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Article

Analysis of technology usage of teens: correlating social media, technology use, participation in sports, and popularity

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SUMMARY

This study tests the correlation between technology usage and teens' social lives. The addition of student popularity and the effects of extracurricular activities on technology usage were also examined. A group of 50 students was surveyed (25 males and 25 females; 25 middle schoolers and 25 high schoolers). The survey primarily asked the students to rate the social environment in their school, find the ratio of their in-school to out of school friends, vote for the three most popular students in their grade, and identify their technology usage from one to five (1 representing not dependent at all and 5 representing extremely addicted). A negative correlation was found between participation in extracurricular activities and technology usage (p=0.032), which means that students who participated in extracurricular activities used statistically significantly less technology than the ones who do not. There was no significant difference between the technology usage of middle and high school students. One major finding was that boys used technology mainly for gaming and entertainment (p=0.039), whereas girls mainly used it for social media (p=0.016). Most interestingly, the survey showed that the students who were voted to be more popular by others had higher social media usage on average than those who were not. Unexpectedly, a common answer received in the popularity ranking question was the denial of any presence of popularity in the specified grade. The denying students received significantly fewer "popularity votes" than others. The final results added to an increased understanding of the relationship between technology usage and teens' social lives.

INTRODUCTION

Today's teenagers spend a lot of time on the internet and social media, with 95% of the teens reporting that they have access to or own a smartphone with internet connection and 45% of them saying that they are "constantly online" (1). As a result, experts have identified this problem as internet addiction. According to Young and Rogers, people become addicted to the internet in the same way that they become addicted to drugs, alcohol, and—most similarly—gambling, which result in academic, social, and occupational impairment (2). In addition, previous studies have found a statistically significant correlation between the usage of the internet and depression (3). In the teens' case, this unveils a bigger problem. According to Erik Erikson, teenage years encompass an important developmental stage of life, as teenagers are in search of their unique identities. However, the portrayal of themselves on the internet causes teens to get confused about their emerging new identity (4). With the extended amount of internet use, teens start to create an online personality for themselves. Research done by the Girl Scouts specifies that 74% of girls agree that other girls use social media to make themselves look "cooler" than they are, and 42% say that this statement describes them (5). According to the Pew Research Center, only 25% of teens spend time with their friends after school on a daily basis, and 5% do not meet with their friends outside of school (6). According to the Unified Theory of Adoption and Use of Technology (UTAUT), although it is evident that both genders use technology and social media intensively, males and females do not use it in the same way (7). The intention of this research project is to determine the difference between males' usage and females' usage of technology as well as trying to correlate technology usage and popularity of students at school. In addition, a lot of middle and high school students spend time after school on sports teams and activity clubs. Another factor this study will investigate is whether extracurricular activities after school with which students are occupied with impact their internet usage. Also, this research aims to find the correlation between the thoughts of students about their social life in school and their social media usage. All in all, there are many factors to technology usage among teens, and this study aspires to create a better understanding of the complex social dynamics in school. To clarify, since no intervention is taking place, it is hard to directly infer causal relationships. There may be variables that are not considered in the study, resulting in an illusion of a correlative relationship.

For one of the expected results, whether or not internet usage is affected by extracurricular activities and sports seems clear. We hypothesize that the results would suggest that spending time playing sports and participating in extracurricular activities would decrease technology usage. Since previous studies have proven the beneficial effects of physical exercise and sport participation on self-control (8), although we don't currently have data to support this model, one possibility is that that exercising contributes to solving internet addiction. One can resist the urge of going through the reward and excitement packed social media sites with the discipline exercising regularly brings. On the other hand, preventing boredom by filling free time with extracurricular activities also stops the wanting of using the internet. Whether or not this expected result is correct in our case will be tested through the surveys and data collected from the phones of teenagers. Testing an expected result may also help check the

data and the selected subject group.

One hypothesis questions whether there is a correlation between the thoughts of students about social life in school and their social media usage. The 8th and 9th grade students at the surveyed high school spend time socializing in and outside of school. The school surveyed Aci High School, which has one 20-minute, one 50-minute, and several 5-minute breaks between classes. Students have around two hours of free time at school that they can spend socializing. The question in the survey regarding this hypothesis required the students to rate the social environment during these breaks, which are defined to be the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact (9). According to Moawad and Ebrahem adolescents' extensive use of electronic communication to interact with their peers may impair their relations with their parents, siblings, and other family members (10). This suggests that adolescents are using technology to profoundly interact and communicate with friends. According to Denworth (11), friendship takes time to develop. The more time two people spend together, the more likely they are to become friends. Since many adolescents use technology to communicate with their peers, one would expect that the more technology they use the better their friendship with others would be, since they would spend more time not necessarily together physically but with each other online. This may signify that students who stay in touch after school are more likely to develop stronger friendship bonds than those who do not. According to Laugeson (12), the lack of social connections and friendship greatly predicts juvenile delinquency, hate towards school, and mental health problems, which can affect someone's liking or disliking of the social environment at school. Thus, the data may unveil that those who have weaker friendship bonds or less usage of social media/communication applications may rate the social environment at school as being worse than those who have stronger friendship bonds or higher usages. Tying it all together, we hypothesized that someone with high social media and technology usage for communication would rate the social environment at school higher than those who use technology primarily for playing games and entertainment purposes.

We found that students who took elective courses after school had a lower technology usage with 24.66 hours per week compared to 30.89. Another major finding was the usage difference between the sexes with females on average spending 54.86% of their technology usage on social media compared to males with 37.62%. Similarly, the findings suggested that male students spent more time on gaming than females with 50.52% of the total technology usage, compared to females' 24.67%.

RESULTS

We asked how the technology usage could be correlated to social life in teenagers with the help of a survey of male and female middle and high school students.

The data collected revealed that the average technology usage (hours per week) for the 8th and 9th graders was 25.86 hr/wk (hours per week) (**Figure 1**). The 9th graders had an average of around three hours more than the 8th graders with 27.03 hr/wk versus 24.25 hr/wk. The maximum time spent on a phone was 46 hr/wk. The average amount of time spent on social media by the 8th and 9th graders was 11.85 hr/wk,

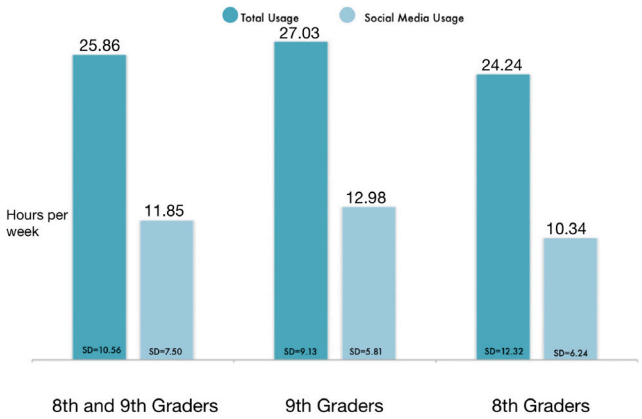

Figure 1: The technology usage averages of 8th , and 9th graders. The total technology usage average is 25.86 hours per week (SD=10.56) and 11.85 hr/wk (SD=7.50) for total social media usage. 9th graders had an average total technology usage of 27.03 hr/wk (SD=9.13) and social media usage of 12.98 hr/wk (SD=5.81). 8th graders had an average total technology usage of 24.24 hr/wk (SD=12.32) and social media usage of 10.34 hr/wk (SD=6.24).

with the maximum being 29.91 hr/wk. The 9th graders led this category with an average of 12.98 hr/wk, while the 8th graders fell back with an average of 10.34 hr/wk. On average, the surveyed teens spent 45.55% of their time on social media. The 9th graders spent on average nearly 5% more time on social media than the 8th graders with 47.97% versus 42.21%.

Out of the 50 students studied, 28% specified that they either did not do sports outside of school or did not participate in any clubs. Only 4% said that they neither participated in clubs nor sports teams outside of school. The average rating on a scale of 0-5 that the students gave to the "social environment" was 3.97. According to the survey, the kids classified themselves as above average technology users by putting up an average of 3.87 to the question: If 5 is extremely addicted to technology and 0 not at all, what would you classify yourself as? Even the students who were clearly under the average technology usage claimed that they were above average internet users. On average, the surveyed students had obtained 66.14% of their friends from school, displaying the importance of the school environment in friendship, with the majority of the friends of surveyed students being in the same school with them. One interesting question on the survey (Appendix A) was the last one: If you are comfortable, name 3 people from your grade that you would consider as the most "popular" (defined as someone or something is liked, enjoyed, or supported by many people) (30). During the surveying process, a considerable amount of people stated that their grades neither used the term "popular" nor had "popular" kids. This seemed to be a controversial topic among teens since many students did not feel comfortable answering this question. Most of them replied with the exact words: "Our grade does not have such a thing as popularity". Upon creating a table from the registered votes, it was clear that the people who received "popularity votes" were not hesitant on voting for others. Those who received 0 votes, without exception, stated that popularity did not exist; however, not all people who denied the existence of popularity received 0 votes. It appears that most of the students who are deemed unpopular deny that the term "popularity" is widely accepted in their grades.

In the intergroup analysis, the rates of social media usage

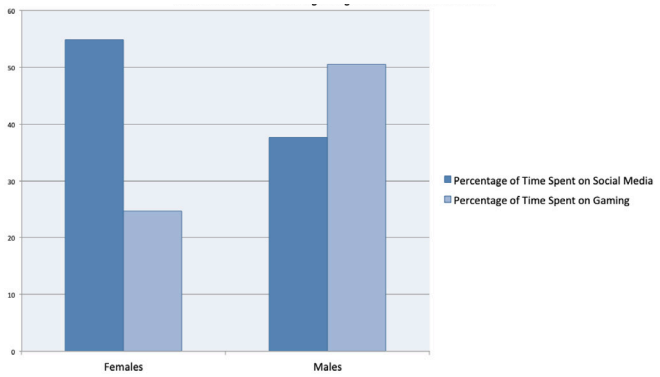

Figure 2: Social media and gaming usages of males and females. On average males spent 37.62% of their technology usage in social media and 50.52% in gaming. Whereas females spent 54.86% of their technology usage in social media and 24.27% in gaming.

between the sexes were examined first. Descriptive statistics of the variables created according to gender are given in the graph below (**Figure 2**). We showed that there was a significant difference between the social media usage rates of male and female students. Especially when the average was examined, we saw that the female students spent 54.86% (SD=13.65) of their free time in social media compared to the 37.62% (SD=21.25) spent by the male students. Similarly, when the time devoted to games and entertainment was examined, we saw that male students spent 50.52% (SD=16.04) of their free time on games and entertainment compared to female students with 24.67% (SD=17.89) (t-test, p=0.03).

The threshold for statistically significant p-values for the t-test was taken as alpha=0.05. When the t-test results were examined, a significant difference was found between the rate of social media use to all technology usage, social media usage, in-school friend rates, and game and entertainment ratio for males and females (t-test, p=0.01). This means that statistically, male (25.17 hours per week, SD=11.08) students used social media less than female (28.70 hk/wk, SD=11.28) students. Similarly, there seemed to be a significant difference in the percentage of in-school friends between females and males, with females reportedly having more in-school friends than males (t-test, p=0.03). The higher number of in-school friends of females may be because of their higher use of social media and communication applications than males. Further research would be necessary to investigate this result.

When we examined the students who take elective courses (including playing sports) and those who do not, the average technology usage values between the two groups appeared to be close to each other. **Figure 3** shows the significant differences between these two groups when we take a critical value of 0.05 for the t-test. For this reason, we can say that there is a significant difference in technology usage amounts between those who take elective courses and those who do not.

When the data above (**Figure 3**) of students who are engaged in sports activities and those who do not were examined, we could show that the students who play sports spent less time on social media than the students who do not play sports (30.89 hr/wk, SD=17.40, compared to 24.66, SD=13.24). Similarly, there was a difference in the scores obtained according to the answers to the questions. It is striking that especially non-student-athletes were also more interested in technology than the student athletes. Because the values for the rate of friends in school (p=0.06) and social environment ratings (p=0.07) were close to the critical value (p=0.05), we notice that they are close to being statistically significant. This means that there might be a real difference of in-school friends of students who participate in sports and students who do not; however, this data failed to demonstrate a statistically significant correlation. Similarly, these tests and data cannot prove any causation between the two variables and should be approached with scepticism.

According to the correlation test, the "Game and Entertainment Ratio Compared to Total Usage, and the Social Media Ratio Compared to Total Usage" variable had a high inverse correlation with an r-value of r=0.67 (p=0.04) for females and r=0.73 (p=0.03) for males. This suggests that, with statistical significance, the students who do not spend their free time on social media spent time on games and entertainment, and vice versa. This was obtained by analyzing social media and gaming application usages of individuals. Although the data signifies an inverse correlation, we could not specify whether the variables have a causal relationship.

When analyzed in female students, there was a weak positive correlation between "Social Media Ratio Compared to Total Usage" and "Social Environment Score" variables r=0.33 (p=0.02). In other words, the social environment score of female students increased slightly as social media usage increased.

To summarize, the data supported both the hypothesis and the expected results. From the analysis, we could see that, in fact, spending time playing sports and participating in extracurricular activities decreased technology usage. However, we could not obtain a causative relationship from the data since, again, no variable was manipulated. We can only infer that, in this specific group, the usage of technology was lower for individuals who spent time doing sports and extracurricular activities. For the hypothesis concerning the relationship between social media usage and social environment ratings of students, results from the correlation test showed that there was a correlation between the two data. Although this suggests that individuals who have higher social media usage ranked the social environment at school higher, we cannot say that one causes another. Another aim of this research was to pinpoint the differences in the technology usage of males and females. From the t-test results, we see

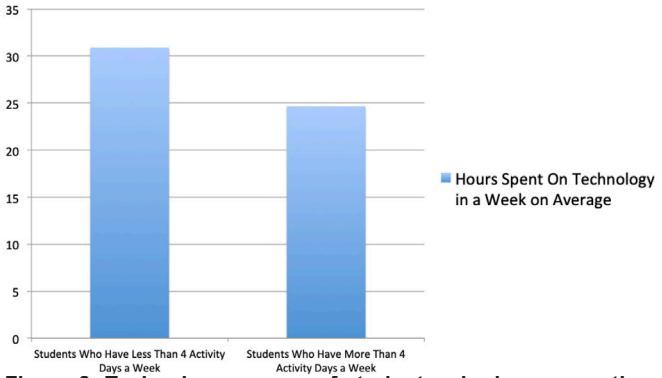

Figure 3: Technology usages of students who have more than four activity days a week and those who do not. The average total usage for the students who have more than four activity days a week was 30.89 and 24.66 for those who do not.

that males and females use technology differently. Females use technology mainly to go through social media while males mainly use technology for entertainment and games. The results did not suggest a significant difference between the technology usages of middle and high school students.

DISCUSSION

When an intergroup analysis was made between the males and females who participated in the study, there was a noticeable statistical difference between the technology usages of the two groups. We calculated that the females spent 54.86% of their total technology usage on social media, compared to 37.62% of usage in males. Similarly, with a p-value equalling 0.03, males spent more time on mobile games than females did. Thus, we can infer that females on average tend to spend their time on social media while males prefer gaming on mobile applications. With this information, we can see that females and males tend to use their time on their mobile phones differently, helping us understand the general usage.

We found that there was a statistically significant difference in the technology usage of students who participated in extracurricular activities and those who did not. Additionally, we showed that students who participated in extracurricular activities spent less time on their technological devices. Although this semblance is only a correlation, not causation, it could increase our understanding of the subject. For example, understanding that participating in clubs and sports teams correlates with decreased internet usage, could help parents who are concerned about their children's social media usage to help their children by encouraging them to participate in those kinds of activities. One interesting finding similar to this one is the social environment ratings and in-school friend numbers of students who participated in sports. Student athletes, with a value trending towards significance (t-test, p=0.06), both rated their social environment higher than non-student-athletes and reported that they had more in-school friends than those who did not do sports. This could also help parents understand the social dynamics of schools, even if the results are not completely statistically significant, which could help children who have problems socializing or making friends at school find common ground with others or overcome their problem.

There are several factors that affect one's technology usage that cannot be accounted for. This research aimed to find correlations rather than causations, since every individual is unique. Although there are several factors that affect an individual's internet usage, correlations can greatly help in understanding the general picture. Since personality, socializing preferences, friend groups, and family influences differ in every individual, it is hard to estimate whether someone's preferences would change when the variables in this study were to change (sex, age, technology usage, and activity and application preferences). Another setback of the study is that the measurement methods were not standardized or taken from psychology literature. Future studies may develop or validate the findings of this study by using measures set by a standardized source such as the the DCT-IA by the DSM-5 (The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition)(31).

Several prior studies were conducted on the correlation between social media usage and clinical depression (3). This topic is worth further discussion, since it is estimated that around 20% of all adolescents get diagnosed with depression (13). Comparing prior research and this experiment's findings, social media usage may be one of the causes. The overwhelming use of social media usage among teens and the manipulation of physical appearance may cause teens to create a false sense of being. With the extended use of the internet, teens today create an online personality for themselves, which is usually different from their real-life identity. Research done by the Girl Scouts specifies that 74% of girls agree that other girls use social media to make themselves look "cooler" than they are, and 42% say that this statement describes them (5). Teens may create or believe in higher standards of beauty given the extreme usage of social media and body manipulation techniques, and get depressed when they cannot reach the increased standards. The creation of a "better" or "cooler" personality online may cause them to devalue their real-life identity. This may be found in any age range as Yang and Brown found the use of an altered Facebook self-representation to obtain a contemporary higher self-esteem in transition to college (32).

Prior to this study, there have been many arguments about the effects of social media usage in an adolescent's well-being and emotional status. Many studies, such as that of Kross, have found that Facebook use predicted a negative shift in both life satisfaction and how people feel moment-to-moment (14). Contrarily, many studies, such as Orben's "Social Media's Enduring Effect on Adolescent Life Satisfaction," have found that social media use is not, in and of itself, a strong predictor of life satisfaction among the adolescents (30). Both of these contrasting studies have been criticized due to their methods of measuring well-being, thus not resolving the debate. Although the results of this study do not definitely prove anything or end the discussion, they support Orben's findings with a significant difference in the numbers of in-school friends and social environment evaluation scores of students with high and low social media usages. An external cause may make social media usage and the user's well-being appear negatively correlative, thus causing the debate. As long as the absence of a perfect well-being metric and ability to survey a large proportion of the users continues, so will the debate.

A term that is worth researching is the term popularity. The fact that around 20 students gave the exact response ("There is no such thing as popularity in our term") seems to be more than a mere coincidence. The purpose of searching for the most "popular" students was to be able to draw a correlation between the popularity of a student and their social media usage or social environment point (the rating that helps us calculate how favourable a school's social environment is from the perspective of the students). However, interestingly there was no correlation. What stood out was that the popular kids (the kids who received votes from others) did not refuse to vote for others, yet the ones with fewer than five votes refused to write down any names. We hypothesize that the ones who are not deemed popular by their peers do not want to admit their unpopularity by stating that there is no such thing as popularity. However, this hypothesis would need more time and data to be resolved with clear reasoning.

METHODS

To test the hypothesis concerning the relationship between technology usage and the social lives of teenagers, 8th and 9th graders of a private high school were surveyed. Every

student was asked to give consent for their data to be used anonymously in our research project. The survey requested the amount of time each student spent on their phone, going through apps classified as social media, games and entertainment, and creativity and productivity.

Some apps were more popularly used than others in their categories. According to the survey, Instagram, Snapchat, WhatsApp, Facebook, Twitter, and TikTok were the most used social media apps (unordered). YouTube, 9Gag, Netflix, Hulu, PUBG Mobile, Fortnite Mobile, Growtopia, Minecraft, and Sims were the most popular applications under the category "Games and Entertainment". Finally, the Apple Notes, Notability, Safari, Puffin, PowerPoint, Word, Google Drive, Google Docs, and Google Slides were the most used apps under the category "Creativity and Productivity" (28, 29).

The amount of time each student spent on these apps was received via the new screen time feature that calculates the time spent on each app. The data taken from the screen time feature were matched to a number representing the students' names for privacy. After the data were processed, a survey was made using the questions listed in the appendix.

The students were asked about what extracurricular clubs they were participating in and how much time they spent attending it. They were also questioned about how much time they usually spent during each week on sports. The students were asked to rate the social environment at school, estimate the number of friends attending the same school, and describe their technology usage as above or below average without knowing the data. The survey was complemented by the values taken from the screen time feature on personal devices.

The results of the survey were analysed using the SPSS Program; t-tests and correlation tests were performed to obtain statistically significant (p-value = 0.05) different mean values and correlations from the data.

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