line.
- This denotes the better results which occurred after P.E. Where the orange line crosses the green line denotes that a few students performed worse after P.E.
- These graphs further support our conclusion from our first analysis, that the students had higher levels of concentration after P.E.

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Analysis 3 ctd.

- The points of the graph are quite near a straight line, indicating a relatively strong, positive relationship between the two data sets.
- The correlation coefficient, $r = 0.68$, further supports this conclusion.
- This evidence once again supports the conclusion that the students had better concentration after P.E.
- Note: a value of $r = 1$ indicates a perfect positive relationship.

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Limitations and Bias

- The main limitation of our experiment was that our sample was small, however we feel that it provided us with sufficient data to answer the question we set out to answer.
- Though we aimed to make the tests as equal in difficulty as possible, the difficulty of questions on each test could be deemed by some to have varied slightly.
- Basic human error may have come in to play as we corrected the tests ourselves.
- We had to sort through the tests in order to select the data we deemed to be valid. To us it was clear which students had not taken the test seriously as they barely attempted the questions.

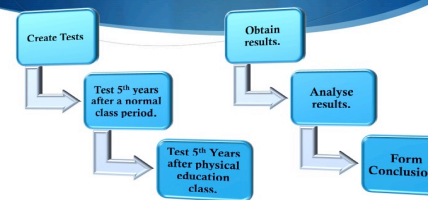
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Final Conclusion

- All of our analyses proved that the students performed better after P.E, indicating they had higher levels of concentration.
- We feel these results are significant as they indicate that exercise and a change of environment could play a key role in maintaining high concentration levels.
- This data could potentially be used to plan school timetables.
- In addition this information could be used for the benefit of students, to plan the inclusion of exercise and a change of environment into their study timetables.

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Strategy



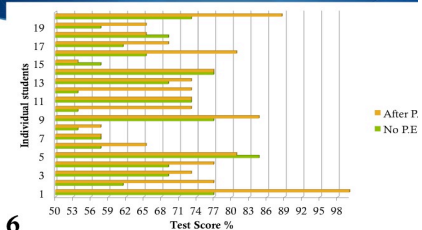
Analysis 1

- We thought that calculating the measures of location and a measures of variability (spread) of the data obtained would be a good place to start our analysis.

	No Physical Education %	After Physical Education %
Mode	Bimodal: 57.7 and 69.2	73.1
Median	67.3	73.1
Mean	65.9	73.3
Range	30.8	46.2
Standard Deviation	8.96	10.7

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Bar chart- results



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Analysis 3

- We wanted to investigate whether there was a linear relationship (correlation) between the two sets of data.
- Representing the data on a scatter plot would achieve this, and would give us a visual representation of the strength of any relationship present.
- A further calculation of the correlation coefficient would allow us to more accurately determine the strength of any relationship present.

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Analysis 4

- In both tests, students left a number of questions unanswered.
- We attributed this to either a lack of concentration to form a valid answer, or to a lack of speed, meaning they didn't have time to answer the question.
- Though the number in each case was small, and the difference between the data sets was small; we thought it was still worth comparing as it was a difference nonetheless.
- The fact that there were less unanswered questions after P.E support the conclusion of the previous analyses that the students had higher concentration levels after P.E.

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Improvements for future studies

- We tested the effect of physical education class on concentration as it encompasses both exercise and a change of environment.
- Future studies could test both of these factors separately and investigate which has a greater effect on concentration.
- There is potential to see how the effect of these factors on concentration varies with age.
- A larger sample, along with a more extensive testing procedure would give a far more accurate indication of the effect of these factors on concentration.

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