

P Chapter 9 Projects

Project A: Screentime Challenge

Students sometimes get a bad reputation for the amount of time they spend on their smartphones. But what about the screen times of faculty and staff? Do you think students really have higher screen time averages than the faculty and staff at their schools? This project will allow you to investigate this claim for yourself.

Step 1: For this project you will need 30 volunteers, with approximately half being students and half being faculty or staff. (It doesn't have to be exactly 15 each.) Ask each volunteer to look up *yesterday's* total screen time as recorded on their smartphone. It's important that the screen times recorded are all the same day of the week for consistency. It is also necessary to record a full day of screen time, which is why you cannot use the screen time for the current day, which would be incomplete. Keep your data organized in a chart.

Step 2: Divide the results into two groups, students and faculty/staff. Compute the mean and sample standard deviation of each group. Record your statistics below.

$n_{\text{students}} =$ _____	$n_{\text{faculty / staff}} =$ _____
$\bar{x}_{\text{students}} =$ _____	$\bar{x}_{\text{faculty / staff}} =$ _____
$s_{\text{students}} =$ _____	$s_{\text{faculty / staff}} =$ _____

Step 3: Construct a 95% confidence interval for the true difference between the mean screen time of students and faculty/staff. Assume that the population variances are not the same and that the population distributions of screen times are approximately normal for both students and faculty/staff.

Step 4: Consider your results and write up your conclusion. Does your study show that students average more screen time than faculty and staff? Are your results convincing? Why or why not? Consider other factors such as how the sample was chosen, possible sources of bias, and the limits of interpreting the confidence interval when you make your conclusion.

Project B: Knowledge of Historical Dates

Many adults assume that college students don't know their history. Let's do an experiment to see if a simple crash course can improve college students' knowledge of important historical dates. This experiment will involve some research and preparation on your part.

Step 1: Begin by preparing a set of flashcards with the following historical events and their corresponding dates. Each flashcard should have one event on the front of the card and its date on the back. If you wish, you can even include pictures or colors to help distinguish the different historical events.

Historical Event	Event Date
Fall of Rome	476 AD
Dark Ages	500 - 1000 AD
US Civil War	1861 - 1865
Moon Landing	1969
Boston Tea Party	1773
September 11	2001
Invention of the Telegraph	1844
WWI	1914 - 1918
Pearl Harbor	1941
Great Depression	1929 - 1939
Columbus Discovers the New World	1492
Wright Brothers First Flight	1903

Step 2: Next, you will need to find 10 willing college student volunteers. You will give each volunteer a pretest and a posttest using the flashcards. For each volunteer, show them the historical events on the fronts of the flashcards and ask them to name the date(s) on the back. Record how many answers he gets correct out of 12. After the pretest, give them the answers. Coach them for five minutes on the historical events and dates. Next, visit with them for a few minutes about the class, what you are doing in this project, the weather, your favorite sports team, and so forth. Then, shuffle the flashcards and quiz your participant a second time. Record how many answers the participant gets correct out of 12. Thank them for their help with the project.

Step 3: Once data have been collected from 10 college students, calculate the paired difference for each student by subtracting the pretest score from the posttest score.

Pretest Score, x									
Posttest Score, y									
$d_i = y_i - x_i$									

Step 4: Calculate each of the following sample statistics.

$$\bar{d} = \underline{\hspace{2cm}} \qquad s_d = \underline{\hspace{2cm}}$$

Step 5: Construct a 95% confidence interval for the true mean difference between the students' scores on the posttest and pretest. Assume that the population distribution of the paired differences is approximately normal.

Step 6: Did your "crash course" on historical dates improve the students' knowledge? Give a conclusion for your study and discuss what these results mean. Consider how you chose the participants in your sample and whether their initial knowledge of the events on your flashcards impacted your results.