Stephen F. Austin State University
Student GPA Study

Kristina Leonard

Jarrett Luthy

Jianheng(Jansen) Zhang

Steven Jones

Spring 2011

4/29/2011

I. Executive Summary:

From the first day of class till the last most college students strive to maintain a good GPA. After surveying 100 random students at Stephen F. Austin State University we have found some factors that help determine a student's GPA. We found that a student's high school GPA, SAT and ACT scores, going to the AARC, as well as watching television and exercising have a positive relationship with a student's college GPA. We also found that a student, who works more, uses more social media websites, as well as the more a student drinks or parties have a negative relationship with a student's college GPA.

To have more vision of our research, there is also a demo to simulate it. Here is the link for the demo: **http://www.jv14.com/gpa/**. We simulated the research to this GPA prediction tool for schools, parents to get the GPA prediction of their kids or for the students themselves. To use this online tool, the information you need, as we mention above, is the students SAT/ACT score, high school GPA, hours of work per week, the percentage of the tuition the student and the parents pay, night of party, bottles of drink per week, hours of physical exercising, hours of videos entertainment, hours spend on social network and last, the AARC tutoring. After putting in these information and submit, the program will calculate the predicted GPA base on the information you provide and the parameters from our research. We did some prediction to some random students on campus and the result is pretty close to their actual GPA.

II. Introduction:

Have you ever wondered if there was a secret to getting a better college GPA? Does your High School GPA really matter when you go off to college? What about SAT or ACT scores, can these scores help predict what your college GPA will be? Most college students want a good GPA; whether it is to impress their parents, have a better chance of landing a good job after school, or just for themselves. So, what factors really matter when you go off to college? To find the answer to these questions we decided to survey 100 students at Stephen F. Austin State University. Before we surveyed the students at SFASU we thought we would find the higher the high school GPA a student had, the higher the college GPA would be. We believed this because you develop study habits throughout high school, good or bad, which would still be used in college. We also thought a student with a higher SAT or ACT score you would be more likely to have a higher college GPA also because of study habits. Once a student was in college we thought the choices they make during the week would affect their GPA. A few of the factors we thought would positively affect a student's college GPA while in school were if a student's parents pay for students tuition, how many hours spent in the AARC a week, and how many hours spent working out. Some of the things we thought would negatively affect a student's college GPA were how many nights a student partied a week, how many drinks a student had a week, how many hours a student watched television or spent on social networking sites, how many hours worked a week, and if a student paid tuition themselves.

III. Data Description

As we looked closely at our data we collected, we found some very interesting facts. For instance, the mean **SAT score** (1600 scale) was a surprising 1152 with the highest and lowest being 1580 and 755, respectively. SAT scores recorded a p-value of .191 which means that it is not statistically significant. It is close to being significant at the 90% confidence level, but not quite there. It is significant at the 80% confidence level, but were only interested in 90% or better. If any variable is statistically significant at the 90% or better confidence level, then it does have significant effects on the goodness of fit of the model.

- **High school GPA** turned out to be the highest statistically significant variable in our model. What people did in high school greatly reflects on what they will do in college. The mean high school GPA was 3.27 with maximums and minimums of 4.23 and 2.2, respectively. Because the p-value is .0000184, we can say that at the 99% confidence level, high school GPA is greatly a determinant of college GPA.
- The **number of hours a week working a job** is statistically significant at the 95% confidence level because the p-value is .024. The average number of hours a week at a job is 14.60 with maximums and minimums of 40 hours and 0 hours, respectively.
- **Who pays for college tuition** is a very interesting variable. The mean average for students who pay themselves is 32% and 55% of the students are paid by their parents. The remaining 13% were paid by scholarships, loans and grants. The coefficient for students that pay their own tuition is not statistically significant because the p-value is .610. On the other hand, parents that pay tuition is a statistically significant coefficient at the 95% confidence level because the p-value is .038.
- The **number of nights spent partying** has a p-value of .006 which means that it is a

statistically significant variable at the 99% confidence level. The average number of nights spent partying a week was .78. The maximum and minimum nights spent partying were 20 nights and 0 nights, respectively.

- The **number of drinks consumed in a week** is a statistically significant at the 95% confidence level in determining GPA because the p-value is .042. The average number of drinks consumed was 7.860 with a minimum and maximum of 0 and 120 drinks.
- The **hours spent at the gym** has a p-value of .023 which means that it is statistically significant at the 95% confidence level. The average hours spent at the gym was 3.64 with a maximum and minimum of 15 and 0 hours, respectively.
- The **number of hours spent on the computer excluding social networking sites** has a p-value of .279. This means that it is not statistically significant at the 90% confident level. The average number of hours a week spent on the computer was 10.085. The maximum and minimum number of hours were 50 and 0, respectively.
- The **number of hours spent on social networking sites** carries a p-value of .044. This means that the number of hours spent on networking sites is not statistically significant in determining GPA. The average number of hours a week spent on these sites was 7, with a maximum and minimum of 50 hours and 0.
- The **number of hours spent at the AARC** has a p-value of .190 which is not statistically significant in determining GPA. The average number of hours spent at the AARC was .88 with a maximum and minimum of 10 and 0 hours, respectively.

Multicollinearity problems occur when 2 or more independent variables are highly correlated and/or explain the variation in predicted GPA in similar but separately ways. That said, the number of nights spent partying and the number of drinks per week explain predicted GPA in

similar ways. If you spend your night partying, your most likely going to have some drinks. These 2 slope coefficients coincide with each other and therefore multicollinearity arises. Also, the number of hours spent on the computer and number of hours spent on social networking sites both can be done at the same time, allowing the multicollinearity problem to occur.

IV. Significant Variables

SAT/ACT Score

A 1 percent increase in SAT score or 16 actual points, increases predicted college GPA by .00415 on average, holding all other slope coefficients constant (percent was used to avoid confusion between the 1600 and 2400 SAT scale).

High School GPA

A 1 point increase in high school GPA would increase predicted college GPA by .415 on average, holding all else constant.

Number of hours working a job

A 1 hour increase in work will decrease GPA by .008. This makes sense because the more time you spend at your job, the less time you are able to spend studying trying to raise your GPA.

College Tuition

We see from our data that if the student pays for his/her tuition in full, then their GPA will decrease only by .051. If a students parent pays tuition, their GPA will decrease by .185 on average, holding all else constant. This shows us that students that pay for their own tuition have

more perseverance for success than those who do not pay for tuition.

Nights spent partying

For every extra night a week spent partying, your GPA is predicted to decrease by .062.

Drinks consumed

For every extra drink that is drunk per week, your GPA is predicted to decrease by .007 on average, holding all else constant.

Hours spent at gym

For every increase in hour spent at the gym, your GPA is predicted to increase by .023 on average, holding all else constant. This alarming statistic might be because people who are motivated to being healthy and getting fit, are also motivated to their academic studies.

Hours spent on social networking sites

For every 1extra hour spent on social networking sites, your GPA is expected to decrease by .01 on average, holding all else constant. This is not surprising because one of the main reasons for procrastination is social networking sites.

V. Test Hypotheses:

H_o: $\beta1=\beta2=\beta3=\beta3=\beta5=\beta6=\beta7=\beta8=\beta9=\beta10=\beta11=0$

H_1: Any slope coefficient $\neq 0$

Test Statistic: $F_{.05, 11,88} = F_{crit}$ 1.83

Reject Ho if F_{test} is > F_{crit}

$$F_{test} = \frac{\frac{SSR}{K}}{\frac{SSE}{N-K-1}} = \frac{\frac{12.429}{11}}{\frac{14.415}{88}} = 6.898$$

6.898 >1.83

Reject Ho. At the 95% confidence level our model helps explain GPA for students surveyed at Stephen F. Austin State University as modeled.

Left Tailed Test High school GPA

H_o: β1≥ .04

H_1: β1< .04

If P value is < alpha then reject Ho.

T_{crit} = -1.662

Reject Ho if T is < -1.662

$$T_{test} = \frac{b1 - \beta 1}{Sb1} = \frac{0.415 - 0.4}{0.098} = 0.153$$

Fail to reject Ho we are 99% confident that β1>1.

We are 99% confident that the increase in current GPA associated with the SAT or ACT score is >.4 on average as modeled.

Right Tailed test Drinks per week

H_o: β7 ≤ -.05

H_1: β7> -.05

T_{crit}= $t_{0.05,88}$=1.662

Reject Ho if T_{test} is >1.662

$$T_{test} = \frac{b1 - \beta 1}{Sb1} = \frac{-0.007 - (-0.05)}{0.003} = 14.334$$

Reject Ho, we are 99% confident that the increase in current GPA associated with how many drinks per week is greater than -0.05.

VI. Predict:

Here is prediction for our group members:

	Coefficients	Student#1	Student#2	Student #3	Student#4
Intercept	1.456	1	1	1	1
SAT/ACT	0.486	82%	66.25%	70%	70.10%
high school gpa	0.415	3.5	3.3	2.3	2.5
hr of work	-0.008	20	20	40	0
youself	-0.051	50%	0	60%	50%
parent	-0.185	50%	100%	40%	50%
night of party	-0.062	0	2	3	2
drink	-0.007	0	20	7	10
work out	0.023	10	0	4	2
video	0.006	5	10	5	10
social network	-0.010	5	3	4	2
aarc	0.033	0	0	0	5
Predicted GPA		3.23	2.57	2.17	2.77
Actual GPA		3.1	2.3	2	2.2

From the table we can see that the predicted GPA is very close to the actual GPA.

For the students who want to apply to SFA, we have some general data for them or their parents to consider how well they can do at SFA:

Here are three kinds of students' predictions: poor, normal and good:

(Assuming variable only “SAT/ACT” “HSGPA” “drink” are different for each prediction, the rest of the variables are the same)

	Coefficients	Poor	Normal	Good
Intercept	1.456	1	1	1
SAT/ACT	0.486	60%	70.00%	85%
HSGPA	0.415	2	3	4
hr of work	-0.008	15	15	15
youself	-0.051	50%	50%	50%
parent	-0.185	50%	50%	50%
night of party	-0.062	3	2	1
drink	-0.007	10	3	0
work out	0.023	3	3	3
video	0.006	3	3	3
social network	-0.010	3	3	3
aarc	0.033	0	0	0
Predicted GPA		2.13	2.71	3.28

If your SAT/ACT is 60% of possible grade and high school GPA is a 2.0 your college GPA will be around 2.0. If you can get 85% of SAT/ACT you have a 4.0 high school GPA then your college GPA will be around 3.28.

With the plug-in data, we can understand that the better the student did in high school, the better they might do at SFA. Also going to the AARC can help students to get a higher college GPA.

What is interesting from the survey is if a student is a very social person (such variables like “night of party”, “social network”) it hurts the GPA. Therefore, doing more exercises, going to the AARC to ask more questions can make you in a good shape of your college GPA.

VII. Conclusion:

We found that a student's high school GPA, SAT and ACT scores, going to the AARC, as well as watching television and exercising have a positive relationship with a student's college GPA. We also found that a student, who works more, uses more social media websites, as well as the more a student drinks or parties have a negative relationship with a student's college GPA. So if you or you know someone who is just starting with their college career or is looking to improve their GPA changing a few of these variables in their life should help them to raise their GPA.

If we could continue research on the college GPA relationship with other variables we believe we would add a few questions to the survey. One question we would add is how hard a student works to achieve an A in a class. This will be hard to measure but if we ask students to rank their motivation for an A we believe it could explain why some students who might have had a high high school GPA but did not work hard for a good grade in a college class might have a lower grade than what our model might predict now. We would also survey about 400 students at SFASU as well as students at other Texas Universities to compare and see if they are similar to each other.

Correlation Matrix

	GPA	*SAT/ACT*	*high school gpa*	*hr of work*	*youself*	*parent*	*night of party*	*drink*	*work out*	*video*	*social network*	*aarc*
GPA	1											
SAT/ACT	0.143644	1										
high scho	0.502104	0.01668	1									
hr of work	-0.24042	-0.00051	-0.148886919	1								
youself	0.055387	-0.01687	-0.083134106	0.073616454	1							
parent	-0.20531	0.035436	-0.174843725	0.076132324	-0.1982169	1						
night of pa	-0.32798	0.037037	-0.206277565	0.005984727	0.0026843	-0.06674	1					
drink	-0.29165	-0.18525	-0.122016436	0.036154814	-0.1857281	-0.01703	0.365010814	1				
work out	0.154003	-0.07709	0.149745972	0.065162234	0.2071088	-0.02508	0.063850485	0.246838	1			
video	-0.13713	-0.1345	-0.233054064	-0.032291637	-0.1283896	0.111996	0.171052124	0.235891	0.035994	1		
social net	-0.07353	-0.11435	0.065298417	-0.170491876	-0.1335195	-0.15366	-0.04247886	-0.13807	-0.12417	0.125686	1	
aarc	0.108214	0.096297	-0.020051982	-0.080143124	0.2773755	-0.12983	0.345966379	-0.1117	0.154252	-0.09123	-0.079317983	1

Descriptive Statistics

	Mean	Standard Deviation	Sample Variance	Minimum	Maximum	Count
GPA	2.890	0.521	0.271	1.8	4	100
SAT/ACT	0.720	0.115	0.013	0.472	0.988	100
high school gpa	3.270	0.466	0.218	2.2	4.23	100
hr of work	14.600	11.941	142.586	0	40	100
youself	0.320	0.469	0.220	0	1	100
parent	0.550	0.500	0.250	0	1	100
night of party	1.335	2.247	5.051	0	20	100
drink	7.860	15.779	248.975	0	120	100
work out	3.640	3.383	11.445	0	15	100
video	10.085	8.176	66.844	0	50	100
social network	7.025	8.923	79.628	0	50	100
aarc	0.880	1.929	3.723	0	10	100

Regression Analysis

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.680							
R Square	0.463							
Adjusted R Square	0.396							
Standard Error	0.405							
Observations	100.000							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	11.000	12.429	1.130	6.898	0.000			
Residual	88.000	14.415	0.164					
Total	99.000	26.844						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.456	0.462	3.151	0.002	0.538	2.373	0.538	2.373
SAT/ACT	0.486	0.369	1.317	0.191	-0.247	1.219	-0.247	1.219
high school gpa	0.415	0.098	4.252	0.000	0.221	0.608	0.221	0.608
hr of work	-0.008	0.004	-2.289	0.024	-0.015	-0.001	-0.015	-0.001
youself	-0.051	0.100	-0.512	0.610	-0.249	0.147	-0.249	0.147
parent	-0.185	0.088	-2.110	0.038	-0.360	-0.011	-0.360	-0.011
night of party	-0.062	0.022	-2.795	0.006	-0.106	-0.018	-0.106	-0.018
drink	-0.007	0.003	-2.063	0.042	-0.013	0.000	-0.013	0.000
work out	0.023	0.014	1.676	0.097	-0.004	0.050	-0.004	0.050
video	0.006	0.005	1.089	0.279	-0.005	0.017	-0.005	0.017
social network	-0.010	0.005	-2.048	0.044	-0.020	0.000	-0.020	0.000
aarc	0.033	0.025	1.320	0.190	-0.017	0.082	-0.017	0.082