Studying Hours of Northland College Students

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Introduction

There has been a lot of research done on human social behavior because it is something that many people are interested in. The differences between ages and gender are very popular subjects. It is important for people, especially those in psychology fields, to find studies that compare different groups of people. Many wonder the differences between people of different ages, and the difference between men and women.

This study was important to me to see if there was a distinction between the grade levels at Northland College, and to see if there was a difference between males and females at Northland College. Since studying is important to me, for the reason I am in college is to learn, I looked to see the average hours of study done by my fellow students. This study is also useful to others who wonder what the study habits are like for Northland College students. This even could be useful for incoming students wondering what the life of a student is like, and wondering how much time an average student at Northland spends studying.

This study looks to see if the number of hours studied per week differs between students in different years in school (upperclassmen and lowerclassmen) and gender (males and females) at Northland College in fall 2007.

Methods

To collect the data, I used two different methods. For one method I asked people around campus face-to-face, questioning them on their year in school and, on average, how many hours they studied per week this semester (Fall '07). I also wrote down if they were male or female. The second method was when I used the phone directory for the Northland Campus, and removed about thirty random numbers, called each one, and asked my two questions (and recorded, according to their voice, if they were male or female).

My sampling methods were not completely random because in order to be able to collect data from upperclassmen (especially seniors), I was not able to randomly call dorm rooms, since most seniors and many juniors do not live on campus. I tried to be as random as possible with whomever I did call in their room, and I tried to ask as many people as possible around campus, but I do not claim my data as random.

To analyze the data, I used 2 two-sample t-tests, one comparing sex with number of hours studied per week, and the other was used to compare grade levels with number of hours studied per week.

Results

For the hours studied by Northland College students, the shape of the distribution was right skewed with no outliers (figure 1). The center was measured by the median, which was 7.0 (table 1). The dispersion was calculated by the IQR, with Q1 being 5.0 and Q3 being 12.0 (table 1). I chose to calculate the center and dispersion with the median and the IQR because the data is strongly right skewed (figure 1), meaning the data are best summarized by the median and the IQR.

The number of individuals questioned between males and females was about equal, with females being 51.3% of the sample (table 2).

The number of individuals questioned between grade levels was somewhat unequal, with sophomores representing 46.1% of the students (figure 2, table 3).

Comparing males and females with the four grade levels, it can be seen that the greatest proportion was sophomore males, followed by sophomore females (table 4).

It appears that between males and females that there is not much of a difference between their average studying hours. Both males and females have right skewed distributions, meaning that there are more individuals in each group that study on the lesser end of number of hours (figure 3). It appears that females study, on average, two hours more than males (figure 3). Females also have more variability than males, and have a bigger range between their Q1 and Q3 (figure 3). Although it appears that females may study a little bit more, there really is not too much of a statistical difference between males and females.

Since there was a lower number of samples in the upper classes versus the lower classes, freshmen and sophomores were combined, and junior and seniors were combined in order to compare lowerclassmen study hours versus the upperclassmen study hours. It was found that between lowerclassmen to upperclassmen, they studied, on average, about the same number of hours (about 7 hours a week). The upperclassmen had more variability within their group, with Q1 being about 4 (for lowerclassmen it is about 5) and Q3 being about 15 (about 11 for lowerclassmen). From looking at this, there is not much of a difference between the lower and upper classmen, but most likely more samples for the upperclassmen would need to be taken to fully compare these two properly. (figure 4)

<u>11-Steps for Males versus Females</u>

(1) Since the data is quantitative (number of hours studied), there are two populations (females and males), and they are independent, the two-sample t-test was used.
(2) The null hypothesis states that μ_f is equal to μ_m, meaning that there would be no difference between the number of hours studied by females and males. The alternative hypothesis states that μ_f is not equal to μ_m, meaning that there would be a difference between the number of hours studied by females and males.
(3) The rejection criterion (α) is equal to .05.
(4) The data was not random and it was observational.
(5) The assumptions for the two sample t-test are that the groups are independent (which they are) and that the two sample sizes are large. Since the two sample sizes add up to 76, which is larger than 40, the assumption is met. The third assumption is that σ_f^2 is equal to σ_m^2. To find this, a Levene's Test must be done (table 5).

(i) Levene's Test
(ii) H_o: $\sigma_f^2 = \sigma_m^2$ and H_A: $\sigma_f^2 \neq \sigma_m^2$
(iii) alpha is equal to .05.
(viii) p-value=.2788, which is greater than .05
(ix) do not reject the null hypothesis
(x) the variances are equal (assumption is met)

(6) The statistic is the differences of females and males (x-bar sub f-m), which is equal to 1.64657 (table 6).
(7) The appropriate test statistic is the t-test, and a t equal to 1.0909 was found, and the degrees of freedom equal 74 (table 6).
(8) The p-value is equal to .2788 (table 6).

(9) The p-value is greater than the rejection criterion, so we do not reject the null hypothesis.
(10) The average hours studied per week by Northland College students appear not to differ between males and females, on average.

11 Steps for Lowerclassmen versus Upperclassmen

(1) Since the data is quantitative (number of hours studied), there are two populations (lowerclassmen and upperclassmen), and the populations are dependent, the two-sample t-test was used.
(2) The null hypothesis states that μ_l is equal to μ_u, meaning that there would be no difference between the number of hours studied by lowerclassmen and upperclassmen. The alternative states that μ_l is not equal to μ_u, meaning that there would be difference in the number of hours studied.
(3) The rejection criterion is equal to .05.
(4) The data was not random and it was observational.
(5) The assumptions for the two-sample t-test are that the groups are independent (which they are) and that the two sample sizes are large (>40), which it is (it is added up to 76). The third assumption is that σ_l^2 is equal to σ_u^2. To find this, a Levene's Test must be done (table 7).
    (i) Levene's Test
    (ii) H_o: $\sigma_l^2=\sigma_u^2$ and H_A: $\sigma_l^2\neq\sigma_u^2$
    (iii) alpha is equal to .05
    (viii) p-value=.114, which is greater than .05
    (ix) do not reject the null hypothesis
    (x) the variances are equal (assumption is met)
(6) The statistic is x-bar of the differences, which is equal to -1.425926 (table 8).
(7) The appropriate test statistic is the t-test, and t is equal to -.8546, and the degrees of freedom equaled 74 (table 8).
(8) The p-value is equal to .3955 (table 8).
(9) The p-value is greater than the rejection criterion, so we do not reject the null hypothesis.
(10) The average number of hours studied per week by Northland College students does not appear to differ between lowerclassmen and upperclassmen, on average.

Discussion

Overall, I found that there was no difference in the number of hours studied per week between grade levels or gender at Northland College. I also found that most students sampled studied between 5 to 15 hours per week. Between grades, I was surprised to find that there was no difference between the grade levels, for I expected the number of hours to increase with the higher grade level. Between males and females, there was no difference, and I was not surprised to find this, for even though people of different sexes differ in many things, I did not expect it to differ for the number of hours studied.

To research this again, I would probably collect more data, especially within higher grade levels, in order to make the samples more comparable and less variable (since with more individuals less variability is seen). I would also try to see if there was a better way to collect data, such as a mass email, though this could be difficult since many do not respond to emails or check it often. Most likely, though, I would probably keep my same collection method. Research in the future that is on a small scale could be trying to collect enough data to be able to

compare males and females within grades (example such as comparing all females between the four grade levels). On a larger scale, future research could possibly compare results from Northland College to another campus, to see if there is a difference in school sizes or public versus private colleges.

Appendix

Table 1. Summary of statistics for hours studied per week by Northland College students in fall 2007.

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	StDev
0.500000	5.000000	7.000000	9.237000	12.000000	30.000000	6.585071

Table 2. Proportions table of females versus males.

Sex	
F	M
51.31579	48.68421

Table 3. Proportions table of freshmen, sophomores, juniors, and seniors.

f.year			
FR	SO	JR	SR
25.00000	46.05263	17.10526	11.84211

Table 4. Total proportions table of sex versus year in school.

	Sex	
f.year	F	M
FR	0.10526316	0.14473684
SO	0.19736842	0.26315789
JR	0.13157895	0.03947368
SR	0.07894737	0.03947368

Table 5. Levene's test calculations used for the assumptions of the two sample t-test for hours studied per week by male and female Northland College students.

Levene's Test for Homogeneity of Variance

	Df	F value	Pr(>F)
group	1	0.4759	0.4924
	74		

Table 6. Two sample t-test R output with values used in steps 6 through 10 for number of hours studied per week by Northland College students between males and females.

Two Sample t-test

data: Hours by Sex
t = 1.0909, df = 74, p-value = 0.2788
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
-1.360837 4.653976

```
sample estimates:
mean in group F mean in group M
      10.038462        8.391892
```

Table 7. Levene's test calculations used for the assumptions of the two sample t-test for hours studied per week by lowerclassmen and upperclassmen Northland College students.

```
Levene's Test for Homogeneity of Variance
      Df F value Pr(>F)
group  1  2.5578  0.114
      74
```

Table 8. Two sample t-test R output with values used in steps 6 through 10 for number of hours studied per week by Northland College students between lower and upper classmen.

```
        Two Sample t-test

data:  Hours by Year
t = -0.8546, df = 74, p-value = 0.3955
alternative hypothesis: true difference in means is not equal to
0
95 percent confidence interval:
 -4.750600  1.898748
sample estimates:
mean in group L mean in group U
       8.824074       10.250000
```

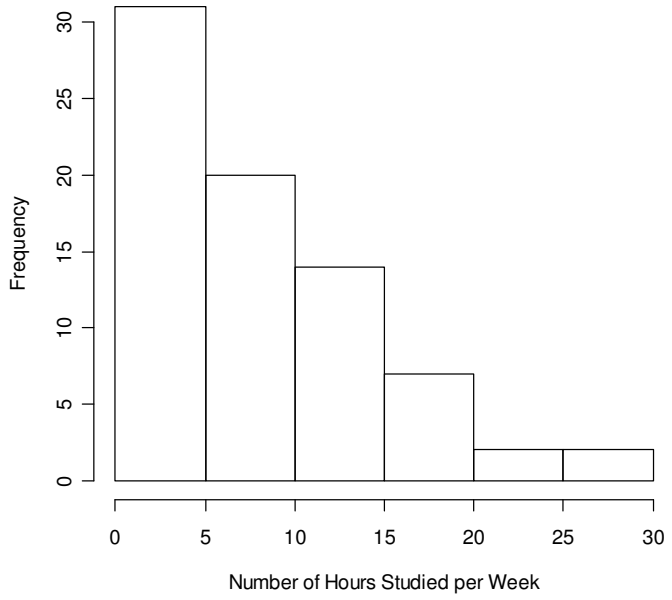

Figure 1. Histogram of the frequency of hours studied per week by Northland College students in fall of 2007.

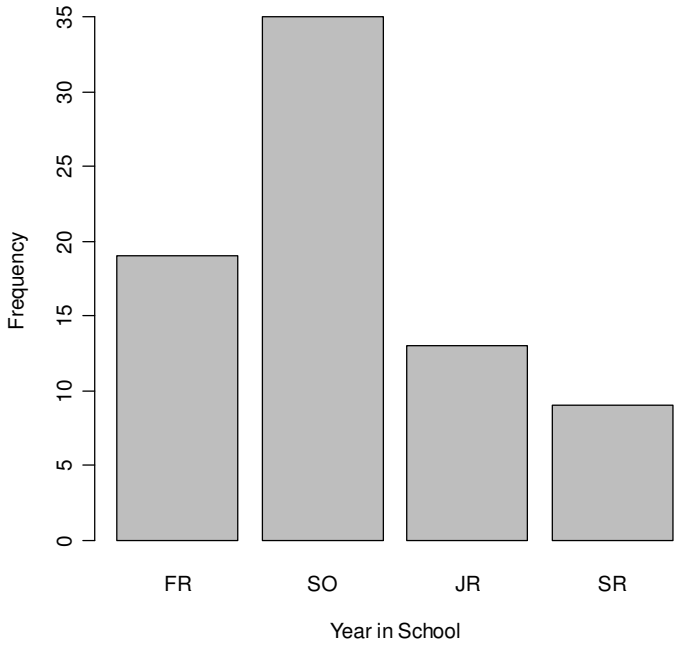

Figure 2. Barchart for the frequency of students in each grade level (freshmen, sophomores, juniors, and seniors).

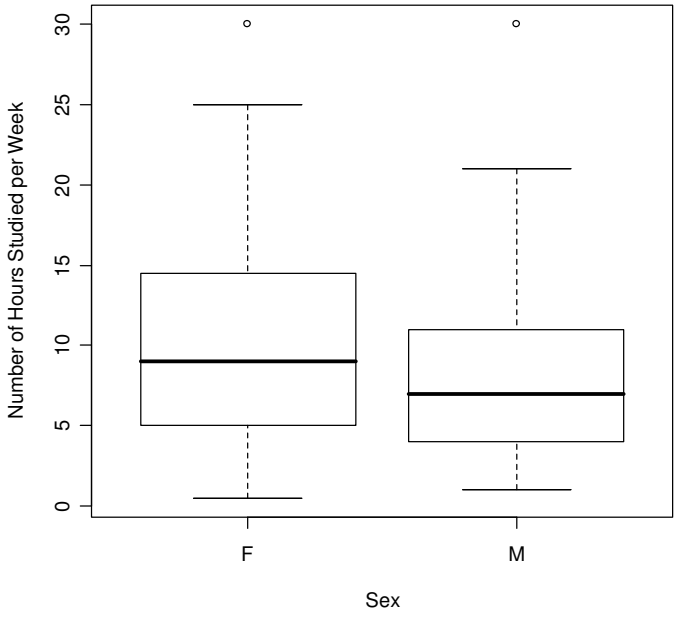

Figure 3. Boxplot for the number of hours studied per week by Northland College students separated between females and males.

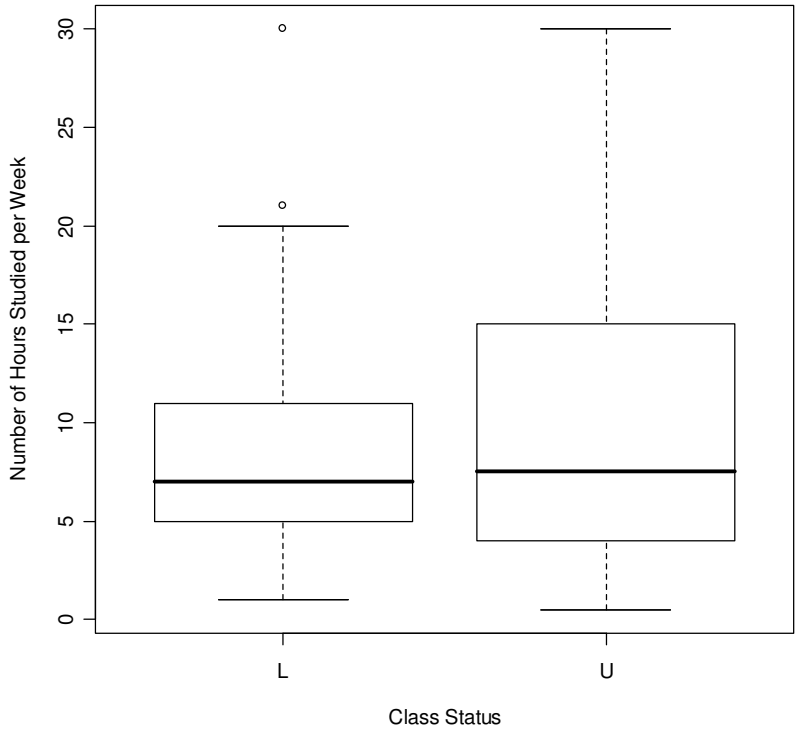

Figure 4. Boxplot for the number of hours studied per week by Northland College students separated between lowerclassmen and upperclassmen.

Commands

```
library(NCStats)
study2<-read.table("statspro.txt",header=T)
str(study2)
attach(study2)
hist(Hours,main="",xlab="Number of Hours Studied per Week")
Summary(Hours)
tbl.s<-table(Sex)
tbl.s
prop.table(tbl.s)*100
boxplot(Hours~Sex,ylab="Number of Hours Studied per Week",xlab="Sex")
Levenes(Hours~Sex)
t.test(Hours~Sex,var.equal=T)
detach(study2)
studyg<-read.table("stats3var.txt",header=T)
str(studyg)
attach(studyg)
f.year<-factor(Year,levels=c("FR","SO","JR","SR"))
f.year
tbl.y<-table(f.year)
tbl.y
```

```
prop.table(tbl.y)*100
barplot(tbl.y,xlab="Year in School",ylab="Frequency")
freq.tbl<-table(f.year,Sex)
freq.tbl
tot.tbl<-prop.table(freq.tbl)
tot.tbl
detach(studyg)
studyul<-read.table("stats3var.txt",header=T)
str(studyul)
attach(studyul)
tbl.ul<-table(Year)
tbl.ul
prop.table(tbl.ul)*100
freq.tbl<-table(Year,Sex)
freq.tbl
boxplot(Hours~Year,ylab="Number of Hours Studied per Week",xlab="Class Status")
Levenes(Hours~Year)
t.test(Hours~Year,var.equal=T)
detach(studyul)
```