

# Examining Relationships between Preservice Mathematics Teachers' Gender and their Perceptions of a Blogging Activity in a Euclidean Geometry Class

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**Abstract** – This paper presents the results of a study that sought to determine if preservice mathematics teachers' perceptions toward a 12-week blogging activity, used as a supportive teaching and learning tool in a college Euclidean Geometry course offered at a university in the Western United States, differed based on their gender. Data was collected using an instrument comprised of 16 Likert-type scale items designed to measure participants' attitude toward the blogging activity and another 18 Likert-type scale items designed to measure participants' perceived effectiveness of the blogging activity. The study determined that both male and female participants found the blogging activity to be appropriate and enjoyable; however, no significant differences were revealed in these measures based on their gender. This lack of a significant difference suggests that blogging activities should be considered appropriate in all classroom situations as such activities do not unfairly advantage one gender over the other.

**Index Terms**— Blog, Blogging Activity, Euclidean Geometry, Gender, Mathematics Teachers, Perceptions

## I. INTRODUCTION

The National Council of Teachers of Mathematics' (NCTM) Principles and Standards for School Mathematics [1] has been a guiding vision of mathematics education at the school level in the United States. Technology is one of the six principles included in this document. Specifically, NCTM's [1] Principles and Standards advocates for appropriate and integrated use of technology in every aspect of mathematics education [2].

Unfortunately, however, current progress in science, technology, and mathematics education in the U.S. is not satisfactory as evaluated by educators and legislators [3, 4]. Although many U.S. students excel in mathematics, as a whole, U.S. performance on international mathematics tests consistently remains between the second and third quartile [4]. There are wide disparities in mathematics achievement among various ethnic groups. Too many U.S. students and parents think that mathematics is a difficult and uninteresting subject. The result is that mathematics education in the U.S. is failing to instill students with sufficient skills and knowledge to meet the needs of this century's challenging economy and leadership issues [4].

Moreover, information technology use is not being satisfactorily implemented in mathematics education programs nationwide in the U.S. [5, 6]. Studies show that many teacher education programs in the U.S. have not integrated technology appropriately [7, 8]. The preparation of preservice teachers to use technology is one of the critical challenges teacher education programs face [2]. Brush, Glazewski, & Hew (2008) report that many teacher education programs prepare preservice teachers with low level or outdated technology skills that do not provide preservice teachers with adequate knowledge to incorporate sufficient technology-based instruction in their classroom. Many teacher education programs use the computer as a teacher-centered tool rather than as a student-centered tool [9].

The emergence of Web 2.0 technologies is receiving intense and growing interest across many sectors of the education industry for addressing the needs of today's diverse students [10-13]. In the fields of law, business, communication, and politics users have been grappling with advanced features of Web 2.0 tools for at least several years [14]. As Web 2.0 tools allow users to create Web content from text based web pages and publish online journals in visual format, Web 2.0 could provide appropriate technologies to create multiuser virtual teaching-learning systems.

Thus, the possibility exists for using the interactive features of Web 2.0 technologies to motivate today's technologically advanced students to create and participate in virtual platforms where they can enrich their mathematical knowledge and understanding by posting mathematical problems and quizzes; providing solutions to problems posted by others; and sharing their thinking in solving and creating mathematical problems. More importantly, this technology might provide a way of learning and understanding mathematics for those teachers and students who cannot afford costly mathematical software.

Studies have shown that gender differences play an unexpectedly significant role in interaction on the Internet in contrast to socioeconomic factors, such as education, income, or age [15-17]. Men and women use the Internet very differently [18, 19].

For instance, women send and receive emails in a richer and more engaging way; women appear to have overtaken men in online shopping; more men than women perform online financial transactions; men pursue and consume information online more aggressively than women (Fallows, 2005). Thus, it is possible that men and women might have different perceptions of using a blog as a supportive tool in a college Euclidean Geometry course.

This paper is part of a semester-long study that measured preservice mathematics teachers' perceptions on participating in a blogging activity in a college Euclidean geometry course. Items on the instrument used to collect data sought information from participants related to their experiences while taking the course as well as their beliefs about how they might utilize a similar activity in their own future classrooms. This paper presents a study designed to determine if preservice mathematics teachers' perceptions toward the 12-week blogging activity differed based on their gender.

## II. METHODOLOGY

### A. Research Questions

The data presented in this paper were collected and analyzed quantitatively, to answer the following research questions:

- (i) *Are there significant differences by gender with regard to preservice mathematics teachers' attitudes toward the blogging activity in a college Euclidean Geometry course?*
- (ii) *Are there significant differences by gender with regard to preservice mathematics teachers' perceived effectiveness of using the blogging activity in the college Euclidean Geometry course?*

### B. Data Collection

Data was collected during a semester long blogging activity was conducted as a supportive teaching and learning tool in a college Euclidean geometry course offered in a university in the Western United States. Due to the page limitation of this paper, a detailed methodology of the study could not be presented here. Briefly it should be noted that the blog was conducted for 12 consecutive weeks, as a standard component of a college Euclidean Geometry course. The blog can be visited at: <http://edsc353fall2011.wordpress.com/>.

There were 28 students in the class and all of them willingly participated in the blogging activity. Before starting the activity, the students were divided into six groups with five students in five of the groups and three in the remaining group. The six groups were randomly assigned to a pair of weeks, 1<sup>st</sup> and 7<sup>th</sup>, 2<sup>nd</sup> and 8<sup>th</sup>, 3<sup>rd</sup> and 9<sup>th</sup>, 4<sup>th</sup> and 10<sup>th</sup>, 5<sup>th</sup> and 11<sup>th</sup>, or 6<sup>th</sup> and 12<sup>th</sup>. Each week the researchers uploaded a new problem set. Each group member was responsible for submitting a complete solution, to one of the eight problems posted during the weeks assigned to their group.

The schedule was purposely set so that each group was assigned one week during the first half of the activity and another week in the second half. Each student created a pseudonym to maintain confidentiality throughout activity.

### C. The Survey Instrument

At the end of the 12-week activity, preservice mathematics teachers' perceptions toward the blogging activity were measured using an instrument developed by the researchers. Prior to collecting data, permission was sought from the Institutional Review Board (IRB) of the university where the study was conducted. Sixteen six-point scale Likert-type items measured the participants' attitudes toward the blogging activity while another 18 six-point scale Likert-type items measured their self-reported perceived effectiveness of the blogging activity. Due to the non-parametric nature of the Likert-type scale data, the non-parametric Wilcoxon-Mann-Whitney U test, which is the alternative to the parametric t-test, was used to analyze the data. The validity and reliability of the instrument were measured through appropriate procedures and were found to be authentic and consistent. An electronic copy of the survey instrument is available at:

[http://edsc353fall2011.files.wordpress.com/2012/10/survey\\_instrument.pdf](http://edsc353fall2011.files.wordpress.com/2012/10/survey_instrument.pdf)

### D. Participants and Data

There were 28 students in the class and all of them participated in the study. Descriptive statistics on the demographic information of study participants revealed that twelve (42.86%) of the participants were male and 16 (57.14%) were female. The participants ranged in age from 20 to 61 years old with a mean, median, and range of 26.43, 22.0, and 41 years, respectively, and a standard deviation of 10.15 years.

The overall attitude toward the blogging activity score for each participant was determined by calculating the median score of the 16 Likert-type scale items designed to measure this construct. Each item had a possible range of 1 to 6; where, for positively worded items, 1 indicated Very Strongly Disagree (VSD) and 6 indicated Very Strongly Agree (VSA). There were 6 negatively worded Likert-type scale items on this instrument, items 9, 11, 13, 16, 19, and 23. The same options were given for the negatively worded Likert-type scale items; however, scores for these items were coded in reverse order with a possible range of 1 to 6; where 1 indicated Very Strongly Agree (VSA) and 6 indicated Very Strongly Disagree (VSD).

Similarly, participants' perceived effectiveness of using the blogging activity was measured by calculating the median response of the 18 Likert-type scale items included on this instrument. Each item had a possible range of 1 to 6; where 1 indicated Very Strongly Disagree (VSD) and 6 indicated Very Strongly Agree (VSA) with a higher number representing a more positive perceived effectiveness of the blog for the learning of Euclidean Geometry. An overview of participants' perception scores obtained from this instrument is presented in the Appendix.

Table 1 shows a summary of the median attitude and median perceived effectiveness scores. Descriptive statistics of the median attitude scores yielded a mean, median, and mode of 4.18, 4.0, and 4.0, respectively, with a standard deviation of 0.95. This indicates that the typical response of participants corresponds to slightly more than agreement that they held a positive attitude toward the blogging activity in the College Euclidean Geometry course. Similarly, descriptive statistics of the median perceived effectiveness scores yielded a mean, median, and mode of 4.13, 4.0, and 4.0, respectively, with a standard deviation of 0.93, indicating that the typical response of participants corresponds to slightly more than agreement that the blogging activity was an effective means of teaching and learning Euclidean Geometry.

Table 1  
 Descriptive Statistics of Median Attitude and Median Perceived Effectiveness Scores

	Median Attitude Scores	Median Perceived Effectiveness
Valid N	28	28
Mean	4.1786	4.1250
Median	4.0000	4.0000
Mode	4.00	4.00
Std. Deviation	.95466	.92921

### III. RESULTS

The first research question was analyzed using a non-parametric Wilcoxon-Mann-Whitney U test on the median attitudes scores by gender. The Wilcoxon-Mann-Whitney U test result (shown in Table 2) indicated a non-significant difference ( $N = 28$ ,  $U = 68.0$ ,  $p > .05$ ) that failed to reject the null hypothesis that the median attitudes of the participants did not differ in terms of their gender in using the blogging activity as a supportive teaching-learning tool in a College Euclidean Geometry course.

Table 2  
 Wilcoxon-Mann-Whitney U Test Statistics for Attitude Scores by Participants' Gender

	Median Attitudes
Mann-Whitney U	68.000
Z	-1.377
Asymp. Sig. (2-tailed)	.169
Exact Sig. [2*(1-tailed Sig.)]	.205 <sup>a</sup>

a. Not corrected for ties.

Based on the ranks result (shown in Table 3), it was determined that male participants had a Mean Rank 16.83 and the female participants had a Mean Rank 12.75 for their attitudes toward the use of a blogging activity as a supportive teaching-learning tool in a college Euclidean Geometry course. The difference in these means was not

significant. Thus, no significant difference was found between the median attitude scores of males and the median attitude scores of females with regard to their attitude toward the blogging activity as a supportive teaching-learning tool in a College Euclidean Geometry course.

Table 3  
 Median Attitude Ranks by Gender

Gender	N	Mean Rank	Sum of Ranks
Male	12	16.83	202.00
Female	16	12.75	204.00
Total	28		

Among the 16 attitude-measuring items there were ten positively worded Likert-type scale items: Q8, Q10, Q12, Q14, Q15, Q17, Q18, Q20, Q21, and Q22. For the positively worded items, participants' responses were inclined towards Agree (A) to Strongly Agree (SA) options (Figure 1).

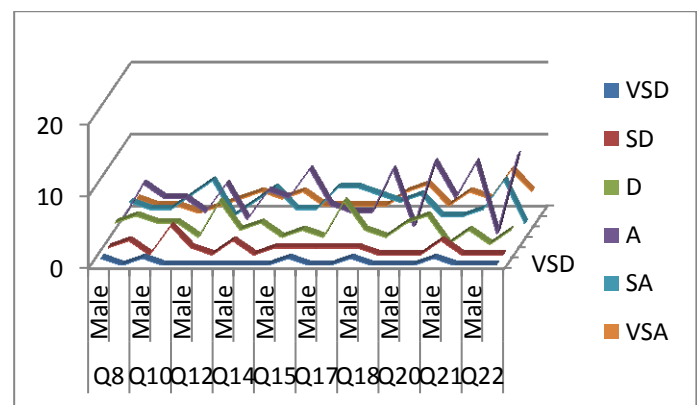


Figure 1: 3-D Line Graph of the Positively Worded Attitude Measuring Scores

On the negatively worded items: Q9, Q11, Q13, Q16, Q19, and Q23 participants' responses were inclined towards Disagree (D) to Very Strongly Disagree (VDA) options (Figure 2). In both cases, it is obvious that participants' overall responses indicated that they had positive attitude toward using the blogging activity.

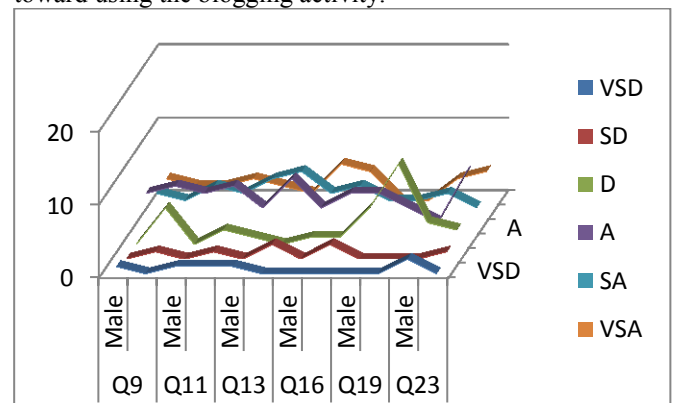


Figure 2: 3-D Line Graph of the Negatively Worded Attitude Measuring Scores

The second research question was analyzed using a non-parametric Wilcoxon-Mann-Whitney U test on the median perceived effectiveness scores by gender. The Wilcoxon-Mann-Whitney U test result (Table 4) indicated a non-significant difference ( $N = 28$ ,  $U = 94.50$ ,  $p > .05$ ) that failed to reject the null hypothesis that the median perceived effectiveness of the blog for the learning of Euclidean Geometry did not differ significantly in terms of the gender of the participants.

Table 4  
*Wilcoxon-Mann-Whitney U Test Statistics for Perceived Effectiveness Scores by Participants' Gender*

	Perceived effectiveness
Mann-Whitney U	94.500
Z	-.073
Asymp. Sig. (2-tailed)	.942
Exact Sig. [2*(1-tailed Sig.)]	.945 <sup>a</sup>

a. Not corrected for ties.

This means that the study did not find a significant difference in the median perceived effectiveness scores of the blog for the learning of Euclidean Geometry in terms of the gender of the participants. Again, based on the ranks of the median perceived effectiveness scores by gender (Table 5), it was determined that the male participants had a mean rank of 14.38 and the female participants had a mean rank of 14.59 in the perceived effectiveness of the blog for the learning of Euclidean Geometry. The difference in these means was not significant.

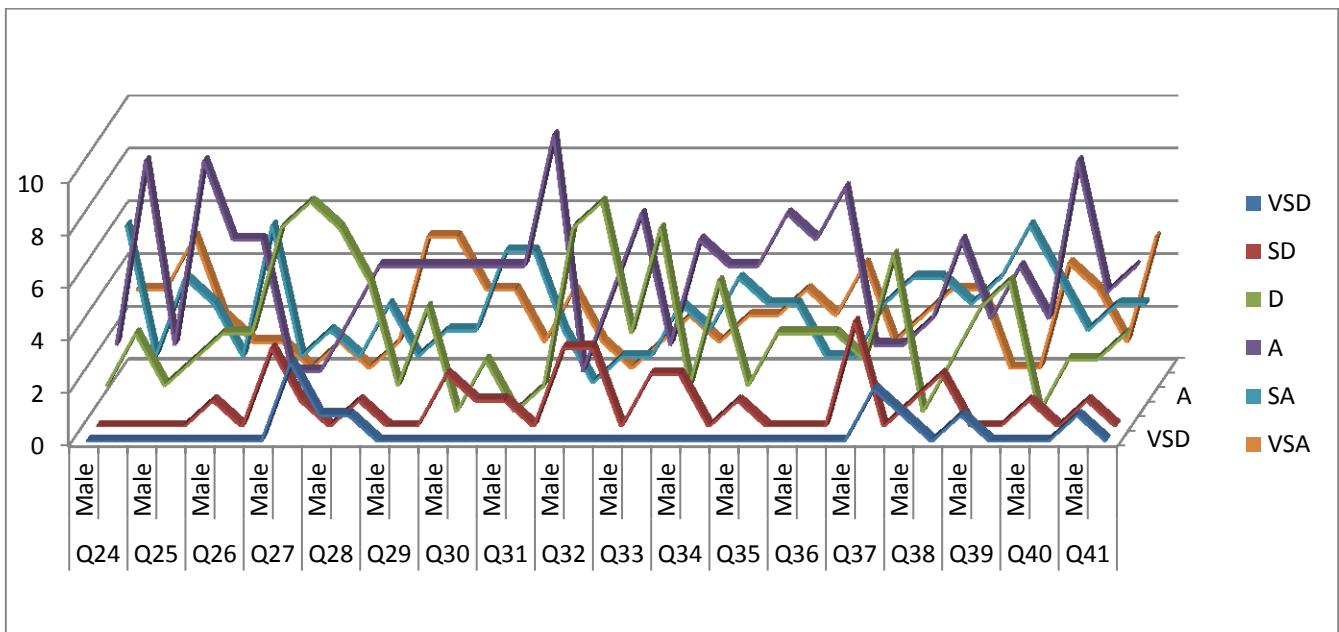


Figure 3: 3-D Line Graph of the Effectiveness Measuring Scores

Table 5  
*Ranks of the Median Perceived Effectiveness Scores by Gender*

Gender	N	Mean Rank	Sum of Ranks
Male	12	14.38	172.50
Female	16	14.59	233.50
Total	28		

All 18 perception-measuring items were worded positively. Participants' responses to these items inclined towards the *Agree* (A) to *Strongly Agree* (SA) options (Figure 3). This indicates that participants held positive perceptions toward the effectiveness of the blogging activity.



#### IV. DISCUSSION AND IMPLICATIONS

Descriptive statistics of the median scores of attitude toward the blogging activity revealed a mean, median, and mode of 4.18, 4.0, and 4.0, respectively, with a standard deviation of 0.95. Similarly, descriptive statistics of the median scores of perceived effectiveness yielded a mean, median, and mode of 4.13, 4.0, and 4.0 respectively with a standard deviation of 0.93. These numbers suggest that participants' typical response indicated more than agreement, meaning that they had overall positive perceptions toward the blogging activity. Moreover, data in this study indicated that both male and female participants experienced consistent perceptions that the blogging activity was appropriate and enjoyable in the Euclidean Geometry course.

The study indicated a non-significant difference in the median attitude scores of the participants toward the blogging activity in terms of their gender. Similarly, a non-significant difference was indicated in the median perceived effectiveness scores toward the blogging activity in terms of the gender of the participants. These results did not support some other studies that found that men and women use the Internet very differently, with women sending and receiving emails in a richer and more engaging way and that women appear to have overtaken men in online shopping, while more men perform online financial transactions and pursue and consume information online more aggressively than women [15, 18, 19]. However, the gender-based result of this study does support another doctoral research study [20] that found "gender did not have a significant relationship with Web 2.0 usage" (p. 81).

The most notable implication of this study is that it did not find any significant differences by gender regarding preservice teachers attitude toward the blog or its perceived efficacy. While typically such null results may not be considered important, in this study they provide critical information. Specifically, these results suggest that professors and teachers who wrongly believe that males are being given an unfair advantage when computers and technology are incorporated into a class should reconsider this thought. This study suggests that implementing a blogging activity should not provide any advantage to either males or females as some educators may wrongly believe to be the case. Therefore, professors and teachers should feel confident about implementing this type of activity without being excessively concerned about unfairly advantaging male or female students as both genders indicated positive attitudes toward this activity and found it to be an effective tool for teaching and learning purposes.

Another implication of this study is that since college students and preservice mathematics teachers responded positively to this activity, there is a good chance that high school and middle school students and/or in-service mathematics teachers might, also, find it to be effective and enjoyable. Thus, middle or high school teachers should consider implementing activities similar to those used in this study in their own classrooms. Furthermore, teacher educators should provide instruction to preservice teachers regarding the implementation of blogging activities and encourage these future teachers to use them in their future classrooms. Additionally, curriculum developers and policy makers should use their influence to encourage the inclusion of blogs and or/other Web 2.0 technologies in the middle school, high school, and teacher education mathematics curricula.

#### V. CONCLUSION

This study has provided some important implications regarding the use of blogs in the teaching and learning of Geometry and other mathematical topics. As most of the participants of this study were preservice mathematics teachers, their perceptions were related to both teaching and learning perspectives. Quantitative measures of participants' attitude toward the use of a blog found enjoyable in a college Euclidean Geometry course. The study also revealed that gender did not have a significant relationship with preservice secondary mathematics teachers' attitudes toward using a blog as a supportive teaching-learning tool in a college Euclidean Geometry course. Thus, it seems reasonable to conclude that both male and female students and teachers would enjoy participating in and potentially benefit from using a blog as a supportive teaching and learning tool.

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## APPENDIX A- SURVEY INSTRUMENT

### Appendix: An Overview of Participants' Perception Scores Obtained from the Survey

Table 1: An Overview of Participants' Attitude Scores toward the Blogging Activity

Participants		Items in the Survey Instrument Pertaining to the Measurement of Attitude																	Median
No.	Gender	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	M	5	6	6	6	5	6	6	5	6	5	5	6	6	6	6	6	6	
2	M	3	5	4	6	5	6	6	6	5	6	6	5	6	6	6	6	6	
3	F	4	3	5	6	5	4	4	4	5	3	4	4	4	4	4	6	4	
4	F	5	4	4	4	4	4	5	4	2	4	4	4	4	4	4	4	4	
5	F	4	3	2	3	3	4	3	2	2	2	4	4	3	4	4	4	3	
6	F	4	4	3	4	3	4	4	4	4	3	4	4	4	4	4	4	4	
7	M	6	6	4	5	5	5	6	6	6	5	5	4	5	5	5	5	5	
8	M	5	5	5	5	5	5	5	5	5	5	5	5	6	6	6	6	5	
9	M	5	4	4	4	4	5	3	3	4	3	5	5	5	4	5	4	4	
10	M	1	6	1	5	6	5	5	6	6	4	1	6	4	1	6	1	5	
11	M	4	4	3	4	4	4	3	4	5	4	4	4	3	4	5	3	4	
12	F	3	3	2	3	3	5	3	4	4	3	4	4	3	3	3	3	3	
13	F	3	4	3	5	3	5	5	4	5	5	5	4	4	5	4	3	4	
14	M	6	4	3	4	5	3	4	4	3	5	3	4	5	4	5	3	4	
15	F	2	2	2	1	3	2	5	1	3	3	4	6	3	4	4	5	3	
16	F	3	3	2	2	3	2	3	3	4	3	3	4	3	3	3	2	3	
17	M	4	4	4	4	5	5	5	4	6	5	4	4	5	4	6	5	4.5	
18	F	6	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
19	M	3	5	3	4	4	4	4	4	4	4	4	5	3	4	5	3	4	
20	F	5	6	5	5	6	5	5	5	6	5	6	4	4	6	6	6	5	
21	F	4	4	4	4	4	5	5	5	6	5	5	5	4	4	4	4	4	
22	F	4	4	4	6	4	5	6	4	5	5	6	4	5	5	6	6	5	
23	M	3	4	4	5	3	4	2	2	4	2	3	4	3	2	5	5	3.5	
24	F	4	3	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
25	F	2	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	
26	F	3	5	3	5	4	4	4	3	6	5	5	5	4	4	4	4	4	
27	M	2	1	5	1	2	1	2	4	6	4	2	5	6	2	6	1	2	
28	F	4	5	4	4	4	5	4	4	5	4	4	5	4	4	4	4	4	

Table 2: An Overview of Perceived Effectiveness Scores of the Blogging Activity

Participants		Items in the Survey Instrument Pertaining to the Measurement of Perceived Effectiveness																			Median
No.	Gender	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41		
1	M	5	6	4	3	3	4	5	5	3	4	5	5	4	4	5	4	5	3	4	
2	M	6	6	4	3	4	6	5	5	3	4	4	5	6	3	4	4	6	4	4	
3	F	4	5	5	3	4	6	6	4	3	5	5	5	4	6	6	5	4	3	5	
4	F	4	4	4	3	4	4	5	5	3	3	4	4	4	4	4	4	4	4	4	
5	F	4	3	4	1	2	3	4	4	2	2	3	3	3	1	2	3	4	4	3	
6	F	4	4	4	2	4	4	4	4	2	3	4	4	4	3	4	4	4	4	4	
7	M	5	6	4	3	4	6	6	5	2	5	5	4	4	5	6	5	6	4	5	
8	M	6	6	6	5	5	6	6	6	6	6	6	6	6	6	6	5	6	5	6	
9	M	5	5	4	3	3	4	4	5	3	4	2	5	4	3	4	5	5	5	4	
10	M	3	6	3	3	3	6	4	4	4	4	4	4	3	4	6	3	6	3	4	
11	M	5	5	3	3	3	4	4	4	3	4	4	4	4	2	4	4	4	4	4	
12	F	3	4	4	3	3	3	2	3	3	3	3	3	3	3	4	3	3	4	3	
13	F	6	6	5	4	5	6	6	4	4	6	6	5	6	5	5	5	6	5	5	
14	M	5	5	4	2	3	5	6	4	2	3	4	4	3	2	5	3	5	2	4	
15	F	4	4	5	1	4	5	5	4	3	2	4	4	4	1	2	4	4	5	4	
16	F	3	3	3	3	1	3	3	4	3	3	3	3	3	3	3	3	3	3	3	
17	M	5	5	5	3	4	6	4	4	3	4	4	6	5	5	5	5	5	6	5	
18	F	6	6	6	6	6	6	6	6	4	5	6	6	5	5	5	5	5	6	6	
19	M	4	4	4	2	3	4	4	5	3	3	4	3	3	2	2	3	4	4	3.5	
20	F	6	5	5	5	5	6	5	6	5	5	5	6	6	6	6	5	6	5	5	
21	F	5	5	5	5	5	5	5	5	3	4	5	6	6	5	5	5	5	6	5	
22	F	4	4	5	3	4	6	5	6	4	6	5	5	6	5	6	5	6	6	5	
23	M	6	3	3	4	3	4	2	4	3	3	3	4	4	2	5	3	4	5	3.5	
24	F	4	4	4	3	3	3	4	4	3	3	4	4	4	3	4	4	4	6	4	
25	F	3	4	3	3	3	4	4	4	3	3	3	4	4	3	4	3	4	3	3	
26	F	4	4	3	1	3	4	3	4	4	3	3	4	4	3	3	3	4	6	3.5	
27	M	4	4	2	2	1	3	2	2	2	4	2	2	4	5	1	1	2	1	2	
28	F	4	4	4	3	3	4	4	4	2	4	4	4	4	4	4	4	4	4	4	