

Does Technology Enable Education?

Candidate Number: 003340-005

IB Math Studies

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Word Count: 1613

Introduction

I will be investigating the effects on whether technology increases the grades of students ^{or decreases} ~~or decreases the student's grades~~. This idea of an investigation first came to my attention when I read an article on people debating whether technology is good for education. Technology is used every day, for this reason I want to see if technology has an impact on education. Some authoritative figures believe that technology ~~helps~~ ^{helps} students, but others believe that too much technology is bad ^{on} ~~toward~~ the health, such as the eyes, and mind.

I am conducting a survey in order to find out if there is a dependency between my fellow peers in the community and the use of technology. Asking my peers their age, if they use glasses, how many hours they spend using technology, what technological device ^{do} ~~are~~ they frequently use, and their grades in school. After collecting the information for the data, I will try to find the dependency among each gender and the various age groups in the high school about their relation with technology. Through the use of surveys, I will find out if one's gender has a negative impact on the use of technology. I believe that the teenage male will be negatively impacted by the use of technology.

In order to ^{maximize the amount of people taking my} ~~find out the outcomes of the~~ survey, I will email it toward each teacher of West Hall

^(my school) High School so they could give the survey to the students, send surveys via Facebook to friends and classmates, and personally ask my peers. After receiving the ^{this} ~~following~~ data, I will create a chart to see the comparison among each gender. The charts will display the difference between the idea in which each gender believe that technology enables education and how technology

Statement of task

Plan of Investigation (my school)

affects ^{it} education. After completing the ^{previous} following task, I will then perform the Chi Square Test in order to find out if ^{there is a} the correlation between technology and education, leading me to have a secure conclusion on the topic.

Hypothesis: Is there a dependence between the uses of technology toward school grades in gender.

Alternate Hypothesis: There is a larger negative dependency between one gender's grades by the use of technology.

Null Hypothesis: Technology is independent to ^{the} gender's GPA.

Collection of Data: To gather the information needed I will make a survey and send it through email and via facebook. The survey includes the following:

1) What gender are you?

- a. Male
- b. Female

2) How old are you?

3) Do you wear glasses, contacts, or neither?

4) How long do you spend using a technological device per day?

- a. Less than 4 hours
- b. 5-6 hours
- c. 7-8 hours

Should be a statement and formatted like a question

How you collected your data

d. 9-10 hours

e. Above 11 hours

5) What do you use your technological device for?

a.) Chatting/ Social Networking

b.) Playing video games

c.) Homework/ Classwork

d.) Work

6) Do you think technology ^{helps} help ~~on~~ your education?

a. Yes

b. No

After receiving the information from the survey, I will make a frequency chart and test the relationship between gender and their use of technology using the Chi-Square method. I will also be using Standard Deviation, Linear Regression, and a scatterplot. The Chi-Square Method, will help determine the correlation among education base on technology and if the hypothesis is correct. Standard Deviation will show how far the results are from the mean, and linear regression and the scatter plot will show the relation of the scatter plots by describing the correlation. Chi Square and linear regression will be considered sophisticated math because they will be done by steps. Standard Deviation, mean, median, and mode will be considered simple math because I plan to use the calculator to solve the problems.

continued part of
Investigation

Don't need
this →

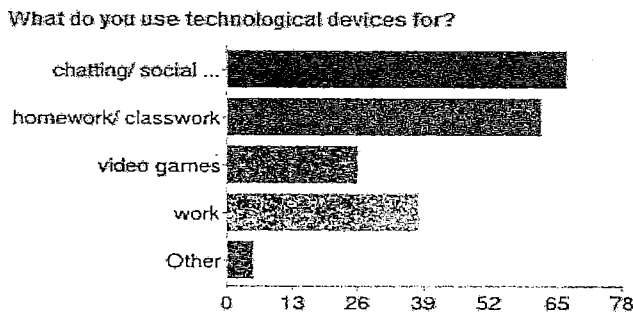
<https://docs.google.com/spreadsheet/viewform?formkey=dDVSeXZoV3FwVVJLU2E1ZVFw>

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Mathematical process

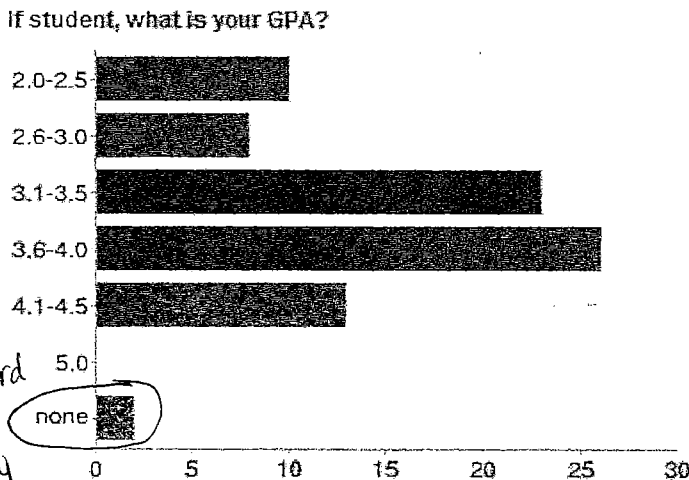
Information/measurement

This is a graph on ^{how} ~~what~~ people use technology for, as you can see, there is a large quantity of people that use technology for chatting and social network ^{ing} ~~compar~~ ^d to homework, ~~but~~ ^{also} the second category, with a large amount of people is homework and classwork, so people do use it for educational reasons, but not as much as chatting.



Label this

In graph 2 you can see the GPA results:



2.0-2.5	8	9%
2.6-3.0	23	26%
3.1-3.5	26	30%
3.6-4.0	28	15%
4.1-4.5	13	0%
5.0	0	2%
none	2	

I would discard his data. As is not helping to prove your case.

Label this

However,

As you can see there is a large amount of people with a GPA of 3.6-4.0, but 11% of the population

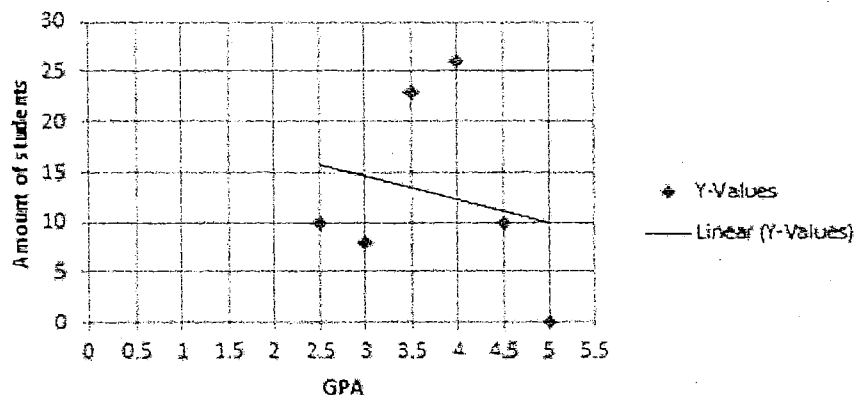
ranges from 2.0-2.5, which is still a high rate for students characterized with low GPA. As for the ~~category none is set for teachers who had a hard time to submit the survey do to technical difficulties.~~

← discard this.
See notes on previous page.

To further investigate the effect technology has on education, I made a scatter diagram based on the table below.

GPA	Amount of peoples frequency
2.0 to 2.5	10
2.6 to 3.0	8
3.1 to 3.5	23
3.6 to 4.0	26
4.1 to 4.5	13
5.0	0

The Amount of Students per GPA



I would consider doing a frequency curve. Look in Red book under "frequency charts".

The scatter plot looks like it has no correlation, but based on the linear regression, the approach to model the relationship between two variables by fitting in a linear equation. Using my TI 84 graphing calculator, I found out that the scatter plot has a small negative correlation because the Pearson's coefficient is equal to -0.18 that is found between the category of small, weak, negative correlation and -0.3 to -0.1. The linear equation is $f(x) = -1.83X + 20.19$, and is represented as a downward slope.

To further investigate the effect technology has on high school students, I plan to use chi Square and standard deviation. Chi Square will use sophisticated math, because the mathematician is explaining how the math is being conducted. As for standard deviation it will be simple math because the mathematician *Not sure what you mean here → Never mind, it's okay* will only show the answer and the equation of standard deviation.

Chi Square (χ^2)

Null Hypothesis: The gender of a person and the amount of time using technology is independent of each other.

Alternate Hypothesis: Gender and the amount of time used in technology are dependent of each

other.

The following image shows the amount of time 12th grade high school seniors and teachers take in using technology base on gender. I chose these groups because it represents one fourth of West Hall High Schools population. As you can see, I split the amount of time used in technology base on gender in order to see a wide spread of used technology. You can see that there are more females compare^d to males, 60%, base^d on the formula $50/84 * 100$.

Amount of Time using Technology per hour

		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Gender	Male	15	4	5	2	3	0	0	1	2	0	0	0	0	1	1	34
	Female	9	10	15	4	7	0	2	0	0	0	0	0	1	0	2	50
	total	24	14	20	6	10	0	2	1	2	0	0	0	1	2	3	84

The image below shows the amount of time using technology based on gender by dividing the data into smaller groups, by adding the numbers certain rows together.

← Reads a little weird

		Amount of Time using Technology per hour			
		<u>or equal to less than</u> 5	6 to 8	9 to more than 18	Total
Gender	Male	19	10	5	34
	Female	19	26	5	50
	Total	38	36	10	84

The equation:

$$\frac{\text{Row Total} \times \text{Column Total}}{\text{Total Total}} = fe$$

, allows the mathematician to find the value of each cell of the following

table.

Gender	Amount of Time using Technology per hour			Total
	less than 5	6 to 8	9 to more than 18	
Male	15.38	14.57	4.05	34
Female	22.62	21.43	5.95	50
Total	38	36	10	84

To find the Chi Square calculated ^{value,} the mathematician has to plug in the data from the fo and fe tables into the following table. After plugging in all the data as given, the mathematician will find the sum of all the numbers from the $(f_o - f_e)^2 / f_e$ column, giving the ~~calculated value~~ of Chi Square calculated. ^{value}

f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$(f_o - f_e)^2 / f_e$
19	15.38	3.62	13.104	0.852
10	14.57	-4.57	20.885	1.433
5	4.05	0.95	0.903	0.223
19	22.62	-3.62	13.104	0.579
26	21.43	4.57	20.885	0.975
5	5.95	-0.95	0.903	0.152
Chi Square Calc =				4.214

Next, the mathematician will find the degree^s of freedom which is calculated as following:

$$(\text{rows}-1) (\text{columns}-1) = \text{degrees of freedom}$$

In this case, there are 3 rows and 3 columns, thus the equation is the following.

$(3-1)(3-1) = 4$, the degrees of freedom is four. The degrees of freedom will help the mathematicians in finding the χ^2 Critical value. As for the significance level, it will be defaulted to .05 or 5%. While viewing a table of critical values, the mathematician concluded that the χ^2 Critical value is 9.488.

$$\chi^2 \text{ Calc.} < \chi^2 \text{ Crit.}$$

$$4.214 < 9.488$$

Since χ^2 Calculated is smaller than χ^2 Critical, the mathematician must ^{fail to} reject the alternate hypothesis and ~~accept~~ the null hypothesis, because χ^2 Crit is greater than χ^2 Calc. The result expresses that the gender of a person and the amount of time using technology are independent.

n't use "accept" when doing χ^2 -test

Standard Deviation:

The equation for standard deviation is:

$$s_n = \sqrt{\frac{\sum_{i=1}^k f_i(x_i - \bar{x})^2}{n}}, \text{ where } n = \sum_{i=1}^k f_i$$

		Amount of Time using Technology per hour														
		less than 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Gender	Male	15	4	5	2	3	0	0	1	2	0	0	0	0	1	1
	Female	9	10	15	4	7	0	2	0	0	0	0	0	1	0	2
		Standard Deviation = 4.27825295														

Standard Deviation is considered sophisticated math because I only plugged in the data in order to find

the output. Standard Deviation, ^stries to show how spread the data is from the mean.
_{discard}

↑
 Re-word and ask me about this one.

Validity

I send the questionnaire via email and facebook to senior students and high school teachers. My investigation is not as valid as it could have been, because the students may have lied about their GPA or the time they take on using technology. In the survey, more females answered compared to males, this could be a result in which gender has no effect, because there is not enough data for males. This

↑
 or, it ~~is~~ unofficially proves more females use technology than males

could be resolve^d by surveying^m ore males. There were also technical flaws with the survey which lead teachers to also answer questions about GPA. This could have been changed easily by changing the questions setting in the questionnaire. Also, I could have investigated other schools or grades, since I only took samples of one school and grade, which does not represent all the students in the world. By improving the process of surveying, I would have gotten a greater and ^{more} accurate ^{return} result on my data.

Conclusion

The results have lead into greater outcomes on the research. I found out that there is an increase^d amount of students with low GPA's. This could be the result of using technology for other purposes that does not involve education, such as social networks.

^{or} a lot more females used technology compared to males
I found out that there was a large amount of males that used technology less than females. I also found out that my hypothesis, Gender and the amount of time used in technology are dependent of each other, does not fit the result of my investigation.

In my investigation, I found that gender and grades are independent of each other and that GPA has a negative correlation because of grades.