

Write a Research Brief/Report

Overview of Assignment:

As a Data Analyst for the US Census Bureau, you will be asked to write reports and research briefs for many government officials according to different topics and questions they present to you. In this case, 5 governors from US states asked your boss, the Bureau Chief, “Are households in my state doing better than 10 years ago?” Your chef then gave you the assignment and told you to “handle it.” As the Data Analyst, you were to select 1 state from the available 5 and write a research brief, or report, to that governor answering their question.

In this assignment, you will pull together all the works from Parts 1-4 to write this brief!

Pieces of the Assignment

To write up your report you will complete the following components that make up the assignment

1. Introduction and Background
 - a. What question are you trying to answer?
 - b. Why are you answering this specific question?
2. Methodology
 - a. What data did you use for this report?
 - b. Why is that data reliable and useful?
 - c. What variables did you select for analysis?
 - d. How did you use the data to answer the question?
 - e. What steps did you take to analyze our data?
3. Data Analysis and Results
 - a. What were the results of your data analysis (the steps we took to analyze the information)?
4. Conclusion
 - a. What is your answer to the question?
 - b. Do you know if the answer is reliable?
 - c. What questions do you still have that can contribute to the answer in a future analysis?

Resources Available to You

For each component of the report, or research brief, you will be provided with an example of how another analyst thought about each step with a similar question but a different set of data.

Directions:

Go on to page 2 to begin writing your research brief answering whether or not the households in their state are doing better than 10 years ago!

Directions:

- Read through the example of a research brief by Marvin Espinoza on this page (page 2)
 - You can find a nicer looking example at the very bottom of this document
- Review the annotated example of the research brief on the next page (page 3)

Example Research Brief

Report to the Principal: Is One Math Instructor Teaching more effectively than 5 years ago?

By Marvin Espinoza

Introduction and Background

At the beginning of 2015, the Principal of New Middle School asked the school district's Chief Academic Officer (CAO), "Is our math instructor teaching students more effectively than 5 years ago?" The CAO immediately assigned Academic Analytics to conduct an analysis and write a report to the Principal sharing our findings. In this report, we answer the question for the Principal while providing the data we used for analysis and what type of analysis we executed.

Methodology

For our analysis, we used the interim test scores of students from last year and 5 years ago. We have the interim test scores for each quarter of the 2 difference school years: quarter 1 test scores for 2009 and 2014, quarter 2 test scores for 2009 and 2014, quarter 3 test scores for 2009 and 2014, and quarter 4 test scores for 2009 and 2014. We use the interim test scores because while the math curriculum has changed slightly, the interim tests have remained largely unchanged for over the past 5 years.

Because certain students were unable to finish the school year each year because of many reasons like moving, we conducted a 10% random sample of students in both years from the math teacher's class to create representative samples. For 2009 test score data, we had a total of 15 students in our sample. For 2014 test score data, we had a total of 17 students in our sample.

Once we conducted our sample, we calculated the average test scores for each interim each year. Then we took the difference between each variable and conducted 2 sample, 2-tailed t-tests with a 95% confidence interval to determine whether the difference in scores between the two school years were statistically significant. For example, we took the difference between: the average Q1 2009 score and the average Q1 2014 score; the average Q2 2009 score and the average Q2 2014 score. Then we ran a t-test for that difference to determine whether the two averages were statistically different from one another.

Data Analysis and Results

After we ran our t-tests on each set of differences between quarter interims' score averages, we found the following results summarized in Table 2 below:

Calculation	Avg '09 Score	Avg '14 Score	Diff in Score	T - Stat	Critical Value	Stat Sig?
Q1 Interim '09 - '14	42.3	63.5	21.2	2.54	1.697	Yes
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Q4 Interim '09 - '14	73.4	82.8	9.4	1.50	1.697	No

Conclusion

Based on our results, we conclude that that one math teacher did improve. He increased overall achievement for every quarter evaluated. For Q1 through Q3, the teacher created statistically significant increases in student achievement on interim tests. Only in Q4, we noted that the teacher did not create a statistically significant increase in student achievement.

The math teacher in question noticeably raised scores, and although his last quarter did not result in a statistically significant change, we at least can see that a 9 percentage point increase from 73% to 82% is noticeable. If it were only a 3 percentage point increase, then we could say there was no real difference.

Directions:

- Below is the annotated example of a research brief by Marvin Espinoza
- Review the 5 components that make up a research brief listed
- After you've reviewed the annotated example along with the 5 components, go on to begin writing your research brief, or report, on page 4 (the next page)

The 5 Components of a Research Brief or Report

1. Title and Author Name
2. Introduction and Background
3. Methodology
4. Data Analysis and Results
5. Conclusion

Annotated Example Research Brief

Report to the Principal: Is One Math Instructor Teaching more effectively than 5 years ago?
By Marvin Espinoza

Introduction and Background

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1.0 - Title and Author Name

Directions:

- Read section 1a and see how 1a translates into 1b, where the content is broken down into an organizer
- Then fill out section 1c with your specific information
- Finally, in Section 1d, write out your final text to match section 1a, but with your information!

1a - Exemplar Text	1b - Exemplar Broken into Component Parts						
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1c - Your Text in Component Parts	1d - Your Final Text (don't worry about formatting until later)						
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Element	Text						
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2.0 - Introduction and Background

Directions:

- Read section 2a and see how 2a translates into 2b, where the content is broken down into an organizer
- Then fill out section 2c with your specific information
- Finally, in Section 2d, write out your final text to match section 2a, but with your information!

2a - Exemplar Text	2b - Exemplar Broken into Component Parts								
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3.0 - Methodology

Directions:

- Read section 3a and see how 3a translates into 3b, where the content is broken down into an organizer
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4.0 - Data Analysis and Results

Directions:

- Read section 4a and see how 4a translates into 4b, where the content is broken down into an organizer
- Then fill out section 4c with your specific information
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5.0 - Conclusion

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Putting It All Together

Directions:

In the column, “Your Final Text for Each Section (#d),” you will copy and paste your final text into the appropriate section of the table below.

Section	Cover Letter Piece	Your Final Text for Each Section (#d)
1d	Title and Author Name	
2d	Introduction and Background	
3d	Methodology	
4d	Data Analysis and Results	
5d	Conclusion	

Formatting Your First Rough Draft of Your Cover Letter

Directions:

Now that you have all the elements of your report to the governor finished, you will now take the following steps to create your report's first draft:

1. Make sure the block below is on a full page by itself.
2. Copy and paste the elements of your report to look like the exemplar provided to you.
3. Make sure that the text in your first draft matches the following requirements:

Section	Font	Text Size	Bolded or Not Bolded?
1.0 - Title and Author Name	Times New Roman	16	Bolded
1.0 - Title and Author Name	Times New Roman	12	Not Bolded
2.0 - Introduction and Background	Times New Roman	12	Not bolded
3.0 - Methodology	Times New Roman	12	Not bolded
4.0 - Data Analysis and Results	Times New Roman	12	Not bolded
5.0 - Conclusion	Times New Roman	12	Not bolded

Block (copy/paste your cover letter elements inside this box, and they should take up no more than 1 page):

Report to the Principal: Is One Math Instructor Teaching more effectively than 5 years ago?

By Marvin Espinoza

Introduction and Background

At the beginning of 2015, the Principal of New Middle School asked the school district's Chief Academic Officer (CAO), "Is our math instructor teaching students more effectively than 5 years ago?" The CAO immediately assigned Academic Analytics to conduct an analysis and write a report to the Principal sharing our findings. In this report, we answer the question for the Principal while providing the data we used for analysis and what type of analysis we executed.

Methodology

For our analysis, we used the interim test scores of students from last year and 5 years ago. We have the interim test scores for each quarter of the 2 difference school years: quarter 1 test scores for 2009 and 2014, quarter 2 test scores for 2009 and 2014, quarter 3 test scores for 2009 and 2014, and quarter 4 test scores for 2009 and 2014. We use the interim test scores because while the math curriculum has changed slightly, the interim tests have remained largely unchanged for over the past 5 years.

Because certain students were unable to finish the school year each year because of many reasons like moving, we conducted a 10% random sample of students in both years from the math teacher's class to create representative samples. For 2009 test score data, we had a total of 15 students in our sample. For 2014 test score data, we had a total of 17 students in our sample.

Once we conducted our sample, we calculated the average test scores for each interim each year. Then we took the difference between each variable and conducted 2 sample, 2-tailed t-tests with a 95% confidence interval to determine whether the difference in scores between the two school years were statistically significant. For example, we took the difference between: the average Q1 2009 score and the average Q1 2014 score; the average Q2 2009 score and the average Q2 2014 score. Then we ran a t-test for that difference to determine whether the two averages were statistically different from one another.

Data Analysis and Results

After we ran our t-tests on each set of differences between quarter interims' score averages, we found the following results summarized in Table 2 below:

Calculation	Avg '09 Score	Avg '09 Score	Diff in Score	T - Stat	Critical Value	Stat Sig?
Q1 Interim '09 - '14	42.3	63.5	21.2	2.54	1.697	Yes
Q2 Interim '09 - '14	50.6	70.9	20.3	1.94	1.697	Yes
Q3 Interim '09 - '14	62.9	82.4	19.5	2.01	1.697	Yes
Q4 Interim '09 - '14	73.4	82.8	9.4	1.50	1.697	No

Conclusion

Based on our results, we conclude that that one math teacher did improve. He increased overall achievement for every quarter evaluated. For Q1 through Q3, the teacher created statistically significant increases in student achievement on interim tests. Only in Q4, we noted that the teacher did not create a statistically significant increase in student achievement.

The math teacher in question noticeably raised scores, and although his last quarter did not result in a statistically significant change, we at least can see that a 9 percentage point increase from 73% to 82% is noticeable. If it were only a 3 percentage point increase, then we could say there was no real difference.