Clocking In Facebook Hours

A Statistics Project on Who Uses Facebook More—Middle School or High School?

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Introduction

With Today's technology, adolescents no longer venture out of their homes to "hang out" with their friends. Rather, the luxuries of a computer, keyboard, and social networking sites such as facebook occupy the passing day hours as social connections are maintained indoors.

As older siblings to middle school students, we both have seen how facebook easily becomes an "addiction," taking away from studying time and a normal sleep schedule. As high school students ourselves, we also use facebook frequently as the social networking has become both a way to communicate to friends all of the nation and the world as well as asking for help on a homework assignment. With such a personal experience as well as the drastic change in society that has occurred due to facebook, a study in the form of surveys was conductged to see if facebook affects one significant age group more so than another.

Since facebook has an age minimum mainly as a safety precaution, thus largely allowing the socialization of two significant age groups—individuals who are in middle school and individuals who are in high school. Since a sample of these two significant groups could be obtained easily, the study was focused on the comparison of the number of hours Middle School students use facebook and the number of hours High School Students use facebook. Thus, a survey was conducted on a population of students in middle school and population of students in high school to investigate whether or not the significant population groups have different social networking durations.

General Plan of the Survey

This study was done via surveys on facebook where a sample of 30 middle school students and a sample of 30 high school students were each selected and given the same ten question survey which asked questions about their age, sex, grade, grade point average, hours of sleep, and number of hours on facebook on the weekdays and the weekends. Specific wording and multiple choice selection of answers along with other constants were provided as a means to eliminate as much bias and possible lurking variables for the study. The survey data was then collected, analyzed, and the proper analytical test (Chi-Square Test for Homogeneity) was performed leading to a proper conclusion in regarding the question: Do middle school students spend more time on facebook than high school students?

Experimental Design

Objective: Conducted a survey that would allow a comparison on facebook hours high school students and middle school students use.

Population description: This project entailed that the survey be conducted amongst two significant groups, a high school population and a middle school population. The high school population would be individuals of Oakton High School of all grades, ages, and gender. The middle school population would be individuals of Rachel Carson Middle School of all grades, age, and gender. Each individual would be randomly selected via a specific process detailed below.

Sample description: This survey involved two samples, one sample of 30 individuals who were each randomly selected from Oakton High School and another sample of 30 individuals who were randomly selected from Rachel Carson Middle School. Each actual population is greater than 10n or 300 (sample size) supporting the independence of the survey.

Sample selection process: Two separate populations would be obtained using two facebook lists, one, a list of Oakton High School Students and the other, a list of Rachel Carson Middle School Students. For each separate group the following process was performed once: This sample, one that is a simple random sample because each of the individuals involved have an equal chance of being selected and are not divided into particular blocking of characteristics within their own population. So in using the single facebook list, all individuals were alphabetized by first name and given a number from 000-200. Each individual was then randomly selected for the consistent sample size of 30 individuals. A random digit generator program on a scientific calculator was used to help randomly choose the sample size numbers. Entering the correct key strokes, the numbers 000-200 were generated randomly, and with each generated number the first thirty numbers which corresponded to an individual was the individual selected for the study and any repetition was disregarded.

Study Process: The following was also performed twice, once for each sample: The selected individuals of the sample were placed in a facebook group and messaged with the survey attached in the message. Selected individuals then took a few minutes of their time to answer the multiple choice questions and privately messaged their responses back. In this system, each individual's response remained anonymous. Then the results of the survey were each organized by question and by the number of individuals who answered the particular answer choice. Those statistics and data table information were then analyzed in the form of graphs and graph comparisons as well as through the Chi-Squared Test for Homogeneity with aid of a calculator and computer graphing program (i.e. excel).

The Following Biases were avoided:

- Subject Response inconsistency-survey included two questions that asked the same information in a varied wording/presentation ensuring consistency in answers and allowed the efficient ruling out of a set of answers should the answers to those questions prove inconsistent. The anonymity of the survey submission would also help prevent any other response bias. There was also no actual question proctor for survey questions present preventing a one on one bias that would result in the presence of another individual when the selected individual is filling out the response.

- Voluntary response bias-the survey involved randomly selecting 30 individuals in each respective population which prevented the answers from coming from volunteers which are generally individuals who give more opinionated answers. With the random sampling process, every individual on each respective list had an equal opportunity of being selected.

- Under-coverage bias-the random selection process included all ages, genders, and grades in each population, thus allowed all individuals who are part of each significant group to have had an equal chance of being represented equally in the survey.

- Multiple Choice Advantage-Formatting the survey in the form of multiple choice questions allowed for a range of answers to be used in the form of answer choices thus allowing the answering subjects to feel more comfortable in disclosing more personal information such as GPA values. It was also easy to gather the data and the questions were also presented in a fairly known form, making student subjects more willing to complete survey.

- Non-response Bias-During the survey conduction process, there were times where individuals were unwilling and unresponsive in regards to the survey and multiple messages were sent out to non-responsive individuals until every member in the sample of 30 individuals responded to the survey. It can be concluded that due to the time consumption and immense hassle that resulted from the lack of response makes facebook not an ideal forum for the facilitation of a survey.

The Following Biases were not/may have not been avoided:

- Multiple Choice Disadvantages-multiple choice question survey formats limited the response options and could have skewed some responses as the exact answer choice may have not been present for the particular individual when he or she answered the survey.

- Number of Options in survey irregularity-Some of the questions on the survey only had two answer choices and some questions had more than the traditional four answer choices which offered more options. Such irregularity could have influenced response bias though not to a degree in which the results were heavily skewed in one direction or the other.

- Gender Balance Bias-This project did not create samples that were equal in gender as the population in order to prevent under-coverage of genders, included both genders. It happened that by chance the middle school sample had an equal number of male and female subjects; however that was not the case for the high school sample. Thus some of the data could have a gender bias as there may be a difference in facebook behavior between males and females.

- Possible Lurking variables/Other Biases-Often, surveys could be time sensitive. In this case, the difficulty in obtaining responses and the actual data could have been drastically different had the survey been conducted on the same sample at a different period of the school year. In addition to the aforementioned, the questions when worded in the multiple-choice format lacked in some details, such as the varying amount of homework middle school and high school students have which could have affected the number of hours the student spent on facebook. Also because it is the end of the school year, homework hours as well as amount of sleep hours could have possibly been drastically different.

- **Please note – because we measured the time spend on facebook on intervals, we could not analyze the graphs using the mean, median, mode, range, etc. We did define in the context of this problem what we meant by symmetry, skewedness, and evenness (in the comparison of the two graphs).**

Data Tables

Middle School Student Subjects Total	High School Student Subjects Total
30	30

	Male Students Subjects	Female Student Subjects
Middle School	15	15
High School	11	19

Age Group	Number of Middle School Subjects in Age Group	Number of High School Subjects in Age Group
12	0	0
13	11	0
14	19	0
15	0	4
16	0	6
17	0	7
18	0	13

Hours spent on Facebook (weekday)	Number of Middle School Subjects in that particular Hours range	Number of High School Subjects in that particular Hours range
Less than 1 hour	7	4
1-2 hours	9	8
2-3 hours	7	8
3+ hours	7	10

Hours Spent on Facebook (weekend)	Number of Middle School Subjects in that particular Hours range	Number of High School Subjects in that particular Hours range
Less than 1 hour	7	7
1-2 hours	6	8
2-3 hours	10	9
3+ hours	7	6

Homework Starting Time	Number of Middle School Subjects	Number of High School Subjects
Right after school (2-4 p.m.)	5	3
In the evening (4-9 p.m.)	15	19
Late in the night (9+ p.m.)	10	8

GPA	Number of Middle School Subjects	Number of High School Subjects
Less than 1	0	0
1-2	0	0
2-3	0	6
3-4	19	7

4+	11	17

Hours of Sleep	Number of Middle School Subjects	Number of High School Subjects
Less than 4	0	1
4	2	0
5	0	6
6	9	5
7	13	10
8+	6	8

Facebook Open during Homework?	Number of Middle School Subjects	Number of High School Subjects
yes	20	24
no	10	6

Facebook mainly used for what?	Number of Middle School Subjects	Number of High School Subjects
Socializing	6	2
School	0	0
Both A & B	24	26
Other	0	2

Analysis on the Weekday Graphs

Graphs on Separate Excel Spreadsheet*

The graph of the Amount of Time High School Students Spend on Facebook during the Weekday is slightly skewed to the left – in this context, this means that the high school students tended to use facebook during the weekdays in the greater number of hours range. In the graph of Amount of Time Middle School Students Spend on Facebook during the Weekday is more even and symmetrical which indicates that they seemed to use facebook in the middle hours range. When a two bar graph is used to directly compare the distributions, the high school students seem to tend to use facebook for longer hours – for example, there were a slightly greater number of high school students who used facebook in the 2-3 hour range and the 3+ hour range. The graphs also indicated that the a greater number of middle school students tended to use facebook for the lesser hours – for example, there were more middle school students who spent time on facebook in the 1-2 hour and the less than 1 hour range than high school students

Analysis on the Weekend Graphs

The graphs of the Amount of Time Middle School Students Spend on Facebook during the Weekend and high school students spend on facebook during the weekend seem to both be roughly symmetrical – in the context of this problem it indicates that they seemed to use facebook in the middle hours range. Both of the graphs of the Amount of Time Middle School Students and High School Students Spend on Facebook during the Weekend are roughly even as well – in the context of this problem, that means that even if there was a difference in the, for example, amount of middle school students who use facebook during the weekend for only 2-3 hours, that difference is only by one or two students at most. However, one important thing to note about these graphs is that, even though it is only slightly, the two bar graph that compare these independent samples, does show that middle school students tend to use facebook slightly more than high school students, as they were a greater number of middle school students than high school students who identified themselves as using facebook for either 2-3 hours or 3+ hours during the weekend.

Chi-squared Tests for Homogeneity

Note: α was .05 in this test of inference

Conditions:

- The sample came from an SRS – yes as we did a random number table to pick all the students.
- The data is independent for both groups – a High School student's answer did not effect a Middle School student's answer.
- 10(n) is greater than the population – yes because 30(10) = 300, and there are more than 300 students from Oakton High School using facebook and more than 300 students from Rachel Carson Middle School using facebook.
- All expected counts are greater than 5 – yes because as seen in the matrices below none of the expected counts are lower than 5.5.

H_0: There is no difference in the distributions of the amount of time middle school students spend on facebook during a weekday and the amount of time High School Students spend on facebook during a weekday.

H_a: There is a difference in the distributions

The Amount of Time Middle School Students and High School Students Spend on Facebook During a Weekday

	Less than 1 hour	1-2 hours	2-3 hours	3+ hours

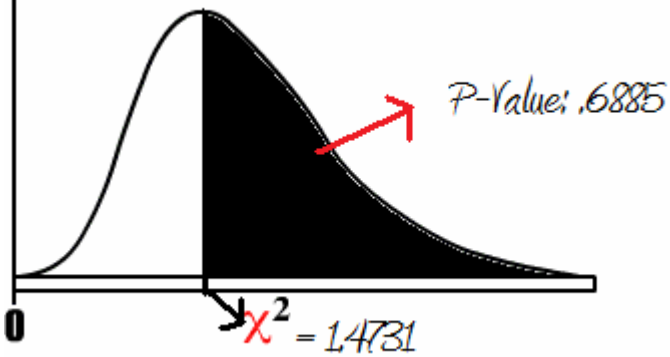
Middle School	7	9	7	7
High School	4	8	8	10

The Expected Amount of Time Middle School Students and High School Students Spend on Facebook During a Weekday

	Less than 1 hour	1-2 hours	2-3 hours	3+ hours
Middle School	5.5	8.5	7.5	8.5
High School	5.5	8.5	7.5	8.5

Results:

$\frac{(O-E)^2}{E} = Chi - Squared = 1.4731$



Chi-squared Value: 1.4731
P-Value: .6885

Conclusion:
Because P is much greater than α (.6885 is much greater than .05) we fail to reject the null hypothesis. This means that we cannot conclude that is a difference in the distributions of the amount of time middle school students Spend on Facebook During a Weekday and The Amount of Time High School Students Spend on Facebook During a Weekday

Chi-squared Tests for Homogeneity

Note: α was .05 in this test of inference

Conditions:

- The sample came from an SRS – yes as we did a random number table to pick all the students.

- The data is independent for both groups – a High School student's answer did not effect a Middle School student's answer.
- y10(n) is greater than the population – yes because 30(10) = 300, and there are more than 300 students from Oakton High School Using Facebook and more than 300 students from Rachel Carson Middle School Using facebook.
- All expected counts are greater than 5 – yes because as seen in the matrices below none of the expected counts are lower than 7.

H_0: There is no difference in the distributions of the amount of time middle school students Spend on Facebook During a Weekend and The Amount of Time High School Students Spend on Facebook During a Weekend

H_a: There is a difference in the distributions

The Amount of Time Middle School Students and High School Students Spend on Facebook During a Weekend

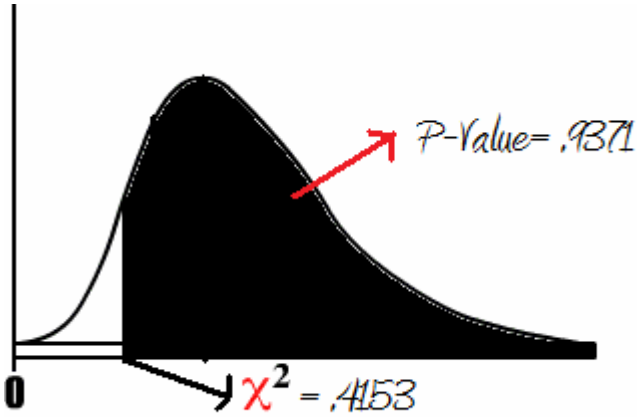
	Less than 1 hour	1-2 hours	2-3 hours	3+ hours
Middle School	7	6	10	7
High School	7	8	9	6

The Expected Amount of Time Middle School Students and High School Students Spend on Facebook During a Weekend

	Less than 1 hour	1-2 hours	2-3 hours	3+ hours
Middle School	7	7	9.5	6.5
High School	7	7	9.5	6.5

Results:

$$\frac{(O-E)^2}{E} = Chi - Squared = .4153$$



Chi-squared Value = .4153
P-Value= .9371

Conclusion:
Because P is much greater than α (.9371 is much greater than .05) we fail to reject the null hypothesis. This means that we cannot conclude that is a difference in the distributions of the amount of time middle school students Spend on Facebook During a Weekend and The Amount of Time High School Students Spend on Facebook During a Weekend.

Conclusion

When analyzing the results of this survey, it is important note that even though we asked 10 questions in the survey, we really only needed to use the answers to three of the questions: Whether the selected individuals of the sample were in Middle School or High school, how much time they respectively spent on facebook during the weekday, and how much time the individuals respectively spent on facebook during the weekend. The rest of the questions we just there either for consistency and to get more information that possibly could have been used but in arriving at the end of this project, that particular remaining data was not used.

Hence, our problem was whether the time spent on facebook by Middle Schoolers (during the weekdays and weekend) differed from the time spent on facebook by High Schoolers (during the weekdays and the weekend). In this context our results were as follows:

It may seem, from a brief glance at the graphs, that high school students seem to spend slightly more time on facebook than high school students during the weekdays, but middle schools seem to spend slightly more time on facebook than high schoolers during the weekends. However, the two chi-squared tests for homogeneity (one for the time spent on facebook during the weekday, and the time spent on facebook during the weekends) each had p-values that were larger than α (.05), which meant we failed to reject the null hypothesis in both tests; the null hypothesis in Weekday test was "there is no difference in the distributions of the amount of time middle school students spend on facebook during a weekday and the amount of time High School Students spend on facebook during a weekday" and null hypothesis in the weekend test was that "There is no difference in the distributions of the amount of time middle school students Spend on Facebook During a Weekend and The Amount of Time High School Students Spend on Facebook During a Weekend". This means, in the context of our problem that we cannot conclude is a difference in the distributions of the amount of time middle school students Spend on Facebook During a Weekday and The Amount of Time High School Students Spend on Facebook During a Weekday, and we cannot conclude that is a difference in the distributions of the amount of time I middle school students Spend on Facebook During a Weekend and The Amount of Time High School Students Spend on Facebook During a Weekend. In other words: there is no difference in the time spent on facebook during a weekday between Middle Schoolers and High Schoolers, and there is no difference in the time spent on facebook during a weekend between Middle Schoolers and High Schoolers.

One error we made that might have affected the outcome of the results was the fact that we did this survey over facebook – this method of survey ended with students taking too long of a time to fill out the survey despite the fact that the survey was relatively short, and made use have to personally contact the students so they fill out the survey, sometime even multiple times. This pressure to fill out the survey may have skewed their answers.

Another bias that may have affected the outcome of the results was a time bias – we gave this survey near the end of school, when work was less and students, especially high school students, generally have more free time. If this test was given during the middle of the school year, the amount of time students spend on facebook, especially for high school

students, may decrease the amount of time spent on facebook, perhaps for one group more than the other, which would affect out results. Hence, if we were to do this project again, we would give this survey to the same group of students at 3 points during the year: during the beginning of the school year, middle of the school year, and end of the school year. This would allow us to get a better idea of whether or not the time spent on facebook by Middle Schoolers (during the weekdays and weekend) differed from the time spent on facebook by High Schoolers (during the weekdays and the weekend).