

Social Media's Influence on Academic Performance

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### Abstract

Online social networks are a part of student's everyday life. Few studies have been conducted to explore the effect of online social networks to a student's grade point average. This qualitative research study provided an opportunity to examine the correlation between online social network daily usage and a student's academic achievement. The purpose of this study is to survey college students at California State University San Bernardino as to their use of social media, their academic performance and the impact of social media on their academic performance. For this study, 39 participants were surveyed and were asked to respond to an eleven item questionnaire. The main study of the results are as follows; first, students on average spend three to four hours on online social networks; second, there was no obvious correlation between participant's online social network usage and their academic achievement; third, there were slight indications that higher rates of online social network usage may have had some impact on a student's academic achievement.

## Social Media's Influence on Academic Performance

### General Statement of the Problem

Social media has become a way of life for most Americans. If you look around, no matter where you are, you will see someone texting, updating Facebook, Tweeting or posting to Instagram. The idea of social media was to keep this global world more connected, but it has done more than that, it has become the fourth meal of the day. The time spent on social media is not limited to free time; it impacts all areas of our lives. This has become increasingly evident at the high school and college level. Between 2009 and 2010 researchers from the Pew Research Center's Internet and American Life Project found that between 67% and 75% of college-aged young adults used social networking websites (Junco, 2012). Karpinski, Kirschner, Ozer, Mellott and Ochwo (2013) state that as of February of 2012 Twitter had exceeded 500 million users which was a jump of over 200 million from May of 2011. They also state that as of June 2011 Facebook had about 700 million users with an additional 100 million by December of that same year. Karpinski, et al (2013) states that about 82% of the world's population is active in the social media world and a large amount is college students. Educators are becoming increasingly concerned about the time students spend on online social networks (OSN) and there is much debate as to whether the time a student spends on OSN impacts their academic performance. "At the core of this debate is whether the growing use of social media by high school and/or college students actually improves or worsens a student's academic performance" (Moze, 2012). Online social networks, and more specifically Facebook, are "intended as a platform for engagement, and because students spend a significant amount of time using the site, it makes sense to study the relationship between Facebook use and student engagement" (Junco, 2012).

The research is still in the early stages so there is no real consensus on whether social media influences a student's academic performance. However, the studies do agree that more and more students are devoting increasing number of hours to social media, which is time they could have been studying or being fully engaged in the classroom presentation. "This behavior not only prevents the offenders from fully engaging in class, more conscientious students have complained that it is distracting to observe fellow students browsing on sites unrelated to class (Mozee, 2012)."

The purpose of this study is to survey college students at California State University San Bernardino as to their use of social media, their academic performance and the impact of social media on their academic experience.

### **Statement of Hypothesis**

Does the use of social media by college students have an impact on their academic performance?

### **Definition of Terms**

The following terms will be used throughout this study:

**Online Social Network:** Online social network will be referred to as any social network such as Facebook, Twitter, Instagram and text messaging. The abbreviation OSN will be used for Online Social Network.

**GPA:** GPA will be used to represent a students academic performance on a traditional four point scale where A = 4 points, B = 3 points, C = 2 points and D = 1 point.

### **Significance of Proposed Study**

The significance of this proposed study is to see the effects of 21st century technology on the traditional college student. The impact of the 21st century on academics has not been fully studied nor has the studies done thus far come to an agreement on the impact of technology.

While our study will not provide a definitive answer to the question of the impact of OSN to academics it will provide data that will hopefully spark further, more in-depth, studies.

### **Literature Review**

While Social media is a large part of each college students life the research as to whether social media has an effect on academic performance is limited. Many articles were reviewed as to whether social media has a negative impact on academic performance. While there was no direct consensus among the articles, all researchers agreed that more data is needed.

Paul, Baker and Cochran (2012) state that academic performance is a function of attention span, time management skills, student characteristics, academic competence and time spent on Online Social Networks. Mozee (2012) found that the use of social media by college students can be either harmful or helpful as related to academic performance. Mozee also stated that “at the core of this debate is whether the growing use of social media by high school and/or college students actually improves or worsens a student’s academic performance. Karpinski, Kirschner, Ozer, Mellott and Ochwo (2013) found a negative relationship between social networking site use and grade point average for students they surveyed due to poor multitasking. Karpinski et al. (2013) also provided “valuable cautionary information about the impact of multitasking and using SNS(s) in a learning environment on student’s GPA.” Junco (2012) also found a negative relationship between social networking site use and grade point average due to multitasking, however that finding was only applicable to the students in the United States and not the European students. Junco adds that “it seems that only large amounts of time spent on Facebook produce the greatest effect on outcome measures such as GPA and time spent studying.”

In a 2008 a case study conducted at Hampton University Business College, the study's author, Braguglia sought to better understand the use of cell phones by college students and the effects of cellphone use on student learning through qualitative research. Braguglia (2008) documented that "college students are tremendous users of cellular telephones and that they use cell phones primarily as a communication tool." And, in spite of classroom prohibitions, most students used their cell phones during class for personal communication. Braguglia (2008) found that 77.3% of students surveyed believe that using a cell phone during class "seldom or never interferes with classroom learning." Most of these same students believe that cell phones distract them from their studies outside of the classroom. Braguglia (2008) also found that students do not utilize their cell phones to assist with learning; "A total of 76.1% of students believe that cell phones seldom or never assist them with learning during class" and "'60.6% of students report that cell phones seldom or never assist them in learning outside the class" (Braguglia 2008). With respect to design methodology, study data recorded each student's self-assessment of their personal cell phone use and the impact of cell phone use on their learning. Participants were asked to complete a brief, ten minute, survey that included a series of question such as "How often does the use of your cell phone during class interfere with your learning?" And, the corollary question, "How often does the use of your cell phone during class assist in your learning" (Braguglia 2008). Participants could choose one of five responses to these series of questions.

Students and educators are challenged to re-think how learning can be progressively improved through the use Twitter in a 2013 study by Lin, Hoffman and Borengasser. The formal purpose of this research was to study the uses of Twitter as a supplement to online and face-to-face classroom learning among undergraduate and graduate students. This was a qualitative case

study conducted in three classrooms comprised of undergraduate and graduate students attending the University of Hawaii, College of Education. The authors examined how students perceive Twitter as a classroom tool through the use of two sources of data: 1) tweets posted to Twitter, and 2) three progress reports prepared by each participant. The authors found that when given options concerning Twitter use, students were most interested in two information sharing applications: first, sharing comments on their personal and immediate status and second, sharing resources related to the course. The authors also found that sustained collaboration did not occur (Lin, Hoffman and Borengasser). Possibly the most important outcome of this research was its “lessons-learned” which are presented by the authors in the form of recommendations for college faculty. Four recommendations are provide scaffolding, address privacy, establish purpose and, model use with structure. The authors have shown the importance of learning from one’s mistakes and to utilize this information to guide and direct future research and thereby making a valuable contribution to the growing body of evidence-based research that will help to improve learning.

Social Media can be used as a learning tool for students. Fewkes and McCabe (2012) conducted a qualitative study focusing on the aspect of social media being a learning tool for students. The two research questions that the investigators want to answer were: (a) How have a selected sample of secondary school students in Ontario been using Facebook since it has become accessible to students? (b) Is there congruency between the vision for the use of social media in the classroom and how students have actually been using it? The purpose of the study was theoretical, the use of Facebook moves beyond formal academic learning. The researchers want to determine if moving from a formal academic learning style will allow students to collaborate and communicate with other students effectively.

There were 63 high school students involved this study, 51 students that completed all of the questions in the questionnaire and 12 that only completed parts of the questionnaire. Twenty seven percent of the students stated that their teacher uses Facebook. However, the majority of these students, 60%, have used Facebook for three to four years. This shows that students have been exposed to using academic applications of Facebook, but often not on a regular basis. When asked if Facebook can be useful as an educational tool, 73% of the student surveyed believe it can be useful as an educational tool. Students explained that Facebook could make communication easier with classmates, quick and easy discussion forums, group collaboration, awareness campaigns, increased self-organization and homework help. Based on the results of this study, the researchers concluded that Facebook is not commonly used by teachers, however, it can be an effective educational tool if implemented correctly.

A quantitative study conducted Heibergert, G., Junco, R., and Loken E. showed similar results regarding social media as a tool for learning. The two research questions were: (a) What effects does encouraging the use of Twitter for educationally relevant purposes have on student engagement? (b) What effect does encouraging the use of Twitter for educationally relevant purposes have on semester grades? This article starts by discussing the problems that teachers are having with keeping students engaged. The researchers describe a link between technology and engagement. Twitter is a social media website, which involves students using technology.

There have been studies conducted which address the effectiveness of social media on student engagement. However, at the time of article publication no studies had been conducted on the effect of Twitter as part of an educational intervention on student engagement. The study



expanded on previous OSN research in academic settings. This is important because the researchers wanted to examine the links between engagement and student success.

With respect to research question number one, the researcher conducted a mixed effects ANOVA model, which sections nest within the treatment group. The difference score between the post- tests was the dependent variable. There was also a mixed ANOVA model conducted for the pre-test engagement score. The experimental group had a higher differences scores. There was no pre-existing difference in engagement by group and nested sections.

With respect to research question number two, a mixed effects ANOVA model was used and the sections nested within treatment groups. Overall first semester GPA was the dependent variable. The semester GPAs for the experimental group was much higher than the control group. A mixed effects ANOVA model was conducted on high school GPA as the dependent variable, but there was no pre-existing differences found between the two groups.

## **Design and Methodology**

### **Subjects and/or Case**

The participants of this study were 18 to 21 year old female students who were in an all-female on-campus organization at California State University San Bernardino. This study was an ethnography study that was used to identify the cultural phenomena that revolves around social media and its impact on student's academic performance in the college setting.

### **Instrumentation/Data Collection**

In order to conduct the research for this study a questionnaire was created, see Appendix 1. The questionnaire consisted of eleven questions which included descriptive questions to know more about the population being surveyed. The majority of questions on the questionnaire were forced choice answers with the exception of one. The one question that was not forced choice

was an open-ended question where the participants would write in what their major was. The questionnaire was adopted from a survey from a previous study by Mehmood and Taswir (2013). The survey was adjusted to fit the needs of this study and this population. Once the questionnaire went through numerous rough drafts and was approved by the entire research group, it was taken to the on campus organization to be completed. One member of the research group attended one of the monthly meetings and handed out the questionnaire, for those present at the meeting, to complete.

### **Data Treatment Procedures**

The survey was anonymous and administered in a single setting. Once the surveys were completed and collected they were sorted by hand and the data from the surveys were entered in a single excel sheet. As a group it was decided on what areas of the survey to focus on. The research group decided to focus on two main parts of the survey results.

### **Presentation of Findings**

Once the data was analyzed we focused on these specific questions;

1. What social media site do you use?
2. How much time do you spend on social media sites per day?

Table 1

*Types of Social Media Sites Used.*

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Social Media Used	Frequency	Percent
YouTube	18	14.8%
Twitter	32	26.2%

Facebook	37	30.3%
Instagram	35	28.7%
None	0	0%

Table 2

*Time Spent on Social Media Sites Per Day.*


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Time Spent	Frequency	Percent
30 minutes	2	.05%
1 hour	5	12.8%
2 hours	10	25.6%
3 hours	12	30.1%
4 hours	6	15.4%
5+ hours	4	10.3%

Once the questionnaires were completed and collected the analysis of the data began. It was found that on average, the participants spent about three hours on OSN everyday. This came out to be about 30.1% of the participants who spent at least three hours on OSN each day. About 25.6% of the participants spent at least two hours per day on OSN. The data also showed that the most commonly used social networking site was Facebook with about 30.3% followed by Instagram with 28.7%. According to the results, all of the participants used at least one of the OSN that were listed. The results can be viewed in Table 1 and Table 2.

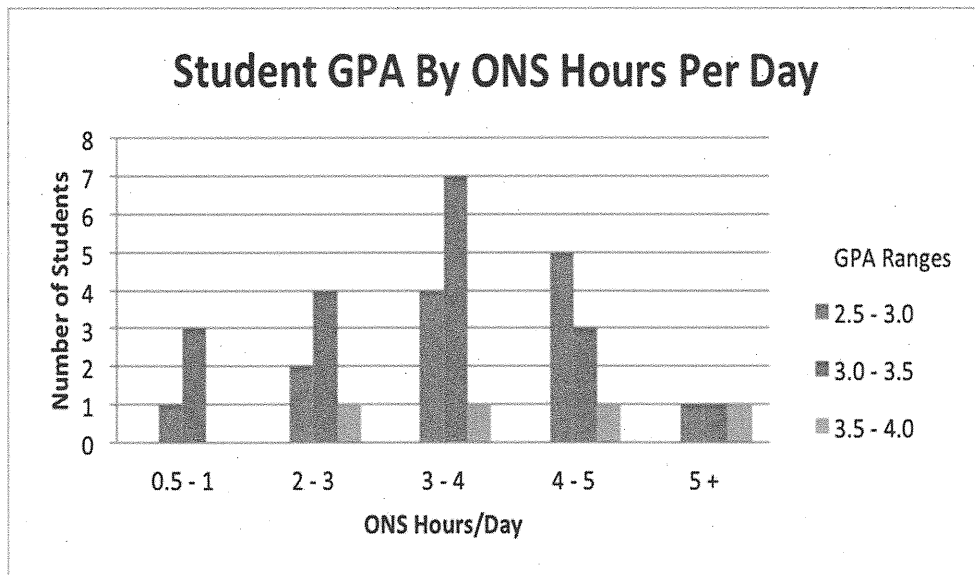
The analysis of this data has been accomplished through the application of descriptive statistical procedures. This statistical analysis has enabled the researchers to organize and

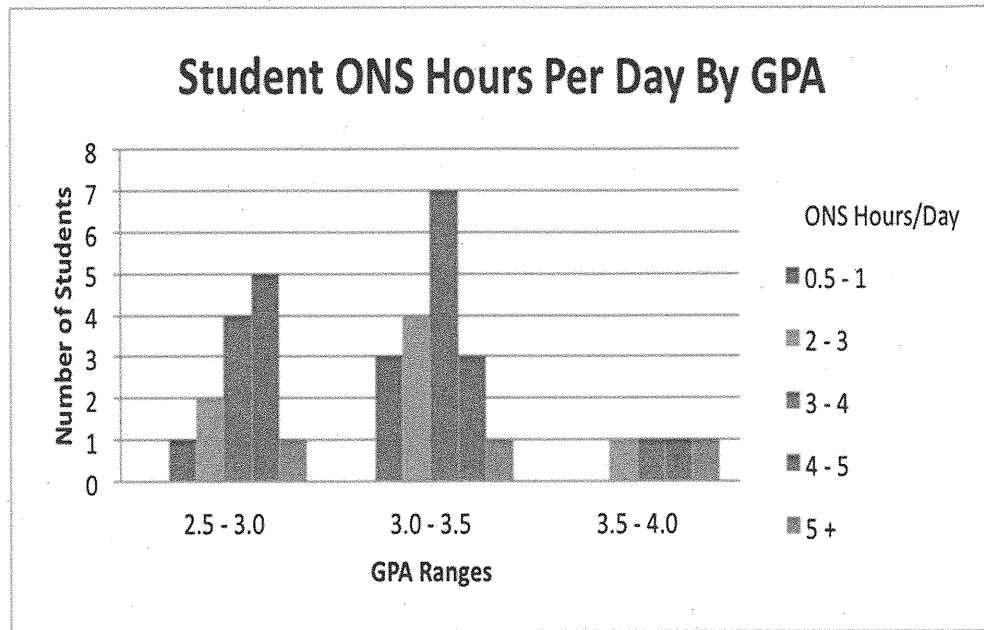
analyze the collected data to reach conclusions and, to raise future research questions concerning the question of whether or not the use of OSN by college students impacts their academic performance.

Undergraduate college students attending the California State University San Bernardino are the units of study for this research. The California State University San Bernardino student population during the fall 2013 semester is 18,398. Of this total, 16,083 are undergraduate students (87% of the total student body). The target population of this study is California State University San Bernardino's 16,083 undergraduate students. As described above, researchers utilized nonprobability sampling procedures to select to 39 undergraduate students to complete questionnaires. These 39 students (participants) are the sample population for this study. Of these 39 students, 36 submitted complete questionnaires that were accepted for analysis by the research group; three questionnaires were culled from the sample due to incomplete information provided by participants.

The research group set out to describe and then inductively synthesize questionnaire data. The objective of this data analysis was to develop generalizations concerning the relationship, if any, between OSN use by participants and their academic achievement. The research group was open to new and better ways to understand the OSN phenomenon and its relationship to academic achievement. For this reason, the group applied a "bottom-up" approach, using an inductive reasoning to analyze questionnaire ordinal data. Statistical analysis of ordinal data (student GPA and OSN hours) was performed by the research group in the following order: frequency distribution, graphic portrayal of these distributions (histogram); measures of central tendency; relationships among measures of central tendency; measures of relationship (scatterplot); and, limited analysis of data distribution variability.

Initial findings appeared to be unremarkable. However, as data analysis progressed, the research group was able to discern clear patterns upon which generalizations and study conclusions are supported. The group next evaluated measures of central tendency. All measures of GPA central tendency (mean, median and mode) are “3.0 – 3.5”; all measures of OSN hours per week central tendency (mean, median and mode) are “3 – 4” (hours per week). At this stage of the analysis, important patterns began to emerge from the data from which the research group was able to form initial generalizations. For example, when analyzing the relationships among measures of central tendency two important results emerged: the distribution of data produced a fairly symmetrical bell curve; and, the distribution was, only slightly, positively skewed. A scatterplot analysis of this data mirrors these findings. The results of the research group’s data analysis are summarized in two figures: Figure 1 - “Student GPA By OSN Hours Per Week” and Figure 2 - “Student OSN Hours Per Week By GPA.”





Results indicate that there is little or no relationship between student's OSN hours per week and GPA. Most students use OSN three to four hours per week and maintain a 3.0 – 3.5 GPA. For highest-achieving students (3.5 – 4.0 GPA), there was no apparent relationship between OSN hours per week and GPA. It is acknowledged that the distribution of data is positively skewed indicating there is a relationship between OSN hours per week and GPA (the greater a participant's OSN use, the lower the participant's GPA). The research group has identified at least two reasons to qualify any relationship between OSN hours per week and GPA, as presented in this research. First, the “no relationship” finding for highest-performing students would appear to contradict, at least in part, the positively skewed distribution of data. Second, the limitations of this study, enumerated below, is reason to qualify all findings presented in this study.

#### Rasch Analysis

Since the Rasch model is unidimensional, only correct and incorrect responses are analysed. Because of this I chose answers that best supported the hypothesis that greater social

media use has a negative effect on GPA as being 'correct'. The analysis can then determine if the responses (correct) do indeed support the hypothesis. The biggest flaw in this design is that the questions are equally weighted. The students GPA is key to the study and should normally receive greater importance. It would have given a better indication of the effect of social media use if we could have had greater differentiation among the students GPA scores.

The first important consideration that I noticed was that the questionnaire and the students are closely aligned. (See appendix 4) The means of both the mean students' scores and the test questions are roughly the same (within one logit). There is an obvious clustering of students scores within one standard deviation of the mean which would also indicate that the questions on the survey are not differentiated enough to provide better analysis of the effect that social media has on their GPA. This supports the earlier conclusion that the effect of social media is negligible according to our results.

For the dimensionality maps, we want to look primarily at the 'infit' and 'outfit' for the students and for the questions. The mean-square values (see appendix 5) have the following importance;

>2.0	Distorts or degrades the measurement system
1.5 - 2.0	Unproductive for construction of measurement, but not degrading
0.5 – 1.5	Productive for measurement
<0.5	Less productive for measurement, but not degrading. May produce misleadingly good and separations.

When looking at the mean-square values for the 'infit', this is the measure that affects the central tendencies of the data, we see that there are two values that are above 2.0 and degrading the total mean-square value of the student scores. Another important factor is that a majority of

values are less than 1 which could indicate that the student responses are too predictable. When looking at question mean-square values, they are all within .38 of the ideal (1) which would indicate that the data and interpretations from the questions are accurate. It is the conclusions from the student responses that could be called into question by these results. One last important detail is the very large difference in standard deviation between the question responses and the students' scores (see appendix 2). This is additional evidence that the questions were not well targeted to the student group that was surveyed. For our results this would mean that little interpretation can be made from the students' responses.

The overall interpretation is fairly clear that according to our survey results, there is no negative effect on GPA caused by social media. However, the data analysis shows that this is due more to the limitations of the survey method chosen and the lack of detailed data rather than any conclusive results.

### **Limitations of the Design**

There were a handful of limitations to this study. One of the limitations of the study was the sample that was used. Although the study used a convenience sample it was an all female sample which limits the accuracy of the generalization of the results to an entire population. Another limitation of the study was that the on campus group surveyed required its members to maintain a certain grade point average in order to remain apart of the organization. Another limitation to the study is that due to time constraints it was impossible to conduct further interviews of the participants to collect more information.

### **Conclusion**

The purpose of this research proposal is to address the question - does the use of social media by college students have an impact on their academic performance? The answers to this



question are not conclusive and warrant further study. The review of literature affirms the growth of OSN and its far-reaching impacts in education. And, while all authors agree that developments in present and emergent OSN technologies will transform for education, there is little agreement on how this will occur and whether such transformations will be positive. For example, Paul, Baker and Cochran (2012) provide substantial evidence that OSN use by adversely impacts student's academic performance. In contrast, Janco, Heilbergert and Loken (2010) found that college students who used OSN resulted in greater collaboration and richer academic dialogue among students. MLin, Hoffman Borengasser in their 2013 study present a more reflective approach. Utilizing data generated from the University of Hawaii case study, the authors provided four recommendations to the educational community for future research and implementation.

The results of this research performed at California State University San Bernardino indicated that there is little or no relationship between student's OSN hours per week and their GPA. While study results were positively skewed, indicating a relationship between participant's OSN weekly use and lowered GPA's, other results contained in this study indicated no apparent relationship. For example, based on questionnaire data, there is no apparent relationship between OSN weekly use and GPA for the highest-performing students (3.5 – 4.0 GPA). The survey found that there were four highest-performing students who were identified in the sample population and their OSN weekly use spanned four categories ranging from two to five hours of OSN per week. None of the highest-performing students used one hour or less of OSN. In this study, it was found that most students use OSN three to four hours per week and maintain a 3.0 – 3.5 GPA.

Further ethnographic qualitative analysis is needed to address the question - does the use of social media by college students have an impact on their academic performance. Such analysis could explore, in-depth, the cultural patterns and behaviors of college students. Such an in-depth description and understanding may be central to understanding the OSN phenomenon and learning in the OSN world.

## References

- Braguglia, K. H. (2008). Cellular telephone use: A survey of college business students. *Journal of College Teaching & Learning*, 5(4), 55-62.
- Fewkes, A. & McCabe, M. (2012). Facebook: Learning tools or distraction? *Journal of Digital Learning in Teacher Education*, 92 – 98. Retrieved from <http://www.eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ972449>
- Heibergert, G., Junco, R. & Loken, E. (2010). The effect of twitter on college student engagement and grades. *Journal of Computer Assisted Learning*, 119 – 132.  
doi: 10.1111/j.1365-272910.00387.x
- Junco, R. (2012). Too much face and not enough books: The relationship between multiple indices of Facebook use and academic performance. *Computers in Human Behavior*, 28. 187-198.  
doi:10.1016/j.chb.2011.08.026
- Karpinski, A.C., Kirschner, P.A., Ozer, I., Mellott, J.A., & Ochwo, P. (2013). An exploration of social networking site use, multitasking, and academic performance among United States and European university students. *Computers in Human Behavior*, 29. 1182-1192.
- Lin, M., Hoffman, E., & Borengasser, C. (2013). Is social media too social for class? A case study of twitter use. *Techtrends: Linking Research & Practice To Improve Learning*, 57 (2), 39-45. doi: 1-.1007/s11528-013-0644-2

- Mehmood, S. & Tarang, T. (2013). The effect of social networking sites on the academic performance of students in college of applied sciences, nizwa, oman. *International Journal of Arts and Commerce*, 2(1), 111-125.
- Moze, S. (2012). The impact of social media use on academic performance at one urban university. *Online Journal of Rural and Urban Research*, 2(1), 1-10. Retrieved from <http://www.jsumurc.org/ojs/index.php?journal=ojrur&page=article&op=view&path%5B%5D=52>
- Paul, J. A., Baker, H. M., & Cochran, J. D. (2012). Effect of online social networking on student academic performance. *Computers in Human Behavior*, 28, 2117-2127.

Appendix 1

Gender: Male Female

Age: 17-19

20-22

Major:

Grade level: 1<sup>st</sup> year 2<sup>nd</sup> year 3<sup>rd</sup> year 4<sup>th</sup> year other

GPA: 2.5-3.0

3.1-3.5

3.6-4.0

Please circle your answer(s):

What Social media sites do you use?

Youtube

Twitter Facebook

Instagram

None

How many social networking sites do you use?

0

1

2

3

4+

How much time do you spend on social media sites per day?

30min

1 hour

2 hours

3 hours

4 hours

5 hours

5+hours

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Do you use social networking sites through your mobile phone?

Yes

No

Do you use social networking sites during regular school hours while in class?

Yes

No

How many texts do you send during any given class period?

0

1-10

11-40

41-75

76+

You use social media primarily for? (check all that apply)

\_\_\_ Downloading music/video

\_\_\_ Blogging

\_\_\_ Submitting articles to website

\_\_\_ Keeping in touch with friends

\_\_\_ Uploading music/videos

\_\_\_ Posting

photos

\_\_\_ Creating polls/quizzes or surveys

\_\_\_ Chatting

\_\_\_ Communication

with teachers/class fellows

Do you think social media sites are changing your study habits in anyway?

Yes No

**Do you think social networking sites effect the time you spend studying?**

Yes No

**How many hours per week do you spend doing homework/reading/school related work outside of the classroom?**

30 minutes 1 hour 2 hours 3 hours 4 hours 5 hours 5+ hours

**Do you think social networking sites help you with your home work?**

Yes No

Thank you for your cooperation!

Appendix 2  
(Main Rasch File)

MINISTEP Version 3.75.0 Nov 20 22:20 2013  
Current Directory: C:\Users\Edward\Documents\

Control file name? (e.g., exam1.txt). Press Enter for Dialog Box:

C:\Users\Edward\Documents\notepad math 607.txt

Report output file name (or press Enter for temporary file, Ctrl+O for Dialog Box):

Extra specifications (if any). Press Enter to analyze:

Temporary Workfile Directory: C:\Users\Edward\AppData\Local\Temp\

Reading Control Variables ..

Reading KEYnn=, GROUPS= etc..

Input in process:

Input Data Record:

0123331121152

^P^I ^N

32 S Records Input.

CONVERGENCE TABLE

-Control: \notepad math 607.txt				Output: \Documents\ZOU757WS.TXT			
PROX	ACTIVE COUNT	EXTREME 5 RANGE	MAX LOGIT CHANGE				
ITERATION	S	Q	CATS	S	Q	MEASURES	STRUCTURE
1	32	11	2	1.73	2.87	3.4340	
2	32	11	2	2.46	3.05	.6351	
3	32	11	2	2.54	3.23	.3622	

PROBING DATA CONNECTION: to skip out: Ctrl+F - to bypass: subset=no

Control: \notepad math 607.txt				Output: \Documents\ZOU757WS.TXT			
JMLE	MAX SCORE	MAX LOGIT	LEAST CONVERGED	CATEGORY			
ITERATION	RESIDUAL*	CHANGE	S	Q	CAT	RESIDUAL	CHANGE
>=====<							

	1	1.13	.1694	4	8*		
>	=====						<
	2	.34	.0323	4	8*		
>	=====						<
	3	.15	-.0189	4	8*		
>	=====						<
	4	.08	-.0124	12	8*		

Calculating Fit Statistics

>=====<  
Standardized Residuals N(0,1) Mean: .02 S.D.: 1.01  
Time for estimation: 0:0:0.105  
Processing Table 0  
Survey Analysis

S	32	INPUT	32	MEASURED		INFIT		OUTFIT	
		TOTAL		COUNT	MEASURE	REALSE	IMNSQ	ZSTD	OMNSQ
ZSTD									
MEAN		5.6	11.0	.21	.86	1.00	.0	1.01	.1
S.D.		1.5	.0		.95	.15	.45	1.0	.88 .7
REAL RMSE		.87	TRUE SD		.36	SEPARATION	.42	S	
		RELIABILITY	.15						

Q	11	INPUT	11	MEASURED		INFIT		OUTFIT	
		TOTAL		COUNT	MEASURE	REALSE	IMNSQ	ZSTD	OMNSQ
ZSTD									
MEAN		16.4	32.0		.00	.53	.97	.0	1.01 .2
S.D.		9.3	.0		1.88	.18	.18	1.1	.46 1.2
REAL RMSE		.56	TRUE SD		1.80	SEPARATION	3.20	Q	
		RELIABILITY	.91						

Output written to C:\Users\Edward\Documents\ZOU757WS.TXT  
CODES= 12345

Measures constructed: use "Diagnosis" and "Output Tables" menus  
Processing Table 1  
Sorting Q for Table 1.0

>=====<



Appendix 3  
(Summary Statistics)

TABLE 3.1 Survey Analysis  
22:28 2013

ZOU017WS.TXT Nov 20

INPUT: 32 S 11 Q REPORTED: 32 S 11 Q 2 CATS  
MINISTEP 3.75.0

SUMMARY OF 32 MEASURED S

TOTAL		MODEL		INFIT	OUTFIT	
SCORE	COUNT	MEASURE	ERROR	MNSQ	ZSTD	
MEAN	5.6 11.0	.21 .80	1.00 .0	1.01 .1		
S.D.	1.5 .0	.95 .05		.45 1.0	.88 .7	
MAX.	9.0 11.0	2.33 .91	2.31 2.0	3.86 1.9		
MIN.	3.0 11.0	-1.55 .76		.32 -1.5	.20 -.9	
REAL RMSE	.87 TRUE SD	.36 SEPARATION		.42 S		
RELIABILITY	.15					
MODEL RMSE	.80 TRUE SD	.51 SEPARATION		.63 S		
RELIABILITY	.29					
S.E. OF S MEAN	= .17					

S RAW SCORE-TO-MEASURE CORRELATION = 1.00  
CRONBACH ALPHA (KR-20) S RAW SCORE "TEST" RELIABILITY = .20

SUMMARY OF 11 MEASURED Q

TOTAL		MODEL		INFIT	OUTFIT	
SCORE	COUNT	MEASURE	ERROR	MNSQ	ZSTD	

MEAN	16.4	32.0	.00	.52	.97	.0	1.01	.2	
S.D.	9.3	.0	1.88	.18	.18	1.1	.46	1.2	
MAX.	31.0	32.0	2.81	1.03	1.38	2.4	1.71	2.1	
MIN.	3.0	32.0	-3.63	.39	.72	-2.2	.28	-2.0	

-----|

| REAL RMSE .56 TRUE SD 1.80 SEPARATION 3.20 Q  
 RELIABILITY .91 |

|MODEL RMSE .55 TRUE SD 1.80 SEPARATION 3.26 Q  
 RELIABILITY .91 |

| S.E. OF Q MEAN = .60  
 |

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UMEAN=.0000 USCALE=1.0000  
 Q RAW SCORE-TO-MEASURE CORRELATION = -.99  
 352 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 310.16 with 310 d.f.  
 p=.4867  
 Global Root-Mean-Square Residual (excluding extreme scores): .3766  
 Capped Binomial Deviance = .1914 for 352.0 dichotomous observations

Appendix 4  
(Stem and Leaf Plot)

TABLE 16.3 Survey Analysis

ZOU017WS.TXT Nov 20

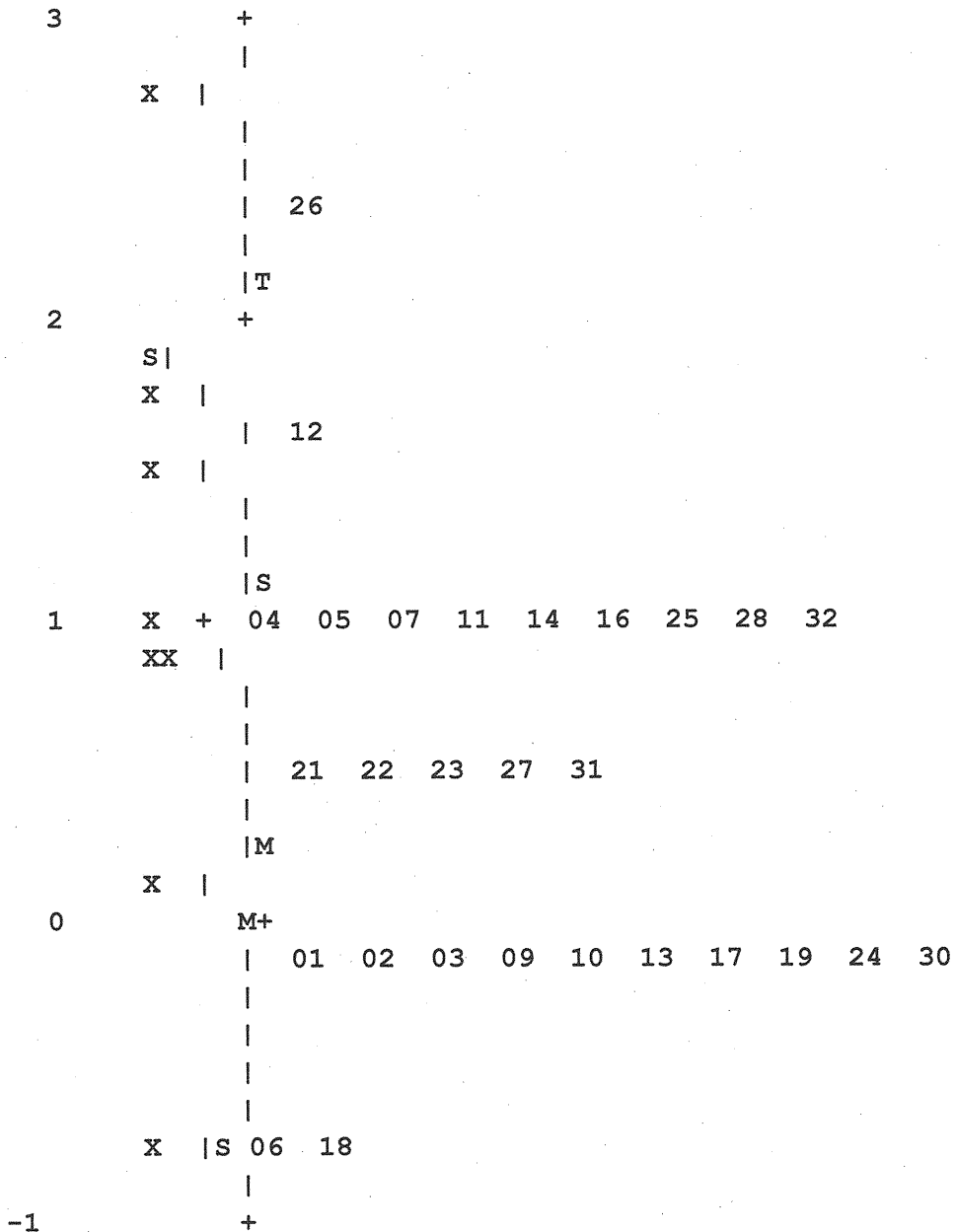
22:28 2013

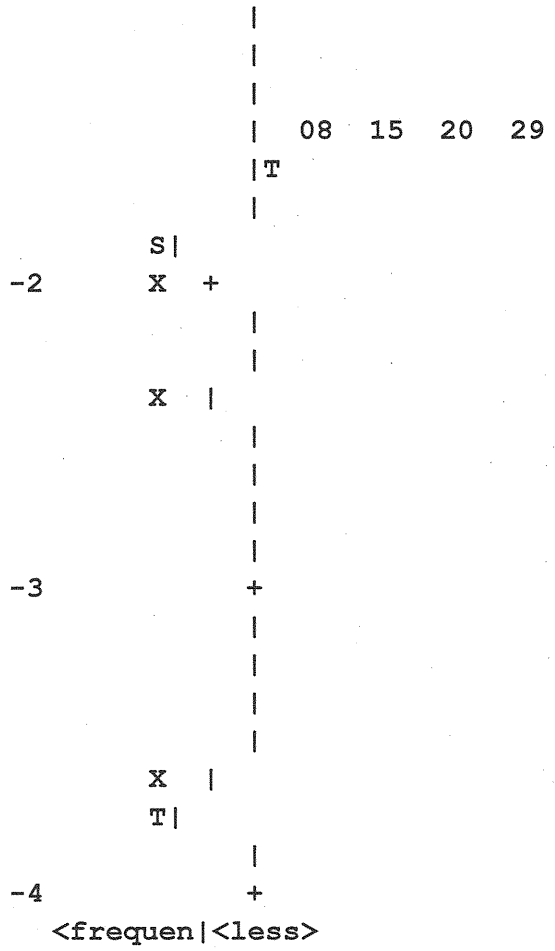
INPUT: 32 S 11 Q REPORTED: 32 S 11 Q 2 CATS

MINISTEP 3.75.0

MEASURE Q - MAP - S

<rare>|<more>





Appendix 5  
(Student Dimensionality)

CONTRAST 1 FROM PRINCIPAL COMPONENT ANALYSIS  
STANDARDIZED RESIDUAL LOADINGS FOR Students (SORTED BY LOADING)

CON-	TRAST	LOADING	INFIT			OUTFIT			ENTRY						
			MEASURE	MNSQ	MNSQ	MEASURE	MNSQ	MNSQ	NUMBER	S	NUMBER	S			
1		.93	-.12	.67	.49	A	1	01	-.82	2.33	.86	.61	a	26	26
1		.93	-.12	.67	.49	B	3	03	-.62	1.05	1.19	1.05	b	4	04
1		.93	-.12	.67	.49	C	17	17	-.48	1.05	.65	.45	c	14	14
1		.80	.48	.59	.42	D	23	23	-.47	-1.55	2.31	3.81	d	20	20
1		.77	-.79	.83	.68	E	18	18	-.46	1.05	.80	.55	e	5	05
1		.66	-1.55	2.19	2.16	F	29	29	-.46	-1.55	1.21	1.27	f	15	15
1		.63	1.05	.65	.45	G	7	07	-.44	-.12	1.30	1.16	g	24	24
1		.63	1.05	.65	.45	H	16	16	-.39	1.64	1.36	.94	h	12	12
1		.54	1.05	.80	.55	I	32	32	-.37	.48	1.38	2.25	i	31	31
1		.54	.48	1.02	.78	J	22	22	-.25	-.12	.95	.68	j	10	10
1		.24	-.12	1.13	.80	K	13	13	-.24	-.12	.67	.49	k	19	19
1		.08	-.12	.45	.32	L	2	02	-.21	1.05	1.67	3.86	l	25	25
1		.08	-1.55	.32	.20	M	8	08	-.20	1.05	1.29	.91	m	28	28
1		.05	-.12	.95	1.98	N	9	09	-.15	-.79	.86	.77	n	6	06
									-.15	-.12	1.24	1.18	o	30	30
									-.12	.48	.76	.58	p	27	27
									-.11	1.05	1.32	1.14	P	11	11
									-.09	.48	.63	.45	O	21	21

CON-	TRAST	LOADING	MEASURE	MNSQ	MNSQ	ENTRY	NUMBER	S
1	1	.93	-.12	.67	.49	A	1	01
1	1	.93	-.12	.67	.49	B	3	03

1 1	.93	-.12	.67	.49	C	17 17
1 1	.80	.48	.59	.42	D	23 23
1 1	.77	-.79	.83	.68	E	18 18
1 1	.66	-1.55	2.19	2.16	F	29 29
1 1	.63	1.05	.65	.45	G	7 07
1 1	.63	1.05	.65	.45	H	16 16
1 1	.54	1.05	.80	.55	I	32 32
1 1	.54	.48	1.02	.78	J	22 22
1 2	.24	-.12	1.13	.80	K	13 13
1 2	.08	-.12	.45	.32	L	2 02
1 2	.08	-1.55	.32	.20	M	8 08
1 2	.05	-.12	.95	1.98	N	9 09
-----						
1 3	-.82	2.33	.86	.61	a	26 26
1 3	-.62	1.05	1.19	1.05	b	4 04
1 3	-.48	1.05	.65	.45	c	14 14
1 3	-.47	-1.55	2.31	3.81	d	20 20
1 3	-.46	1.05	.80	.55	e	5 05
1 3	-.46	-1.55	1.21	1.27	f	15 15
1 3	-.44	-.12	1.30	1.16	g	24 24
1 3	-.39	1.64	1.36	.94	h	12 12
1 3	-.37	.48	1.38	2.25	i	31 31
1 2	-.25	-.12	.95	.68	j	10 10
1 2	-.24	-.12	.67	.49	k	19 19
1 2	-.21	1.05	1.67	3.86	l	25 25
1 2	-.20	1.05	1.29	.91	m	28 28
1 2	-.15	-.79	.86	.77	n	6 06
1 2	-.15	-.12	1.24	1.18	o	30 30
1 2	-.12	.48	.76	.58	p	27 27
1 2	-.11	1.05	1.32	1.14	P	11 11
1 2	-.09	.48	.63	.45	O	21 21
-----						

Appendix 6  
(Question Dimensionality)

CONTRAST 1 FROM PRINCIPAL COMPONENT ANALYSIS  
STANDARDIZED RESIDUAL LOADINGS FOR QUESTIONS (SORTED BY LOADING)

CON-		INFIT OUTFIT					ENTRY		INFIT OUTFIT					ENTRY	
TRAST	LOADING	MEASURE	MNSQ	MNSQ	MNSQ	NUMBER	Q	LOADING	MEASURE	MNSQ	MNSQ	MNSQ	NUMBER	Q	
1	.70	-.71	.91	.91	.91	A	8 Q8	-.56	1.51	.84	.66	.66	a	7 Q7	
1	.63	-2.40	1.10	1.71	1.71	B	9 Q9	-.54	.83	1.15	1.47	1.47	b	1 Q1	
1	.52	.83	1.38	1.57	1.57	C	10 Q10	-.47	-3.63	.89	.28	.28	c	5 Q5	
1	.31	2.81	1.02	.96	.96	D	4 Q4	-.32	.08	.72	.66	.66	d	3 Q3	
1	.00	-2.04	.74	.47	.47	E	6 Q6	-.31	.99	.98	.94	.94	e	2 Q2	
								-.13	1.71	.98	1.49	1.49	F	11 Q11	

CON-		INFIT OUTFIT					ENTRY		INFIT OUTFIT					ENTRY	
TRAST	LOADING	MEASURE	MNSQ	MNSQ	MNSQ	NUMBER	Q	LOADING	MEASURE	MNSQ	MNSQ	MNSQ	NUMBER	Q	
1 1	.70	-.71	.91	.91	.91	A	8 Q8	-.56	1.51	.84	.66	.66	a	7 Q7	
1 1	.63	-2.40	1.10	1.71	1.71	B	9 Q9	-.54	.83	1.15	1.47	1.47	b	1 Q1	
1 1	.52	.83	1.38	1.57	1.57	C	10 Q10	-.47	-3.63	.89	.28	.28	c	5 Q5	
1 1	.31	2.81	1.02	.96	.96	D	4 Q4	-.32	.08	.72	.66	.66	d	3 Q3	
1 1	.00	-2.04	.74	.47	.47	E	6 Q6	-.31	.99	.98	.94	.94	e	2 Q2	
1 1	-.13	1.71	.98	1.49	1.49	F	11 Q11								