Applications Assessment ⬤

Introduction: overview of investigation.

Introduction: This investigation follows a group of students and their grades pre-Covid and post-Covid. The point of this investigation is to demonstrate the lasting impact covid has had on students ability to learn and the amount of work it takes to 'gain back' the knowledge you lost. The variety of data used is primarily Yr8 grades pre-lockdown, and Yr9/Yr10 grades post-covid. The use of 3 years worth of data is to demonstrate the effect on the ability of the kids as long lasting.

Hypothesis: critical assumptions relevant to investigation

When students' education is heavily impacted/stopped for a period of time, the performance of students' grades will decrease as they continue education (further along than when they left.)

Dependent Variable: The final grades of students in a class.

Independent Variable: The time-period, Study 1 is performed pre-Covid. Study 2 is performed post Covid.

Controlled variables;
- The students (same anonymous group in yr8, yr9, yr10)
- Subjects being analysed against (eg. math vs math)
- Grading scale used (0-100, E,D,C,B,A)
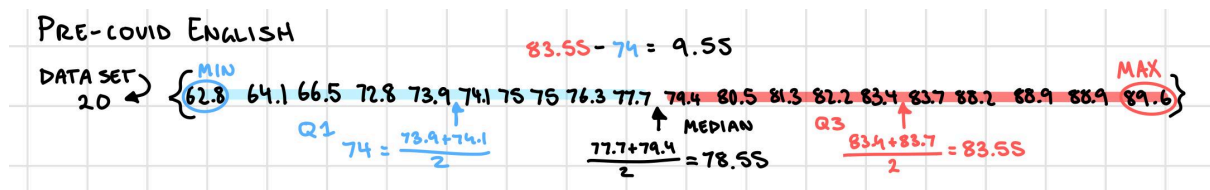
Critical Assumptions;
- Legitimately controlled group.
- The age of my data set is high-school aged teens.
- All grading systems used were the same.
- All subjects follow the same distributors' curriculum.
- Work this and test difficulty remain a constant ratio throughout the time period data was collected.

Discussion of data collection method. Include a copy of raw data.

My data was collected through asking for anonymous grades of a Gat glass through the years that were at highschool during Covid. This class's pre-Covid results are from 2019 reports. The post Covid results are from reports after June 2020 (out of lockdown period, full time teaching). The data is the result of a series of assessments carried out within class over the years. These grades are determined using a marking rubric and by the teacher of the class.
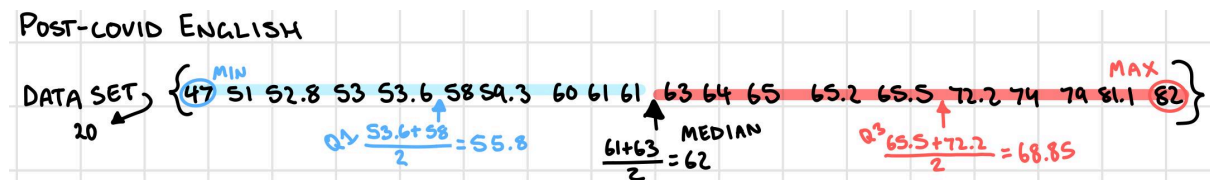
Pre Covid Data Set English

- Population Size: 20
- Minimum: 62.8%
- Lower Quartile: 74%
- Median: 78.55%
- Upper Quarter: 83.55%
- Maximum: 89.6%
- Interquartile Range: 9.55%
- Raw Data Set(%): 62.8, 64.1, 66.5, 72.8, 73.9, 74.1, 75, 75, 76.3, 77.7, 79.4, 80.5, 81.3, 82.2, 83.4, 83.7, 88.2, 88.9, 88.9, 89.6

PRE-COVID ENGLISH

DATA SET 20 → { 62.8 64.1 66.5 72.8 73.9 74.1 75 75 76.3 77.7 79.4 80.5 81.3 82.2 83.4 83.7 88.2 88.9 88.9 89.6 }

MIN 62.8   MAX 89.6

$83.55 - 74 = 9.55$

Q1 $74 = \frac{73.9 + 74.1}{2}$

MEDIAN $\frac{77.7 + 79.4}{2} = 78.55$

Q3 $\frac{83.4 + 83.7}{2} = 83.55$

Post Covid Data Set English

- Population Size: 20
- Minimum: 47%
- Lower Quartile: 55.8%
- Median: 62%
- Upper Quarter: 68.85%
- Maximum: 82%
- Interquartile Range: 13.05%
- Raw Data Set(%): 47, 51, 52.8, 53, 53.6, 58, 59.3, 60, 61, 61, 63, 64, 65, 65.2, 65.5, 72.2, 74, 79, 81.1, 82

POST-COVID ENGLISH

DATA SET 20 → { 47 51 52.8 53 53.6 58 59.3 60 61 61 63 64 65 65.2 65.5 72.2 74 79 81.1 82 }

MIN 47   MAX 82

Q1 $\frac{53.6 + 58}{2} = 55.8$

MEDIAN $\frac{61 + 63}{2} = 62$

Q3 $\frac{65.5 + 72.2}{2} = 68.85$

Analyse: consider appropriate graphs, calculations must be shown.
Calculations are shown above for Boxplot basics and continue after analysis and before conclusion.
Comparative Boxplots are the most appropriate way to display my data as it is a grade (%) and can be charted as quartiles between 0-100.

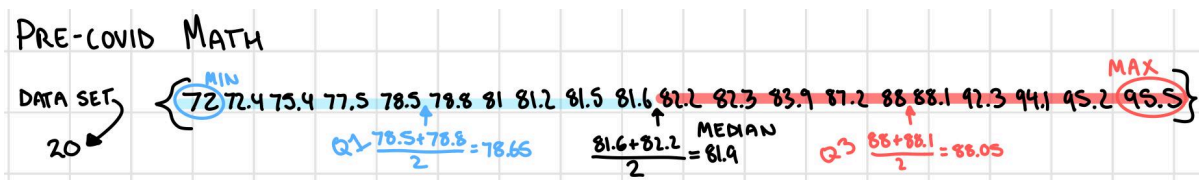English

Legend: Post-Covid, Pre-Covid

%age
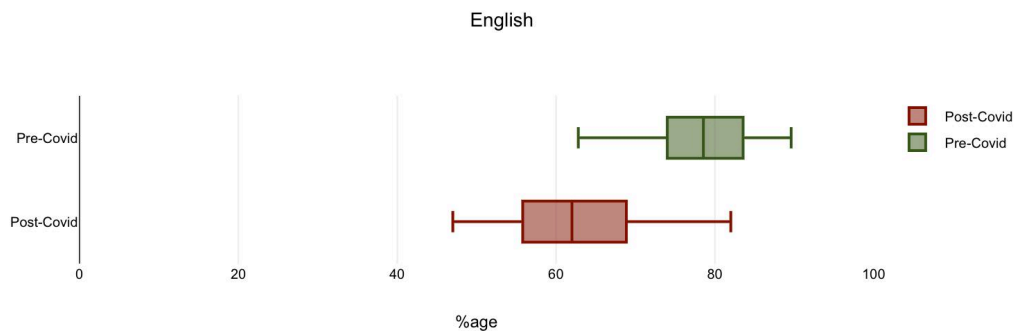
As seen in the above graphs, the Pre-Covid median(78.55) was higher than post-Covid median(62) by a significant amount. This is in theory due to the impact Covid has on students ability to learn, the difference of over 16%(16.55) in the average is definitely contributed to the fact the class is English which is very hard to teach and learn from home as it lacks appropriate marking keys and simplistic activities. What's interesting about this data is that the Max dropped from 89.6 to 82 (7.6 difference) whereas the Min dropped from 62.8 to 47 which is a 15.8% difference. This highlighted that Covid negatively impacted people more than school just 'getting harder' as despite the change the overall grades further than average. Pre-Covid results have a slightly negative skew as well demonstrating the majority are performing well and closer to the higher grades, whereas post-Covid has a slightly positive skew which demonstrates a larger number of kids are close to the bottom scoring results, demonstrating a serious shift in grades despite this being the same group of students. In the pre-Covid results the IQR is 9.55 which shows a consistency throughout the classroom and students grades. This consistency is lost through Covid as the IQR increases to 13.05. The overall range follows this. As pre-Covid it was 26.8 and post-Covid it was 35. This increased range demonstrates the effect Covid had on the students and how they struggled to keep up with the content while in lockdown. This decrease in grades across the boards sets them up to struggle and grasp future content in later years.

Discussion of data collection method. Include a copy of raw data.
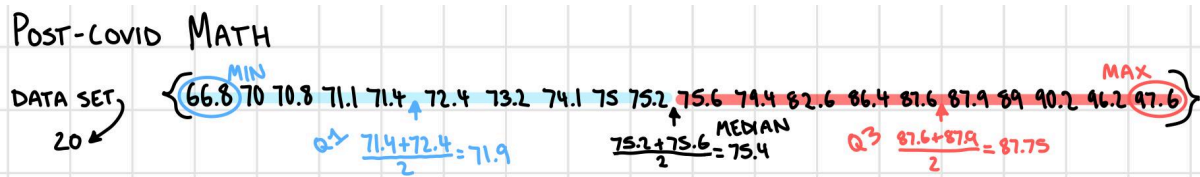
Pre-Covid Data Set Math
- Population Size: 20
- Minimum: 72%
- Lower Quartile: 78.65%
- Median: 81.9%
- Upper Quarter: 88.05%
- Maximum: 95.5%
- Interquartile Range: 9.4%
- Raw Data Set(%): 72, 72.4, 75.4, 77.5, 78.5, 78.8, 81, 81.2, 81.5, 81.6, 82.2, 82.3, 83.9, 87.2, 88, 88.1, 92.3, 94.1, 95.2, 95.5

PRE-COVID MATH

DATA SET 20 — MIN (72) 72.4 75.4 77.5 78.5 78.8 81 81.2 81.5 81.6 82.2 82.3 83.9 87.2 88 88.1 92.3 94.1 95.2 MAX (95.5)

Q1 $\frac{78.5+78.8}{2} = 78.65$ $\frac{81.6+82.2}{2} = 81.9$ MEDIAN   Q3 $\frac{88+88.1}{2} = 88.05$

Post-Covid Data Set Math
- Population Size: 20
- Minimum: 66.8%
- Lower Quartile: 71.9%
- Median: 75.4%
- Upper Quarter: 87.75%

- Maximum: 97.6%
- Interquartile Range: 15.85%
- Raw Data Set(%): 66.8, 70, 70.8, 71.1, 71.4, 72.4, 73.2, 74.1, 75, 75.2, 75.6, 79.4, 82.6, 86.4, 87.6, 87.9, 89, 90.2, 96.2, 97.6

POST-COVID MATH

DATA SET, 20

{ 66.8 70 70.8 71.1 71.4 72.4 73.2 74.1 75 75.2 75.6 79.4 82.6 86.4 87.6 87.9 89 90.2 96.2 97.6 }

MIN: 66.8   MAX: 97.6

Q1: $\frac{71.4+72.4}{2} = 71.9$

MEDIAN: $\frac{75.2+75.6}{2} = 75.4$

Q3: $\frac{87.6+87.9}{2} = 87.75$

Analyse: consider appropriate graphs, calculations must be shown.
Calculations are shown above for Boxplot basics and continue after analysis and before conclusion.

Math

%age
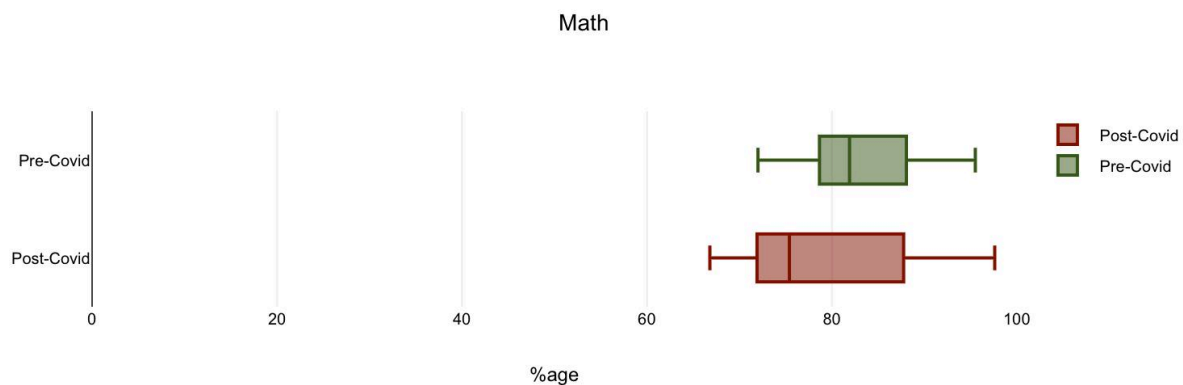
This is a second of data from the same controlled group over the effects of Covid on their math grades. On this graph the Median of the class decreased going from 81.9 pre-Covid to 75.4 post-Covid. This is only about a 6%(6.5) decrease in overall grade, in comparison to the English grade at ≈16% decrease, Math seems to be performing better. This could be attributed to the fact that math is a more structured topic with a clear form of method which can usually be found in textbooks or on YouTube for help. In addition to this you'll notice in the English that the range shifts down the scale, thus demonstrating a collective grade drop, math stays in relatively the same range. This could also be attributed to the learning method. An interesting thing in the Math graph is that the maximum for Pre-Covid was 95.5 and the maximum post-Covid was 97.6. This also paired with the upper quartiles being 88.05 pre-Covid and 78.85 post-Covid, we can see the top 25% of the class has remained consistent throughout Covid. This could be because they worked in Covid or because math is a more logical and analytical subject in comparison to English and can therefore be picked back up quicker. Despite the overall range looking continuous the same cannot be said for the interquartile range. Pre-Covid the range was 9.4 and post-Covid the range increased to 15.85. In addition with the decreased median, this demonstrates that a larger portion of the class have decreased their grades than remained stable. Pre-Covid has a relatively normal slew if slightly positive, which shows within the range the middle is about accurate for the class. In contrast to this the post-Covid is heavily positively skewed highlighting that despite the range seems similar a significantly higher amount are doing worse than before Covid. This IQR also went from

Trends:

As discussed in the analysis of my data the trend of the post-Covid results being worse than pre-Covid results stand. As well as the trend of the medians of the class decreasing pre to post Covid. Another trend is the minimums both decreased. Another trend is not a single grade is below 45 ensuring my results are of a legitimately trying class.

Hypothesis Proven?

The original problem/hypothesis was in relation to how a gap in the teaching of content can affect students' grades. The above data is a representation of two "opposite" subjects and how each has been impacted by the effects of Covid and what it means for students' grades. The hypothesis was proven true due to the decreasing performance demonstrated in the data.

Extra Math:

PRE-COVID ENGLISH	POST-COVID ENGLISH	PRE-COVID MATH	POST-COVID MATH
RANGE: 89.6-68.2 = 26.8	IQR: 68.85-55.8 = 13.05	IQR: 88.05-78.65 = 9.4	IQR: 87.75-71.9 = 15.85
	RANGE: 82-47 = 35	RANGE: 95.5-72 = 23.5	RANGE: 97.6-66.8 = 30.8
MEAN: EVERY NO. ADDED TOGETHER/SAMPLE SIZE	MEAN:	MEAN:	MEAN:
$\frac{1564.3}{20}$ = 78.215 ≈ 78.2	$\frac{1267.7}{20}$ = 63.385 ≈ 63.4	$\frac{1669.7}{20}$ = 83.485 ≈ 83.5	$\frac{1592.5}{20}$ = 79.625 ≈ 79.6

MY WORKING OUT TOOK TOO MUCH SPACE TO INCLUDE SO YOU HAVE BASICS. THIS IS AN EXAMPLE OF PART OF IT TO DEMONSTRATE MY ABILITY – ACE

$$\frac{1592.5}{20} = 79.625$$

General Assumption/Shortened Conclusion:

Looking at the median between English pre and post covid and math pre and post covid, it can be seen that both have decreased (by 16.55% and 6.5%). Based on this along with the larger range of both subjects after covid. (26.8 vs 35 for English and 23.5 vs 30.8 for math) it's obvious the overall class results have decreased between before and after the pandemic.

<u>Explanation/Conclusion/Evaluation:</u>

The results of the experiment conclude that Covid had negatively impacted students ability in a variety of subjects at varying levels. This has depended on the type of content and regular way it would be taught as well as the available potential substitutes. My results align and confirm my original hypothesis.

<u>Assumptions and Limitations:</u>
- The amount of people surveyed allowed for 20 grades. This is a small sample size and therefore may not be accurate for the larger population. (L)
- The entire class is actively contributing to their own learning during the Covid lockdown/performing at that of the average population. (A)
- The type of students results are Gifted and Talented, as a result the extension or general classes may have been affected drastically differently as GaT performs and moves through work at different rates than the average population. (A/L)
- Another limitation is the reliability of the markers, under the instance one marker was particularly easy in comparison to another. (In an attempt to combat this one of the results pre and post maintained the same teacher to aid in regularity) (L)
- The sample size are all the same age, as a result they are all going through a similar period of life, having a variety of ages including within the results would create a more accurate picture of the overall effect of covid. (L)
- The conditions of the experiment are ever-changing as predicting human behaviour is nearly impossible. Due to this the results are a generalised average at best. (L)

Every time this experiment is completed the results will be different. As a generalisation it will have a decrease in performance as you deny a physical aid in the learning process during the lockdowns. To further improve their experiment the following things should be done;
- An increased sample size, a minimum of 100 students on a school scale. If providing a state scale or national scale. A minimum of 10% of the highschool population affected by covid. This is to ensure a more accurate representation of the wider population.
- An increased variety of students in the sample, rather than just GaT. The sample of students should include, foundation, general, aspiring, extension and GaT to demonstrate the impact on society as a whole- not a single group.
- A variety of ages, this study follows a group of students from the Class of 2023. If this experiment was to be performed again, the best course of action would be to pull students from Class of 2020-2024 as the most heavily affected groups as it creates a wider sample and example of students who have just begun their highschool to those on the near end of graduating and how it affected their final grades.

- Considering the effect of the pandemic on a larger scale of subjects as this experiment has focused on the two 'main' subjects, however other classes that align closer to English like HaSS or Arts where there is not always a 'real' answer could be more heavily affected and thus more detrimental to their knowledge than a math or science subject.