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Introduction

Statistics is the science of numbers that deals with the analysis of their grouping, processing, and interpretation. With the help of statistical methods, we can better understand a wide range of phenomena that at first glance may seem chaotic. Statistics also help us not to make hasty decisions about cliché topics with the help of numbers, graphs, and diagrams.

In this project we will analyze the math test results (out of 20) of a class of 40 children who are learning mathematical concepts. A part of the children was given a special app as a learning tool and we will try to find out if it helped the children in their learning process.

Of course, there are other important variables that shaped the results of that test, but I would try to use the paired sample t-test to find out if the actual app had a significant influence. The real question is if the influence was significant.

The next table presents the number of the students, the test scores before using the app and the test scores after using the app.

Stud	Score before using the app	Score after using the app
1	12	14
2	9	9
3	8	10
4	9	11
5	12	15
6	14	15
7	15	15
8	17	10
9	18	20
10	15	20
11	14	18
12	14	16
13	14	17
14	12	14
15	10	20
16	11	15
17	8	4
18	7	10
19	6	11
20	6	19
21	5	16
22	17	17
23	19	19
24	20	12
25	17	18
26	16	20
27	17	19
28	12	20
29	13	14
30	11	14
31	12	13
32	6	9
33	8	20
34	10	17
35	15	17
36	17	17
37	17	19
38	18	20
39	12	13
40	17	15

Outliers

An outlier is an observation that is exaggeratedly different from the rest of the observations in a particular group. In this particular case we can see that there are no significant outliers, and the distribution is relatively uniform. This means that our calculations can be considered valid. If, let’s say, we found any outliers than we would have simply removed them from the observations.

Descriptive statistics

In short, descriptive statistics help us see the characteristics of a certain data set by providing summaries of the sample measurements. The mean, median, and mode are the most well-known types of descriptive statistics. The average is computed by summing all the figures in a data collection and then dividing by the number of figures in the set.

After applying some descriptive statistics formulas, we can tell that, before using the app, the mean is M=12.75 and the standard deviation in S= ±4.10 at a 95% confidence interval. The median and the mode are 12.5 and 17.

Test score before using app	
Mean	12.75
Standard Error	0.648222421
Median	12.5
Mode	17
Standard Deviation	4.099718564
Sample Variance	16.80769231
Kurtosis	-0.992832012
Skewness	-0.208284596
Range	15
Minimum	5
Maximum	20
Sum	510
Count	40
Largest (1)	20

Smallest (1)	5
Confidence Level (95.0%)	1.311153606

In this table we can observe the descriptive variables before the children used the application

Test score after using the app	
Mean	15.3
Standard Error	0.618310353
Median	15.5
Mode	20
Standard Deviation	3.910538031
Sample Variance	15.29230769
Kurtosis	0.208539231
Skewness	-0.732901282
Range	16
Minimum	4
Maximum	20
Sum	612
Count	40
Largest (1)	20
Smallest (1)	4
Confidence Level (95.0%)	1.250650736

In this particular table we can see the changes that occurred after using the app.

Hypothesis

The null hypothesis is an arithmetic theory that states that no statistical link or significance exists between two sets of observable data and measured events in a set of single, observed variables. Hypotheses are very important in determining the importance of variations between experiments and data.

In this project, I will try to use two hypotheses. The first one is the null hypothesis(H0) that tells us that the math application had no effect, and the other hypothesis(H1) tells us that the application had home significant influence on the learning process.

Tools

I used Microsoft Excel to implement the paired sample t-test. A t-test is an inferential statistic that is used to see if there is a significant difference in the means of two groups that are related in some way. It's most implemented when data sets, such as those obtained by flipping a coin 100 times, are expected to follow a normal distribution and have unknown variances. A t-test is a hypothesis testing technique that enables for the testing of a population-based assumption.

To evaluate statistical significance, a t-test examines the t-statistic, t-distribution values, and degrees of freedom. An analysis of variance must be used to execute a test with three or more means. The p-value tells us how likely the data that we observe accepts the null hypothesis and, in our situation, it is equal to 0.003504841. Alpha is a value which shows us if the t-test that we carried out is significant and, in our study, it is equal to 0.10, 0.05 and 0.01. We can see that the p value is smaller than our critical values and that means that the null hypothesis is rejected. The conclusion that we can make is that the math application enhanced the learning process of the children and helped to achieve higher results at the test.

Conclusion

In conclusion, we can clearly see the benefits of integrating the technology in education and now we have the evidence to support that. This kind of studies can help the government to manage their expenses better. Learning technology professionals have long been advocating for the integration of technology in education because the one-size-fits-all method of instruction doesn't work for every child, it's essential that we revaluate our teaching methods. The study of how each student learns and develops may help schools create a stronger connection with each child in their classrooms.

If we're truly committed to creating a globally competitive workforce, we need to start by focusing on the teachers who are responsible for leading their students to learn. Through technology, we can support educators to deliver the best possible instruction. We also need to rethink our testing practices and how we collect and compare student data. We should be analysing a wide range of inputs, including state testing, not just one month's worth of a few state tests. If we're using data that's not truly representative of how

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