
LEARNING ANALYTICS FOR AN UNDERGRADUATE MATHEMATICS COURSE

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EXECUTIVE SUMMARY

This data analysis is at the request of a university professor who wished to understand their undergraduate mathematics course of 312 students. This instructor requested an overview of the students in their class, how they were evaluated, how they performed in the class overall, how effectively they participated in the discussion board, how discussion board related to exam performance, what categories of students were more or less active in Blackboard, how minutes spent in Blackboard related to student performance, and what elements of the course were the strongest predictors of the final exam score. The analysis revealed that 77% of students scored a C or above, while 23% scored a D or below. There is a high positive correlation between minutes spent in Blackboard and final exam score, and the total score on assignments is the best predictor of a final exam score. Scores on exams and assignments tended to stay consistent over time, and there was only a small difference in final scores between students who completed the SELFI and those who did not. Recommendations were made to further explore predictors of a high final course score, while also focusing on the 23% of students who scored a D or below. Additional recommendations were made to add a point value to discussion board posts and assess whether or not giving a point value can improve course performance.

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GLOSSARY

StudentID: Student's unique identifier

Gender: Student's gender identification

Major: Student's major

Academic_level: Student academic level (Freshman, Sophomore, Junior, Senior)

Blackboard_Minutes: Minutes spent in the blackboard course shell.

Discussion_Posts: Number of discussion board posts in the semester

Discussion_Minutes: Minutes spent in the course discussion board

Materials_Minutes: Number of minutes spent reviewing course materials such as documents and the syllabus

Lecture_Minutes: Number of minutes spent watching lecture videos

Final_Exam_Score: Final exam score out of 150

Final_Course_Points: Total number of points earned in the course out of 900

SELFI_Complete: If a student completed the SELFI evaluation for the course (Yes or No) **Assignment_Scores:** Assignment scores out of a possible 25 points over (10) assignments.

Quiz_Scores: Quiz scores out of a possible 10 points possible over (10) quizzes

Exam_Scores: Exam scores out of a possible 100 points over (4) exams

SELFI: Student Evaluation of Learning and Feedback for Instructors

1.INTRODUCTION

The purpose of this data analysis is to gain an understanding of one undergraduate mathematics course. This class has 312 students and utilizes multiple learning modalities and evaluation types. This course contains discussion posts, lecture materials, exams, quizzes, assignments, and a final exam. Students are evaluated on their assignments, exams, quizzes, and the final exam.

1.1 Aims

This analysis aims to improve student performance by determining the best predictor of final exam scores, gauging student performance on exams and assignments over the length of the course, and examining if participation in SELFI is associated with better performance in the course. Additionally, the performance of subgroups of students will be explored to determine if any groups need further academic support.

2.METHODS AND MATERIALS

Anonymized student data will be gathered from the learning management system, cleaned, and visualized using R Studio. I will run descriptive statistics, create frequency summaries, and explain the relationships between the different categories of data to answer the questions in the presented section 1.1. Data Visualizations will be created to display the results of this data analysis.

3.RESULTS

3.1 Students

The class consisted of 312 students representing all academic levels and 15 majors.

Figure 1 shows that the class was evenly split, with 50% male and 50% female.

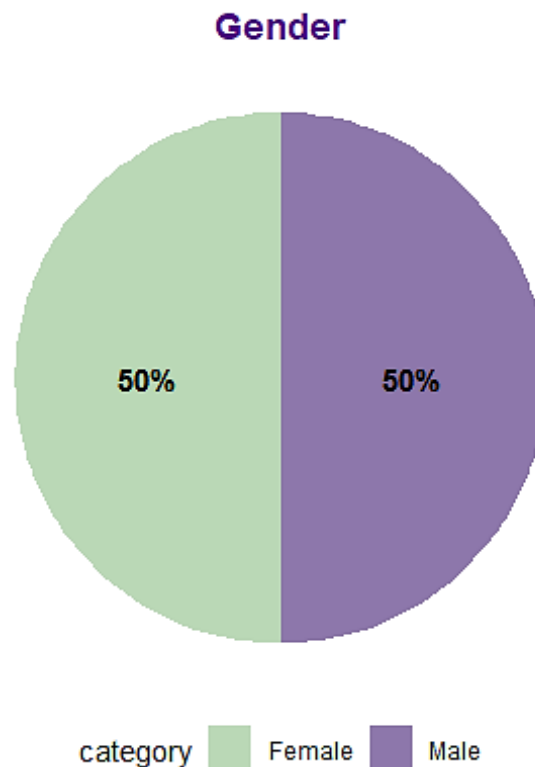


figure 1

Figure 2 shows the distribution of students by class, with each class broken down by gender. The sophomore, junior, and senior classes were split almost evenly, with 70-76 students in each class. The freshman class had significantly more students, with 96. Males comprised the sophomore and junior classes, at 59% and 51%, respectively. Females made up 52% of freshmen and 57% of seniors, respectively

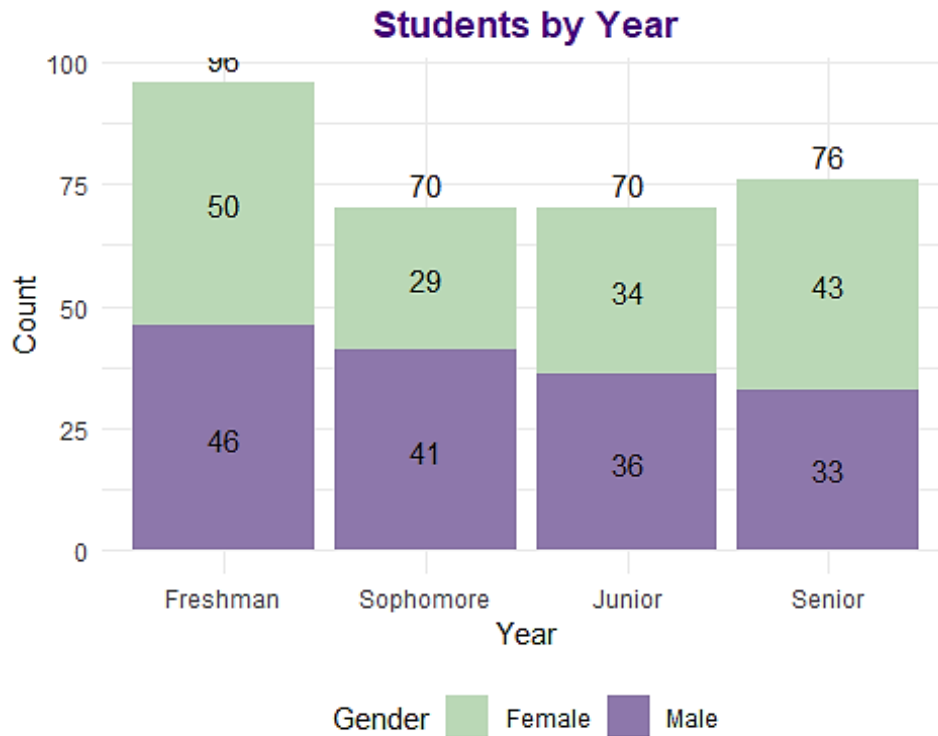


figure 2

Figure 3 shows that the students in the class represent 15 majors. The number of students in each major ranged from 14 to 28, with biology being the major with the most students and philosophy being the major with the fewest students. Most majors were evenly balanced between male and female, but computer science, physics, history, nursing, psychology, education, math, business, and philosophy had more than a ten percent difference between the number of males and females. There was a higher percentage of males in physics, economics, history, English, nursing, sociology, education, and political science. Females were the majority in biology, computer science, psychology, math, business, and philosophy.

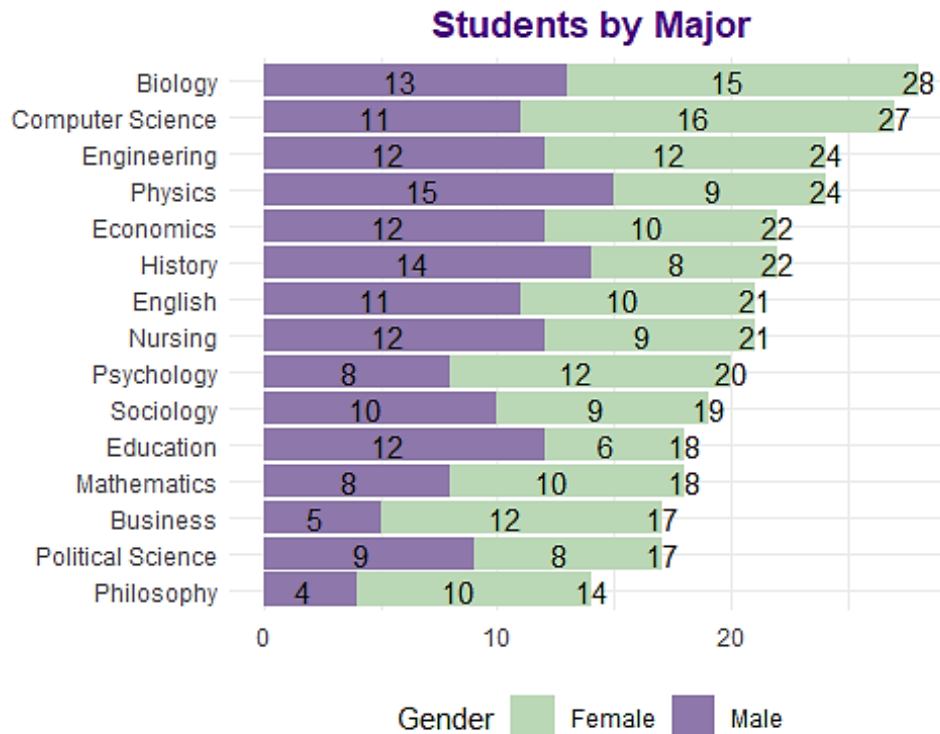


figure 3

3.2 Student Evaluation

3.2.1 Breakdown of Evaluation Types and Point Distribution

The students were evaluated using a variety of methods. The course consisted of discussion board posts, ten assignments, ten quizzes, four exams, and one final exam. There were 900 total points possible for the course, which consisted of assignments worth 250 points, quizzes worth 100 points, exams worth 400 points, and a final exam worth 150 points. The grade composition from figure 4 is broken down as follows:

- Exams contribute to 44.4% of the final grade.
- Assignments make up 27.8% of the final grade.
- The final exam accounts for 16.7% of the final grade.

- Quizzes represent 11.1% of the final grade.

Breakdown of Evaluation Types

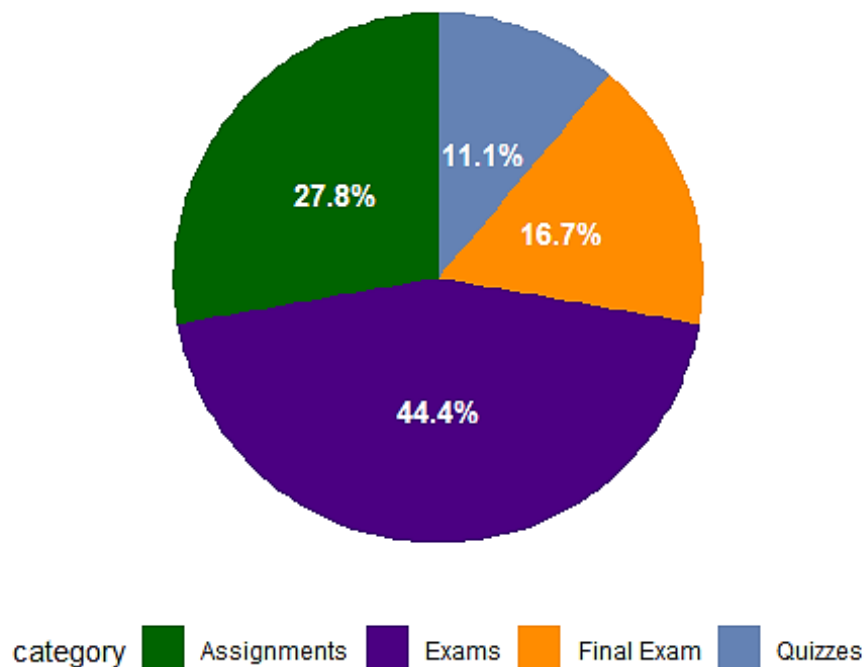


figure 4

3.2.2 Minutes Spent in the Course

Although not part of the grade, the amount of time that students spent in the learning management system, discussion board, and lectures was tracked (See Figures 6 and 7), and the students spent between 180 and 4978 minutes in Blackboard, with the average time being 2486 minutes. Fifty percent of the students spent between 1849 minutes and 3065 minutes in Blackboard. There was one outlier who spent 4978 minutes in Blackboard. For the discussion board, students spent between 0 and 462 minutes with an average of 145 minutes. Fifty percent of the students fell between 65 and 210 minutes. Students spent between 197 and 1893 minutes on materials, with an

average of 145 minutes. Fifty percent spent between 772 and 1893 minutes on materials. The students spent between 107 and 2861 minutes on lectures, with an average of 1505 minutes. Fifty percent of the students spent between 1178 minutes and 1853 minutes on lectures.

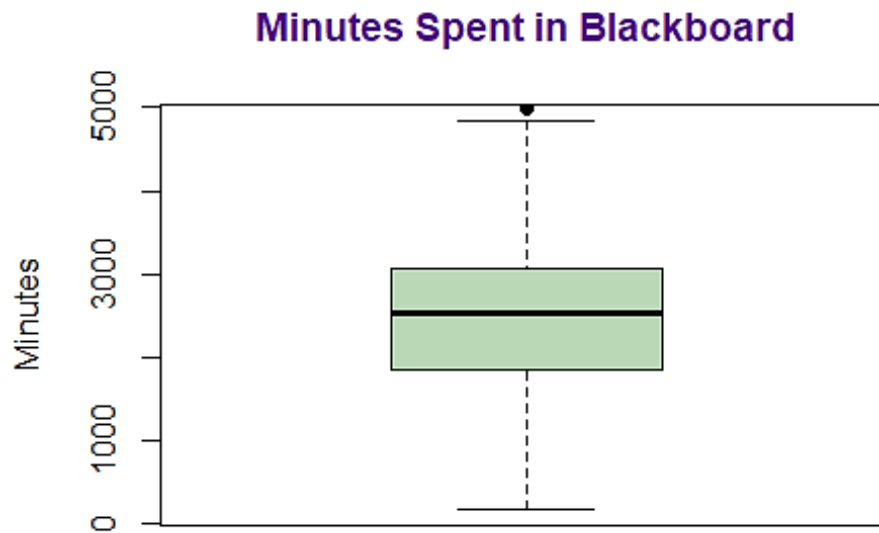


figure 5

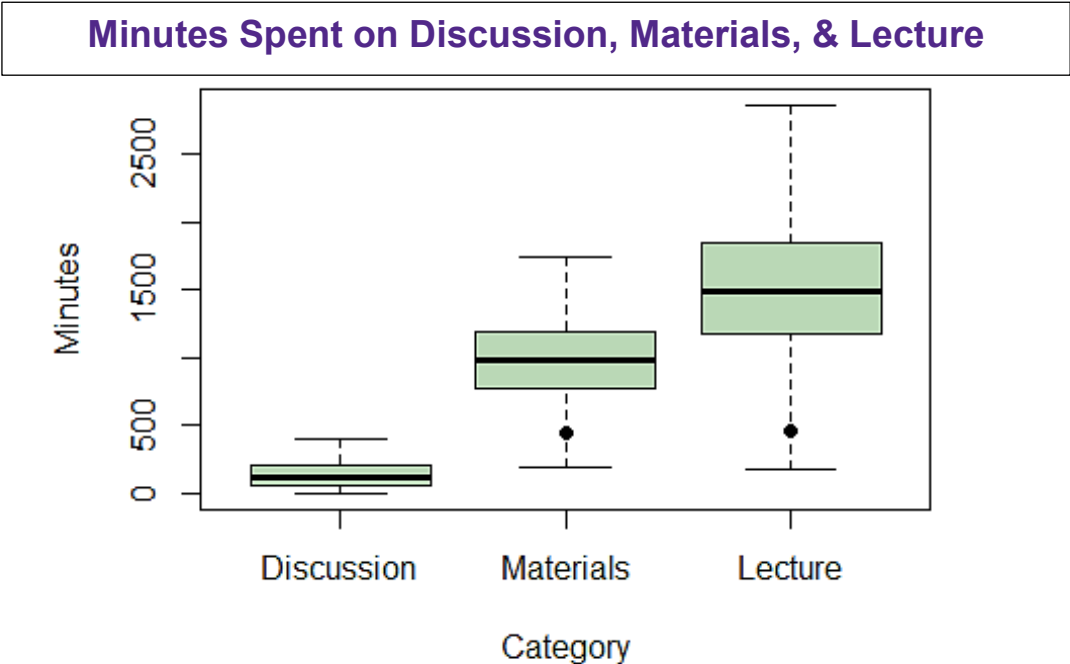


figure 6

3.3 Course Performance

Figure 7 shows the distribution of course points. There was a 356-point spread from 508 to 864 for the course scores. The average score was 682, which is a C.

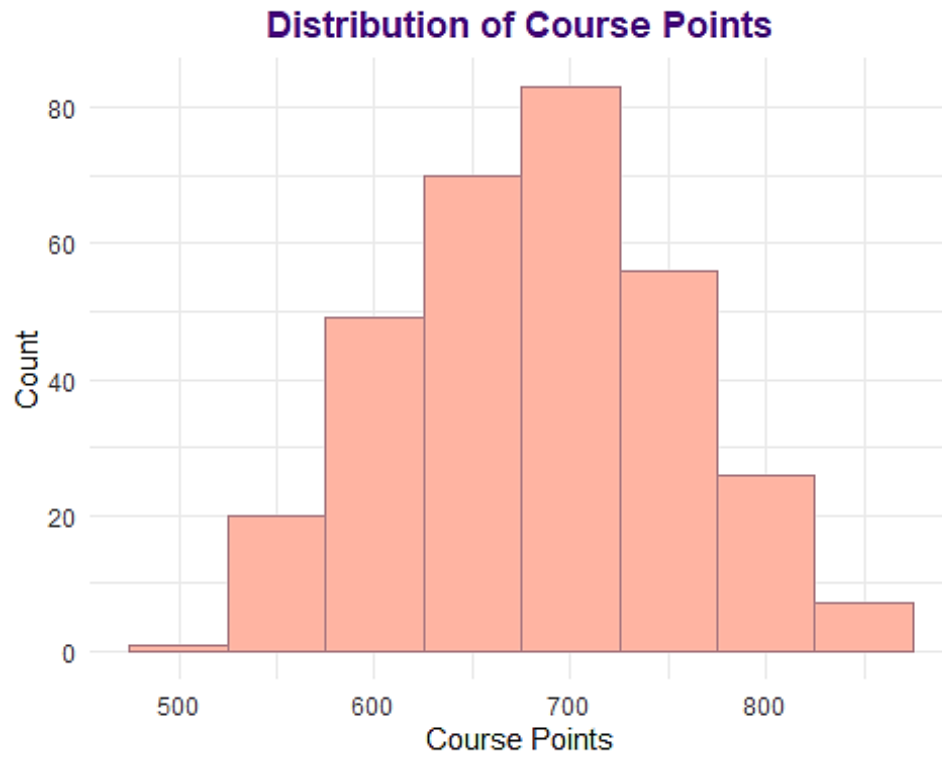


figure 7

A total of 227 students (73% scored between a B and a C. The grade breakdown shown in Figure 8 is as follows:

- A=12
- B=91
- C=136
- D=70
- F=3

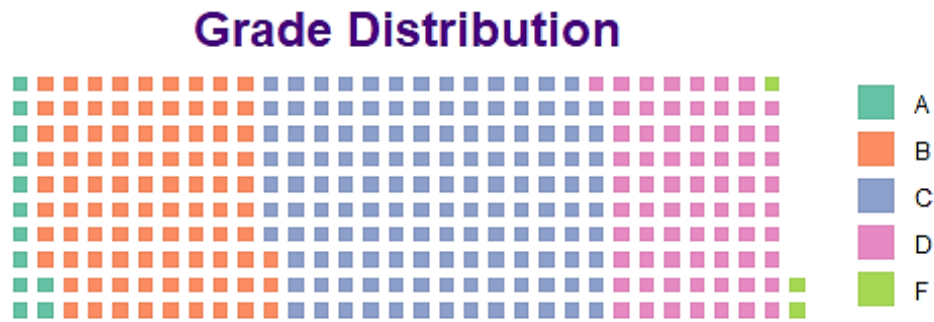


Figure 8

3.4 Discussion Board Participation

Figure 9 shows that students made between 0 and 42 posts throughout the semester, with an average of 14.74 posts. Students spent between 0 and 462 minutes in the discussion board, with 144.62 minutes being the average. Figure 10 shows a weak positive correlation between the number of posts students made and their average on all four exams.

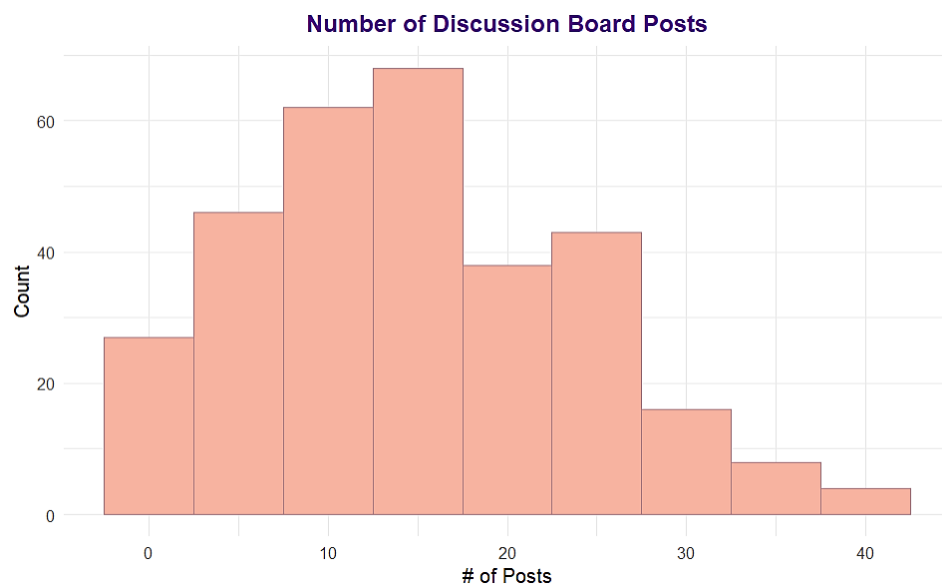


figure 9

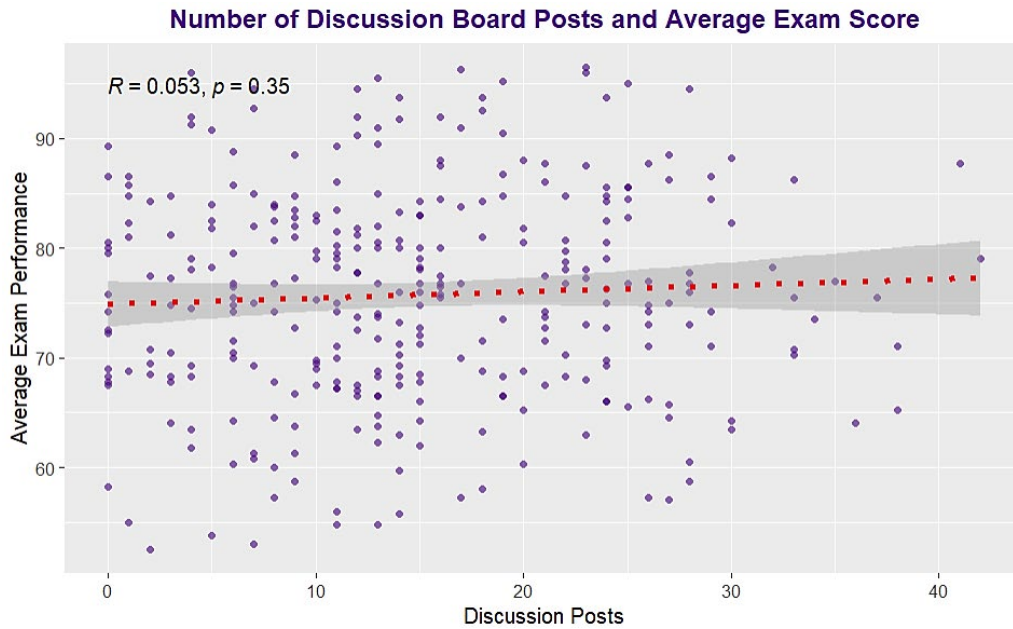


figure 10

3.5 Learning Management System Minutes

Students spent between 180 and 4,978 minutes in Blackboard throughout the semester, with a mean of 2486 minutes spent in the learning management system.

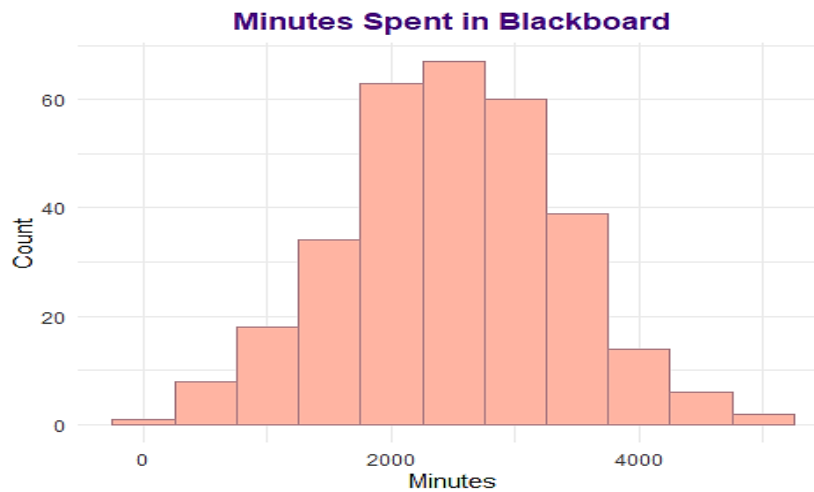


figure 11

Males spent more time in Blackboard, peaking between 2500 and 3000 minutes, while the females peaked at around 2000 minutes.

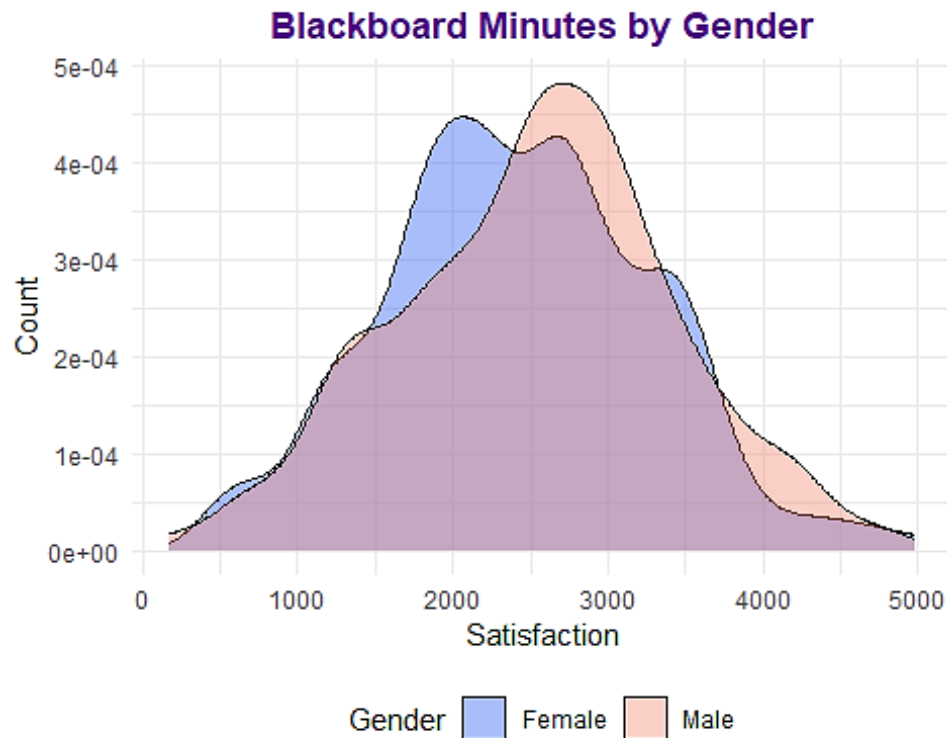


figure 12

The freshmen and juniors spent the most time in the LMS, peaking between 2500 and 3000. While the seniors spent between 2000 and 2500 minutes, and sophomores spent around 2000 minutes in the learning management system.

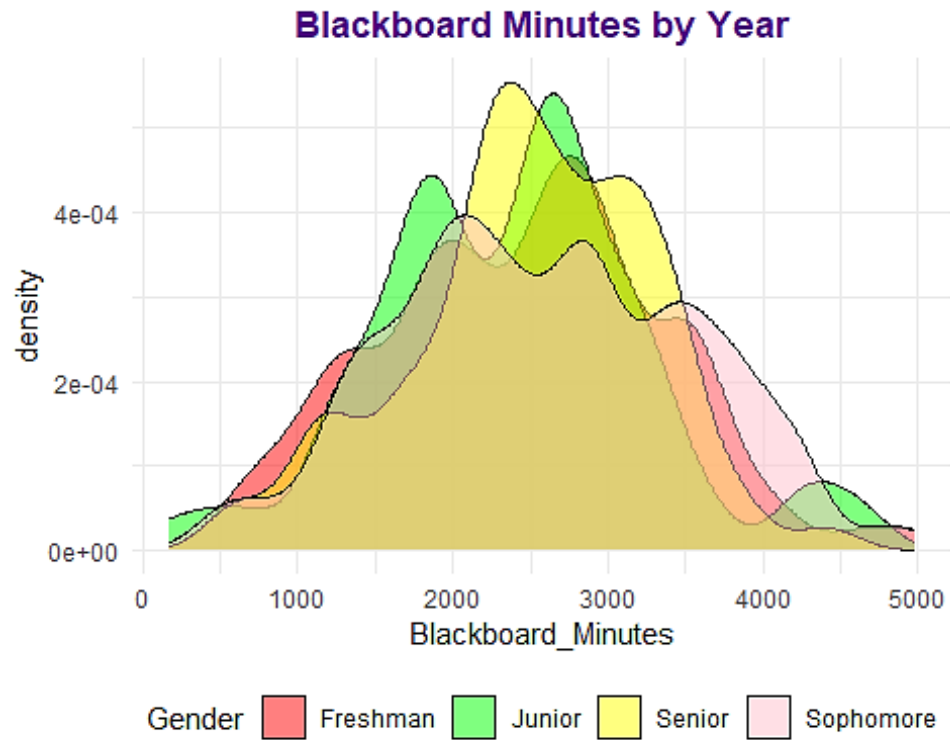


figure 13

The students in nursing and mathematics spent the most time in Blackboard, while philosophy and computer science majors spent the least amount of time in Blackboard. All majors averaged between 2000 minutes and 2500 minutes.

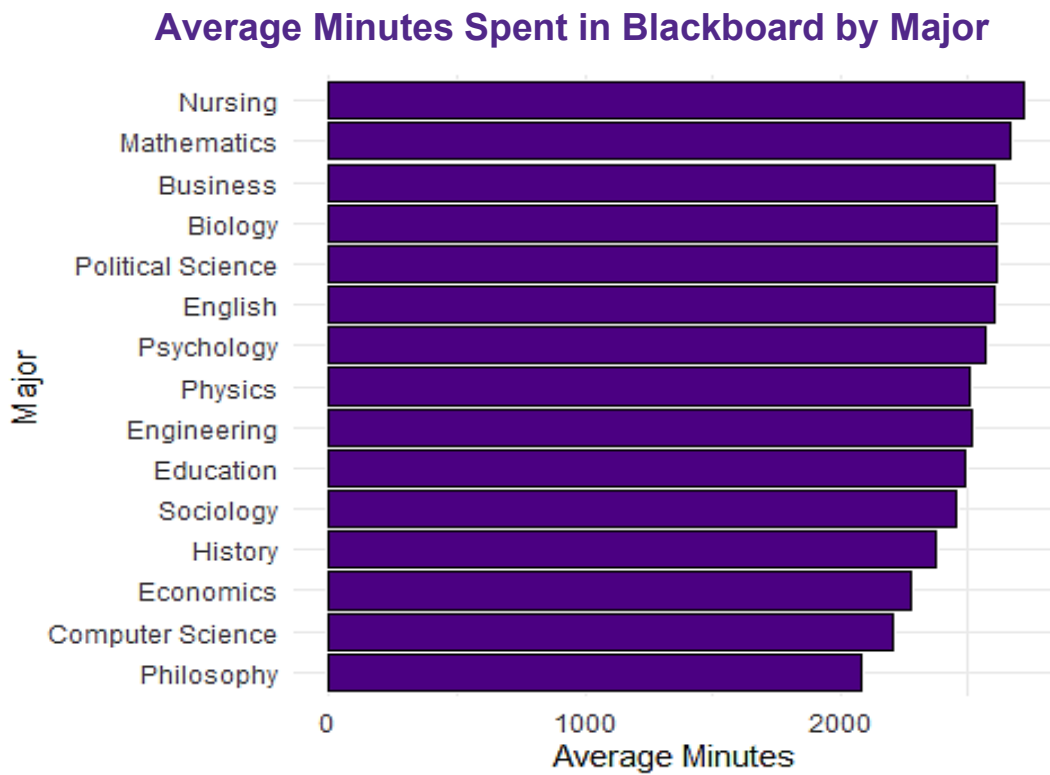


figure 14

There is a high positive correlation between minutes spent in Blackboard and total points for assignments. There is a moderate positive correlation between minutes spent in Blackboard and total points for quizzes and total points for exams. There is a low positive correlation between minutes spent in Blackboard and the final exam score.

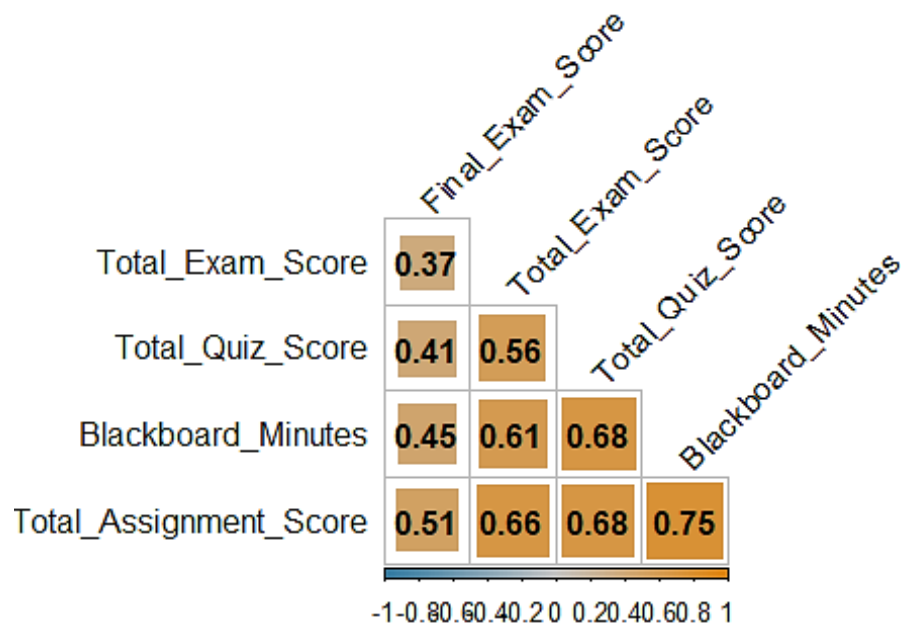


figure 15

3.6 Predictor of Final Exam Score

Total points for assignments, total points for quizzes, and total points for exams were examined to see which of these categories could predict the final exam score. The total assignment score had a moderate positive correlation with the final exam score, while the total quiz score and total exam score both had a low positive correlation with the average exam score. Of those three, the total assignment score is the best predictor of the final exam score.

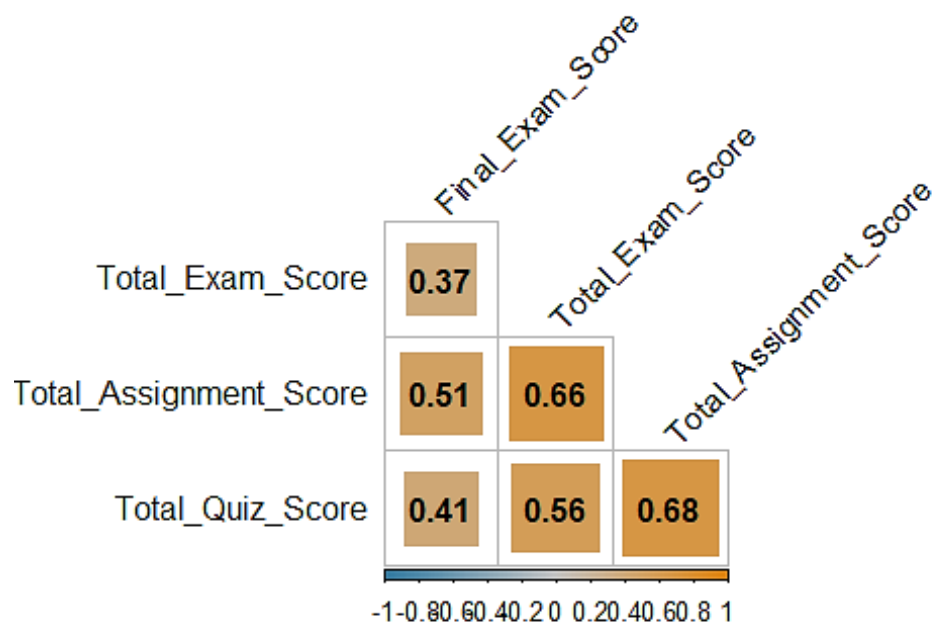


figure 16

3.7 Performance Over Time

The assignment scores remained consistent throughout the semester and averaged between 19.6 and 20.

Assignment Scores Over Time

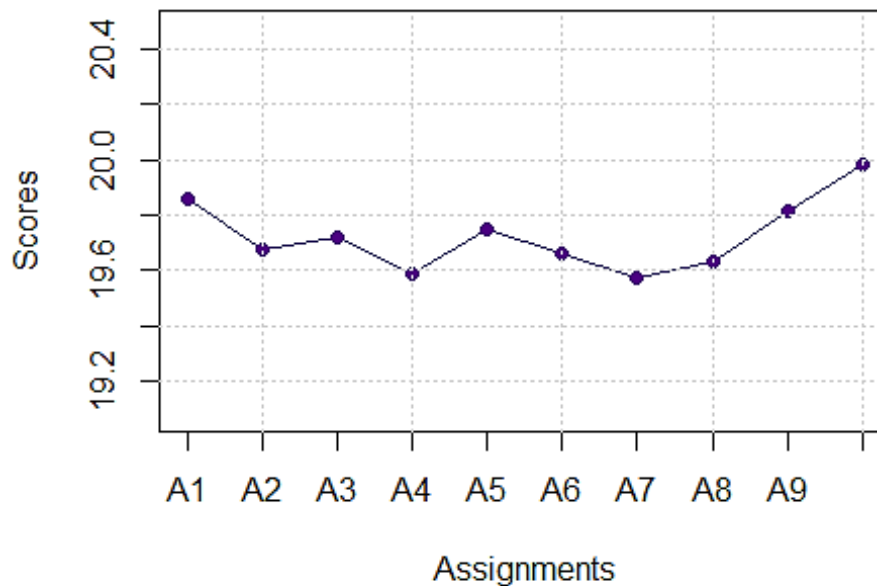


figure 17

The Freshman class maintained an average between 19.5 and 20.5, the sophomore class maintained an average between 19.75 and 20.25, the junior class maintained an average between 19 and 20.25, and the senior class maintained an average between 19.25 and 20.25. The junior class had the biggest increase from assignment 3 to assignment six, going from 19.25 to 20.5. The junior class had the largest decrease between assignments four and seven, going from 19.75 to 19. The freshman, junior, and senior classes all improved by almost a point between assignments eight and ten.

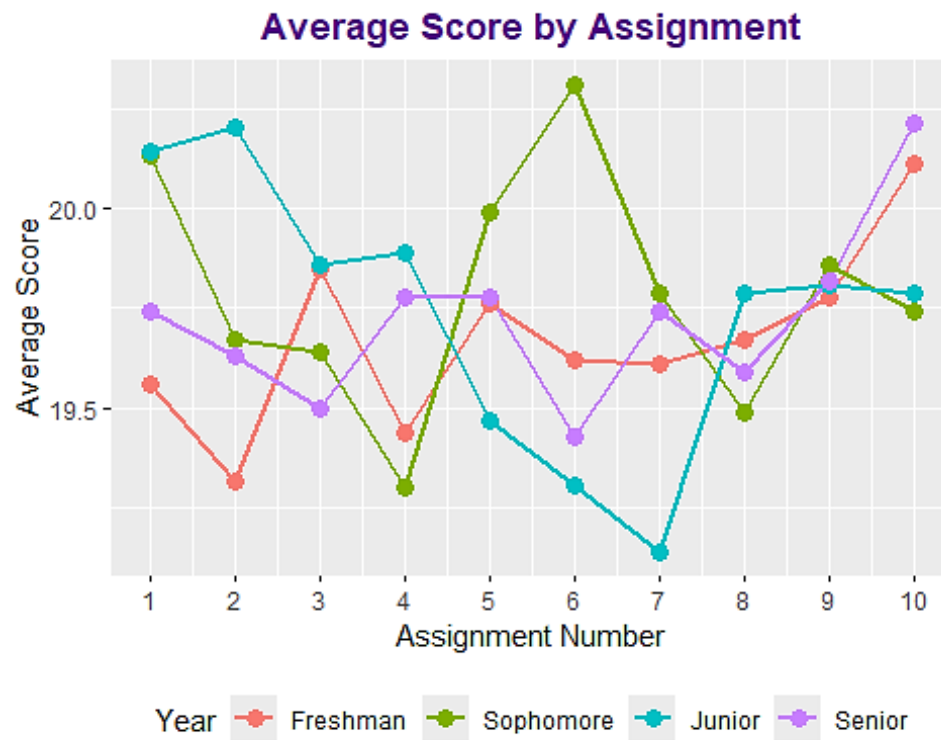


figure 18

The overall exam average went from 74.5 to 76.6.

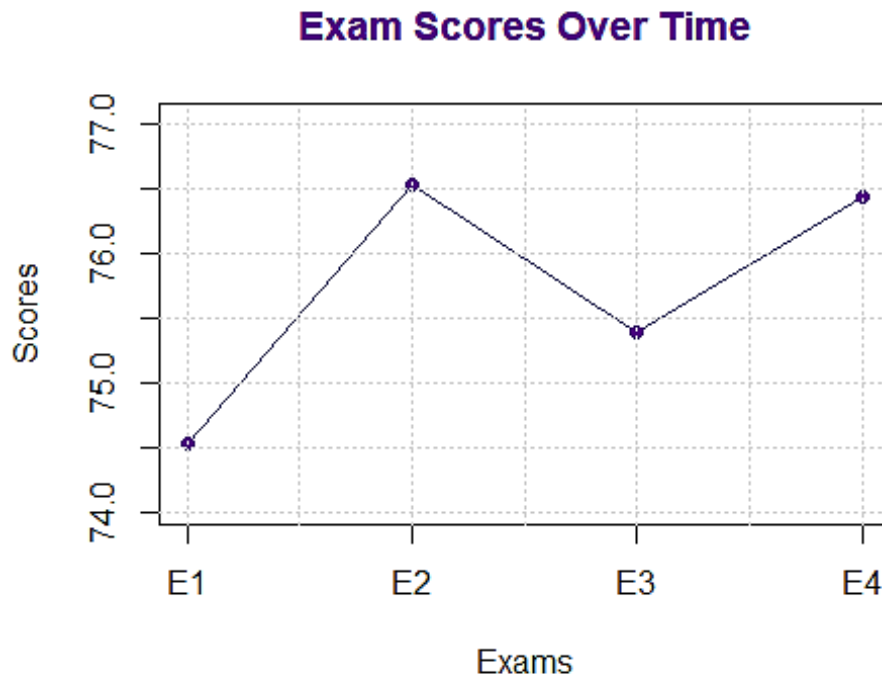


figure 19

Each class averaged between 73 and 78.5. The largest increase was between 73.5 and 78 by the junior class between exam one and two. The largest decrease was between 78.5 and 75 between test two and three by the junior class. The scores between test

three and four either increased or stayed the same.

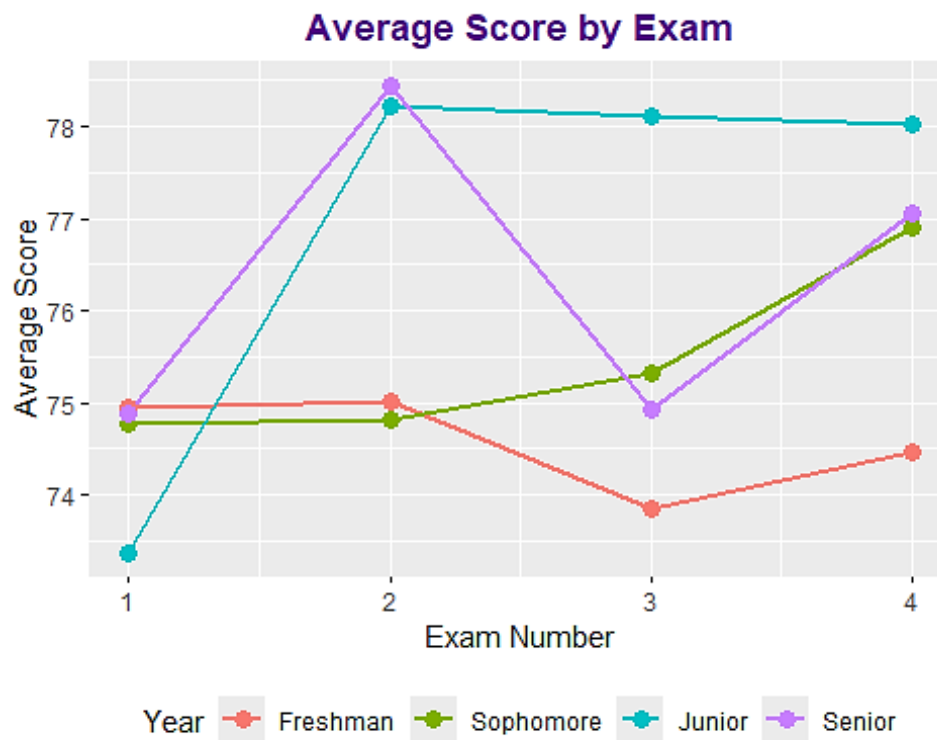


Figure 20

3.8 SELFI and Course Performance

The students who completed the SELFI scored on average 3 points higher than those who did not complete the SELFI. The range for those who complete the SELFI was 334 while those who did not complete the SELFI had a range of 328.

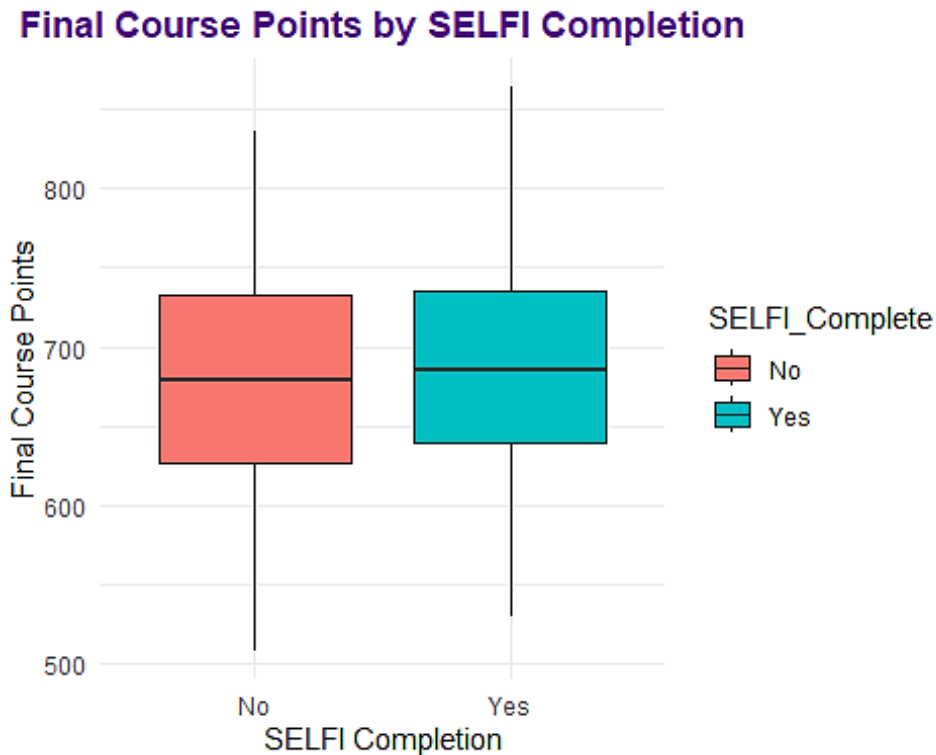


figure 21

4.CONCLUSIONS

Seventy-seven percent of the students scored a C or above, while 23% scored a D or below, and .9% failed the course. There is a weak relationship between the number of discussion board posts and the average final exam score. There is a high positive correlation between minutes spent in Blackboard and total points for assignments, There is a low positive correlation between minutes spent in Blackboard and final exam score. The total score on assignments is the best predictor of the final exam score with a moderate positive correlation. Students tended to maintain a consistent assignment score with a no more than a one-point difference in the average scores over time. Additionally, the difference in average exam scores over time was no more than five

points. There was only a three-point difference between students who completed the SELFI and those who did not.

5. RECOMMENDATIONS

Recommend examining different course components (assignments, discussion board posts, etc.) to see if any one element can predict the final course grade. Once that is established, focus on the 23% of students who scored a D or below to evaluate if they are deficient in one of the areas. There is a high positive correlation between minutes spent in Blackboard and total points for assignments. It is recommended to explore the relationship between minutes in Blackboard, the number of posts in Blackboard, and the final grade. It would also be beneficial to consider whether grading Blackboard posts will lead to more posts and/or time spent in Blackboard for an increased grade.

6. APPENDIX

R CODE

```
library(ggplot2)
## Warning: package 'ggplot2' was built under R version 4.4.3
library(dplyr)
## Warning: package 'dplyr' was built under R version 4.4.3
##
## Attaching package: 'dplyr'
##
## The following objects are masked from 'package:stats':
##
##   filter, lag
##
## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
library(tidyr)
## Warning: package 'tidyr' was built under R version 4.4.3
library(summarytools)
## Warning: package 'summarytools' was built under R version 4.4.3
library(psych)
## Warning: package 'psych' was built under R version 4.4.3
##
## Attaching package: 'psych'
##
## The following objects are masked from 'package:ggplot2':
##
##   %+%, alpha
library(corrplot)
## Warning: package 'corrplot' was built under R version 4.4.3
## corrplot 0.95 loaded
```

```

library(readxl)

## Warning: package 'readxl' was built under R version 4.4.3

library(waffle)

## Warning: package 'waffle' was built under R version 4.4.3

library(ggpubr)

## Warning: package 'ggpubr' was built under R version 4.4.3

Data <- read_excel("Data.xlsx", na = "NA")
View(Data)
attach(Data)

summarytools::descr(Blackboard_Minutes,stats=c("mean","sd","skewness","kurtosis",
"N.valid"),style="rmarkdown",headings=FALSE)

##
## |          &nbsp; | Blackboard_Minutes |
## |-----:|-----:|
## |    **Mean** |          2486.33 |
## |   **Std.Dev** |          881.35 |
## |  **Skewness** |           0.04 |
## |  **Kurtosis** |          -0.20 |
## |   **N.Valid** |          312.00 |

summarytools::descr(Discussion_Posts,stats=c("mean","sd","skewness","kurtosis",
"N.valid"),style="rmarkdown",headings=FALSE)

##
## |          &nbsp; | Discussion_Posts |
## |-----:|-----:|
## |    **Mean** |          14.74 |
## |   **Std.Dev** |           9.07 |
## |  **Skewness** |           0.42 |
## |  **Kurtosis** |          -0.35 |
## |   **N.Valid** |          312.00 |

summarytools::descr(Discussion_Minutes,stats=c("mean","sd","skewness","kurtosis",
"N.valid"),style="rmarkdown",headings=FALSE)

##
## |          &nbsp; | Discussion_Minutes |
## |-----:|-----:|
## |    **Mean** |          144.62 |
## |   **Std.Dev** |          101.48 |
## |  **Skewness** |           0.73 |
## |  **Kurtosis** |          -0.09 |
## |   **N.Valid** |          312.00 |

```

```
summarytools::descr(Materials_Minutes,stats=c("mean","sd","skewness","kurtosis",
"N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp;      | Materials_Minutes |
## |-----:|-----:|
## |    **Mean** |          975.54 |
## |   **Std.Dev** |         298.52 |
## |  **Skewness** |          -0.01 |
## |  **Kurtosis** |          -0.20 |
## |   **N.Valid** |         312.00 |
```

```
summarytools::descr(Lecture_Minutes,stats=c("mean","sd","skewness","kurtosis",
"N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp;      | Lecture_Minutes |
## |-----:|-----:|
## |    **Mean** |         1504.72 |
## |   **Std.Dev** |         529.56 |
## |  **Skewness** |           0.02 |
## |  **Kurtosis** |          -0.21 |
## |   **N.Valid** |         312.00 |
```

```
summarytools::descr(Final_Exam_Score,stats=c("mean","sd","skewness","kurtosis",
"N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp;      | Final_Exam_Score |
## |-----:|-----:|
## |    **Mean** |          110.00 |
## |   **Std.Dev** |          22.04 |
## |  **Skewness** |           0.03 |
## |  **Kurtosis** |          -0.77 |
## |   **N.Valid** |         312.00 |
```

```
summarytools::descr(Final_Course_Points,stats=c("mean","sd","skewness","kurtosis",
"N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp;      | Final_Course_Points |
## |-----:|-----:|
## |    **Mean** |          682.27 |
## |   **Std.Dev** |          70.46 |
## |  **Skewness** |           0.05 |
## |  **Kurtosis** |          -0.54 |
## |   **N.Valid** |         312.00 |
```

```
summarytools::descr(Assignment_Score_1,stats=c("mean","sd","skewness","kurtosis",
"N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_1 |
## |-----:|-----:|
## |    **Mean** | 19.86 |
## |   **Std.Dev** | 2.99 |
## |  **Skewness** | 0.00 |
## |  **Kurtosis** | -0.98 |
## |   **N.Valid** | 312.00 |
```

```
summarytools::descr(Assignment_Score_2,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_2 |
## |-----:|-----:|
## |    **Mean** | 19.67 |
## |   **Std.Dev** | 3.06 |
## |  **Skewness** | 0.16 |
## |  **Kurtosis** | -0.95 |
## |   **N.Valid** | 312.00 |
```

```
summarytools::descr(Assignment_Score_3,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_3 |
## |-----:|-----:|
## |    **Mean** | 19.72 |
## |   **Std.Dev** | 3.04 |
## |  **Skewness** | 0.21 |
## |  **Kurtosis** | -0.91 |
## |   **N.Valid** | 312.00 |
```

```
summarytools::descr(Assignment_Score_4,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_4 |
## |-----:|-----:|
## |    **Mean** | 19.59 |
## |   **Std.Dev** | 3.00 |
## |  **Skewness** | 0.13 |
## |  **Kurtosis** | -1.02 |
## |   **N.Valid** | 312.00 |
```

```
summarytools::descr(Assignment_Score_5,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_5 |
## |-----:|-----:|
## |    **Mean** | 19.75 |
```

```
## | **Std.Dev** | 3.14 |
## | **Skewness** | 0.10 |
## | **Kurtosis** | -1.09 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Assignment_Score_6,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_6 |
## |-----:|-----:|
## | **Mean** | 19.66 |
## | **Std.Dev** | 3.15 |
## | **Skewness** | 0.08 |
## | **Kurtosis** | -1.13 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Assignment_Score_7,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_7 |
## |-----:|-----:|
## | **Mean** | 19.58 |
## | **Std.Dev** | 2.84 |
## | **Skewness** | 0.11 |
## | **Kurtosis** | -0.82 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Assignment_Score_8,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_8 |
## |-----:|-----:|
## | **Mean** | 19.63 |
## | **Std.Dev** | 3.10 |
## | **Skewness** | 0.08 |
## | **Kurtosis** | -1.11 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Assignment_Score_9,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_9 |
## |-----:|-----:|
## | **Mean** | 19.81 |
## | **Std.Dev** | 3.05 |
## | **Skewness** | 0.09 |
## | **Kurtosis** | -1.01 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Assignment_Score_10,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Assignment_Score_10 |
## |-----:|-----:|
## |    **Mean** | 19.98 |
## |   **Std.Dev** | 2.97 |
## |  **Skewness** | 0.00 |
## | **Kurtosis** | -0.97 |
## |  **N.Valid** | 312.00 |
```

```
summarytools::descr(Quiz_Score_1,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Quiz_Score_1 |
## |-----:|-----:|
## |    **Mean** | 7.36 |
## |   **Std.Dev** | 1.65 |
## |  **Skewness** | 0.05 |
## | **Kurtosis** | -1.13 |
## |  **N.Valid** | 312.00 |
```

```
summarytools::descr(Quiz_Score_2,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Quiz_Score_2 |
## |-----:|-----:|
## |    **Mean** | 7.16 |
## |   **Std.Dev** | 1.70 |
## |  **Skewness** | 0.28 |
## | **Kurtosis** | -1.14 |
## |  **N.Valid** | 312.00 |
```

```
summarytools::descr(Quiz_Score_3,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Quiz_Score_3 |
## |-----:|-----:|
## |    **Mean** | 7.20 |
## |   **Std.Dev** | 1.70 |
## |  **Skewness** | 0.16 |
## | **Kurtosis** | -1.24 |
## |  **N.Valid** | 312.00 |
```

```
summarytools::descr(Quiz_Score_4,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; Quiz_Score_4 |
## |-----:-----:|
## |    **Mean**    7.33 |
## |    **Std.Dev** 1.76 |
## |    **Skewness** 0.12 |
## |    **Kurtosis** -1.29 |
## |    **N.Valid** 312.00 |

summarytools::descr(Quiz_Score_5,stats=c("mean","sd","skewness","kurtosis","N
.valid"),style="rmarkdown",headings=FALSE)

##
## |      &nbsp; Quiz_Score_5 |
## |-----:-----:|
## |    **Mean**    7.14 |
## |    **Std.Dev** 1.68 |
## |    **Skewness** 0.29 |
## |    **Kurtosis** -1.09 |
## |    **N.Valid** 312.00 |

summarytools::descr(Quiz_Score_6,stats=c("mean","sd","skewness","kurtosis","N
.valid"),style="rmarkdown",headings=FALSE)

##
## |      &nbsp; Quiz_Score_6 |
## |-----:-----:|
## |    **Mean**    7.15 |
## |    **Std.Dev** 1.75 |
## |    **Skewness** 0.27 |
## |    **Kurtosis** -1.24 |
## |    **N.Valid** 312.00 |

summarytools::descr(Quiz_Score_7,stats=c("mean","sd","skewness","kurtosis","N
.valid"),style="rmarkdown",headings=FALSE)

##
## |      &nbsp; Quiz_Score_7 |
## |-----:-----:|
## |    **Mean**    7.17 |
## |    **Std.Dev** 1.68 |
## |    **Skewness** 0.23 |
## |    **Kurtosis** -1.15 |
## |    **N.Valid** 312.00 |

summarytools::descr(Quiz_Score_8,stats=c("mean","sd","skewness","kurtosis","N
.valid"),style="rmarkdown",headings=FALSE)

##
## |      &nbsp; Quiz_Score_8 |
## |-----:-----:|
## |    **Mean**    7.22 |
```

```
## | **Std.Dev** | 1.70 |
## | **Skewness** | 0.16 |
## | **Kurtosis** | -1.19 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Quiz_Score_9,stats=c("mean","sd","skewness","kurtosis","N
.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; Quiz_Score_9 |
## |-----:-----:|
## | **Mean** | 7.23 |
## | **Std.Dev** | 1.73 |
## | **Skewness** | 0.18 |
## | **Kurtosis** | -1.23 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Quiz_Score_10,stats=c("mean","sd","skewness","kurtosis","
N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; Quiz_Score_10 |
## |-----:-----:|
## | **Mean** | 7.14 |
## | **Std.Dev** | 1.67 |
## | **Skewness** | 0.23 |
## | **Kurtosis** | -1.12 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Exam_Score_1,stats=c("mean","sd","skewness","kurtosis","N
.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; Exam_Score_1 |
## |-----:-----:|
## | **Mean** | 74.54 |
## | **Std.Dev** | 14.79 |
## | **Skewness** | 0.02 |
## | **Kurtosis** | -1.04 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Exam_Score_2,stats=c("mean","sd","skewness","kurtosis","N
.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; Exam_Score_2 |
## |-----:-----:|
## | **Mean** | 76.53 |
## | **Std.Dev** | 15.69 |
## | **Skewness** | -0.17 |
## | **Kurtosis** | -1.16 |
## | **N.Valid** | 312.00 |
```

```
summarytools::descr(Exam_Score_3,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Exam_Score_3 |
## |-----:|-----:|
## | **Mean** |      75.40 |
## | **Std.Dev** |     15.19 |
## | **Skewness** |      0.02 |
## | **Kurtosis** |     -1.06 |
## | **N.Valid** |     312.00 |
```

```
summarytools::descr(Exam_Score_4,stats=c("mean","sd","skewness","kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Exam_Score_4 |
## |-----:|-----:|
## | **Mean** |      76.44 |
## | **Std.Dev** |     15.25 |
## | **Skewness** |     -0.14 |
## | **Kurtosis** |     -0.98 |
## | **N.Valid** |     312.00 |
```

```
summarytools:: freq(Data$Gender)
```

```
## Error in if (tmp_name %in% colnames(obj)) {: the condition has length > 1
## Warning in parse_call(mc = match.call(), caller = "freq"): metadata extrac
tion
## terminated unexpectedly; inspect results carefully
```

```
## Frequencies
##
##           Freq  % Valid  % Valid Cum.  % Total  % Total Cum.
## -----
##      Female   156    50.00      50.00    50.00    50.00
##      Male    156    50.00     100.00    50.00   100.00
##      <NA>      0      0.00      100.00    0.00   100.00
##      Total   312   100.00     100.00   100.00   100.00
```

```
summarytools:: freq(Data$Major)
```

```
## Error in if (tmp_name %in% colnames(obj)) {: the condition has length > 1
## Warning in parse_call(mc = match.call(), caller = "freq"): metadata extrac
tion
## terminated unexpectedly; inspect results carefully
```

```
## Frequencies
##
##           Freq  % Valid  % Valid Cum.  % Total  % Tota
```

```

1 Cum.
## -----
-----
##          Biology      28      8.97      8.97      8.97
8.97
##          Business     17      5.45     14.42      5.45
14.42
##    Computer Science   27      8.65     23.08      8.65
23.08
##          Economics    22      7.05     30.13      7.05
30.13
##          Education    18      5.77     35.90      5.77
35.90
##          Engineering   24      7.69     43.59      7.69
43.59
##          English       21      6.73     50.32      6.73
50.32
##          History       22      7.05     57.37      7.05
57.37
##    Mathematics       18      5.77     63.14      5.77
63.14
##          Nursing      21      6.73     69.87      6.73
69.87
##    Philosophy        14      4.49     74.36      4.49
74.36
##          Physics       24      7.69     82.05      7.69
82.05
##    Political Science   17      5.45     87.50      5.45
87.50
##          Psychology    20      6.41     93.91      6.41
93.91
##          Sociology     19      6.09    100.00      6.09
100.00
##          <NA>          0
100.00
##          Total        312    100.00    100.00    100.00
100.00

summarytools:: freq(Data$Academic_Level)

## Error in if (tmp_name %in% colnames(obj)) {: the condition has length > 1
## Warning in parse_call(mc = match.call(), caller = "freq"): metadata extrac
tion
## terminated unexpectedly; inspect results carefully

## Frequencies
##
##          Freq  % Valid  % Valid Cum.  % Total  % Total Cum.
## -----
##    Freshman    96    30.77    30.77    30.77    30.77

```

```
##           Junior      70      22.44      53.21      22.44      53.21
##           Senior      76      24.36      77.56      24.36      77.56
##      Sophomore      70      22.44      100.00      22.44      100.00
##           <NA>         0           0.00      100.00
##           Total     312     100.00      100.00      100.00      100.00
```

```
summarytools:: freq(Data$SELFI_Complete)
```

```
## Error in if (tmp_name %in% colnames(obj)) {: the condition has length > 1
```

```
## Warning in parse_call(mc = match.call(), caller = "freq"): metadata extrac
tion
```

```
## terminated unexpectedly; inspect results carefully
```

```
## Frequencies
```

```
##
##           Freq  % Valid  % Valid Cum.  % Total  % Total Cum.
## -----
##           No    91     29.17     29.17     29.17     29.17
##           Yes   221     70.83    100.00     70.83    100.00
##           <NA>    0           0.00     100.00
##           Total 312    100.00    100.00    100.00    100.00
```

##Gender Pie Chart

##Data Frame

```
Data_Pie <- data.frame(category = c("Male", "Female"),
count = c(156,156))
```

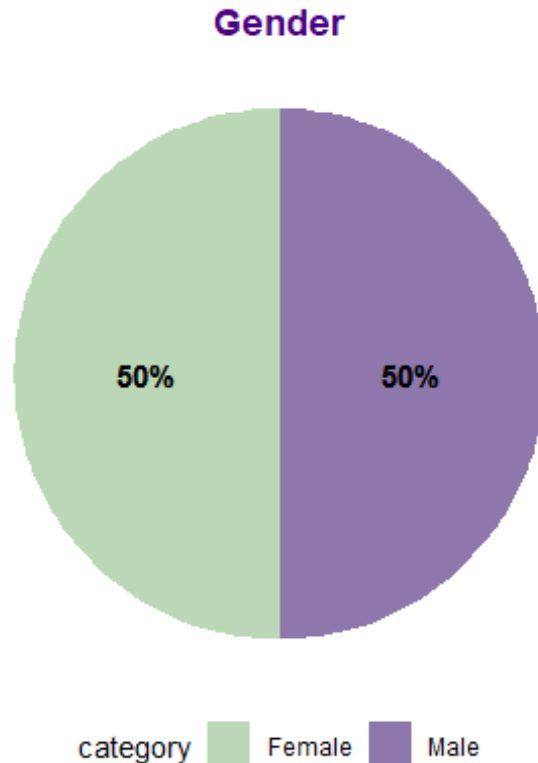
```
Data_Pie$fraction = Data_Pie$count / sum(Data_Pie$count)
```

```
Data_Pie$percentage = Data_Pie$fraction * 100
```

```
Data_Pie$label = paste0(round(Data_Pie$percentage, 1), "%")
```

##Pie Chart Gender

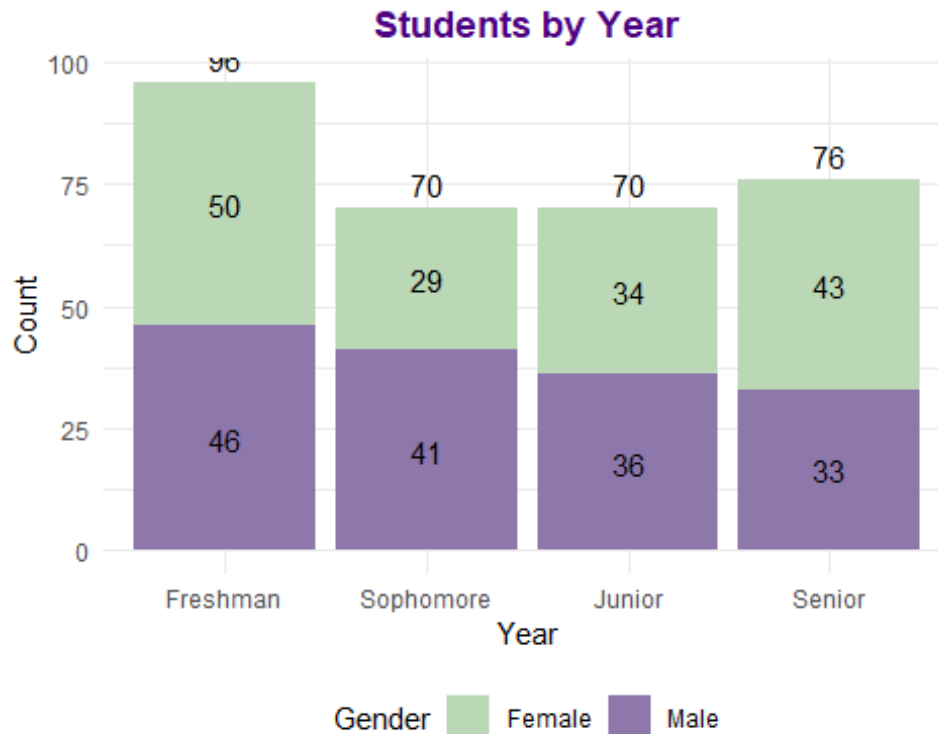
```
ggplot(Data_Pie, aes(x = "", y = count, fill = category)) +
geom_bar(stat = "identity", width = 1) +
coord_polar(theta = "y") +
geom_text(aes(label = label), position = position_stack(vjust = 0.5)) +
theme_void() +
labs(title = "Gender") +
theme(legend.position = "bottom") +
geom_text(aes(label = label), position = position_stack(vjust = 0.5), color =
"black", fontface = "bold") +
theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082"
)) +
scale_fill_manual(values = c("#BAD8B6", "#8D77AB"))
```



```
##Level Data Frame
Level_totals <- Data %>%
group_by(Academic_Level) %>%
summarise(Total = sum(n()))

ggplot(Data, aes(x = factor(Academic_Level, levels = c("Freshman", "Sophomore", "Junior", "Senior")), fill = Gender)) +
theme_minimal() +
geom_bar(position = "stack") +
geom_text(aes(label = ..count..), stat = "count", position = position_stack(vjust = 0.5)) +
geom_text(data = Level_totals, aes(x = factor(Academic_Level, levels = c("Freshman", "Sophomore", "Junior", "Senior")),
                                     y = Total, label = Total), inherit.aes =
  FALSE, vjust = -0.5) +
labs(title = "Students by Year", x = "Year", y = "Count") +
theme(legend.position = "bottom") +
theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082")) +
scale_fill_manual(values = c("#BAD8B6", "#8D77AB"))

## Warning: The dot-dot notation (`..count..`) was deprecated in ggplot2 3.4.0.
## i Please use `after_stat(count)` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was generated.
```

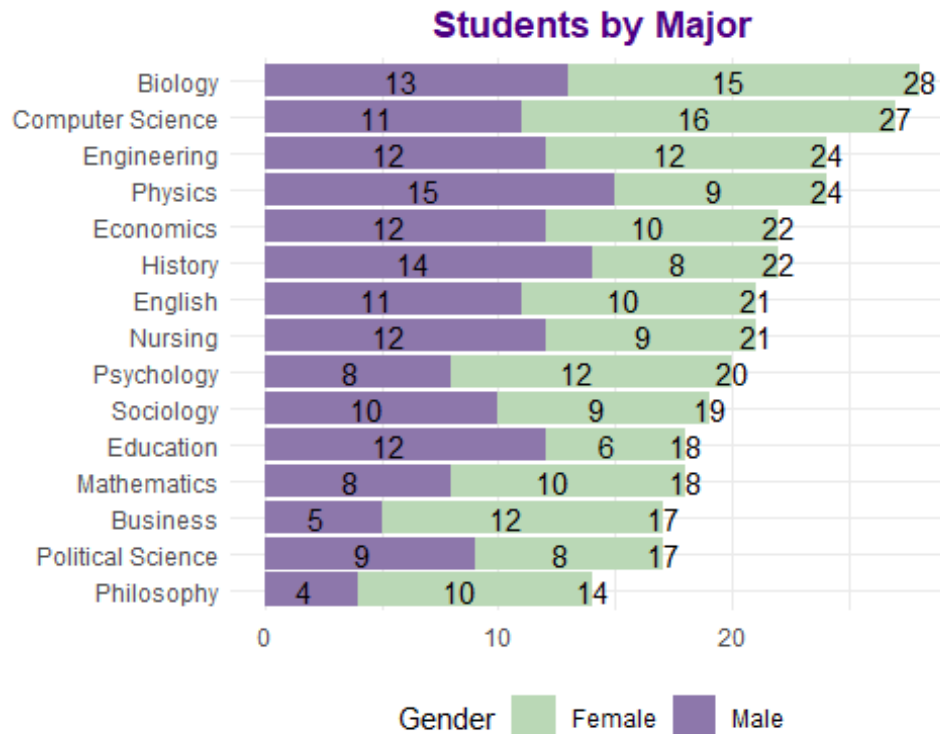


##Major Totals

```
Major_totals <- Data %>%
group_by(Major) %>%
summarise(Total = sum(n()))
```

Major Stacked Bar Chart

```
ggplot(Data, aes(x = factor(Major, levels = c("Philosophy", "Political Science", "Business", "Mathematics", "Education", "Sociology", "Psychology", "Nursing", "English", "History", "Economics", "Physics", "Engineering", "Computer Science", "Biology")), fill = Gender)) +
theme_minimal() +
geom_bar(position = "stack", stat = "count") +
geom_text(aes(label = after_stat(count), hjust = 1), stat = "count", position = position_stack(vjust = 0.5)) +
labs(title = "Students by Major", x = "Major", y = "Count") +
geom_text(data = Major_totals, aes(x = Major, y = Total, label = Total), inherit.aes = FALSE, vjust = 0.5) +
theme(legend.position = "bottom") +
scale_fill_manual(values = c("#BAD8B6", "#8D77AB", "#E1EACD")) +
theme(axis.title.x = element_blank(), axis.title.y = element_blank()) +
theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082")) +
coord_flip()
```



##Evaluation Data Frame

```
Data_PiePoints <- data.frame(category = c("Final Exam", "Exams", "Quizzes", "Assignments"), count = c(150, 400, 100, 250))
```

```
Data_PiePoints$fraction = Data_PiePoints$count / sum(Data_PiePoints$count)
```

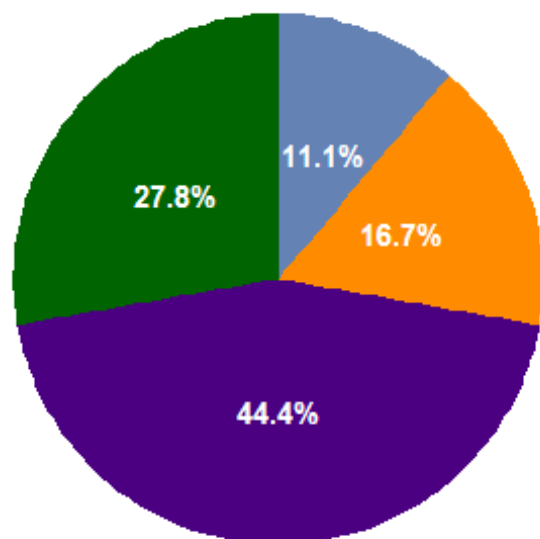
```
Data_PiePoints$percentage = Data_PiePoints$fraction * 100
```

```
Data_PiePoints$label = paste0(round(Data_PiePoints$percentage, 1), "%")
```

##Evaluation Pie Chart

```
ggplot(Data_PiePoints, aes(x = "", y = count, fill = category)) +
  geom_bar(stat = "identity", width = 1) +
  coord_polar(theta = "y") +
  geom_text(aes(label = label), position = position_stack(vjust = 0.5), color =
    "#ffffff") +
  theme_void() +
  labs(title = "Breakdown of Evaluation Types") +
  theme(legend.position = "bottom") +
  geom_text(aes(label = label), position = position_stack(vjust = 0.5), color =
    "#ffffff", fontface = "bold") +
  theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082")) +
  scale_fill_manual(values = c("#006400", "#4B0082", "#FF8C00", "#6482B4"))
```

Breakdown of Evaluation Types



category ■ Assignments ■ Exams ■ Final Exam ■ Quizzes

##Data Summary

```
summarytools::descr(Blackboard_Minutes,stats=c("Q1", "med","Q3", "min", "max",
, "sd", "iqr", "skewness","kurtosis","N.valid"),style="rmarkdown",headings=TRUE)
```

```
## ### Descriptive Statistics
```

```
## ##### Blackboard_Minutes
```

```
## **N:** 312
```

```
##
```

	Blackboard_Minutes
-----:	-----:
Q1	1848.50
Median	2528.50
Q3	3065.00
Min	180.00
Max	4978.00
Std.Dev	881.35
IQR	1212.75
Skewness	0.04
Kurtosis	-0.20
N.Valid	312.00

```
summarytools::descr(Discussion_Minutes,stats=c("Q1", "med","Q3", "min", "max",
,"sd", "iqr", "skewness","kurtosis","N.valid"),style="rmarkdown",headings=TRUE)
```

```
## ### Descriptive Statistics
## ##### Discussion_Minutes
## **N:** 312
##
## |      &nbsp; | Discussion_Minutes |
## |-----:|-----:|
## | **Q1** | 65.00 |
## | **Median** | 120.50 |
## | **Q3** | 210.00 |
## | **Min** | 0.00 |
## | **Max** | 462.00 |
## | **Std.Dev** | 101.48 |
## | **IQR** | 145.00 |
## | **Skewness** | 0.73 |
## | **Kurtosis** | -0.09 |
## | **N.Valid** | 312.00 |

summarytools::descr(Materials_Minutes,stats=c("Q1", "med","Q3", "min", "max",
"sd", "iqr", "skewness","kurtosis","N.valid"),style="rmarkdown",headings=TRUE
)

## ### Descriptive Statistics
## ##### Materials_Minutes
## **N:** 312
##
## |      &nbsp; | Materials_Minutes |
## |-----:|-----:|
## | **Q1** | 772.50 |
## | **Median** | 976.00 |
## | **Q3** | 1186.00 |
## | **Min** | 197.00 |
## | **Max** | 1893.00 |
## | **Std.Dev** | 298.52 |
## | **IQR** | 412.25 |
## | **Skewness** | -0.01 |
## | **Kurtosis** | -0.20 |
## | **N.Valid** | 312.00 |

summarytools::descr(Lecture_Minutes,stats=c("Q1", "med","Q3", "min", "max","s
d", "iqr", "skewness","kurtosis","N.valid"),style="rmarkdown",headings=TRUE)

## ### Descriptive Statistics
## ##### Lecture_Minutes
## **N:** 312
##
## |      &nbsp; | Lecture_Minutes |
## |-----:|-----:|
## | **Q1** | 1177.50 |
## | **Median** | 1486.00 |
## | **Q3** | 1853.50 |
## | **Min** | 107.00 |
```

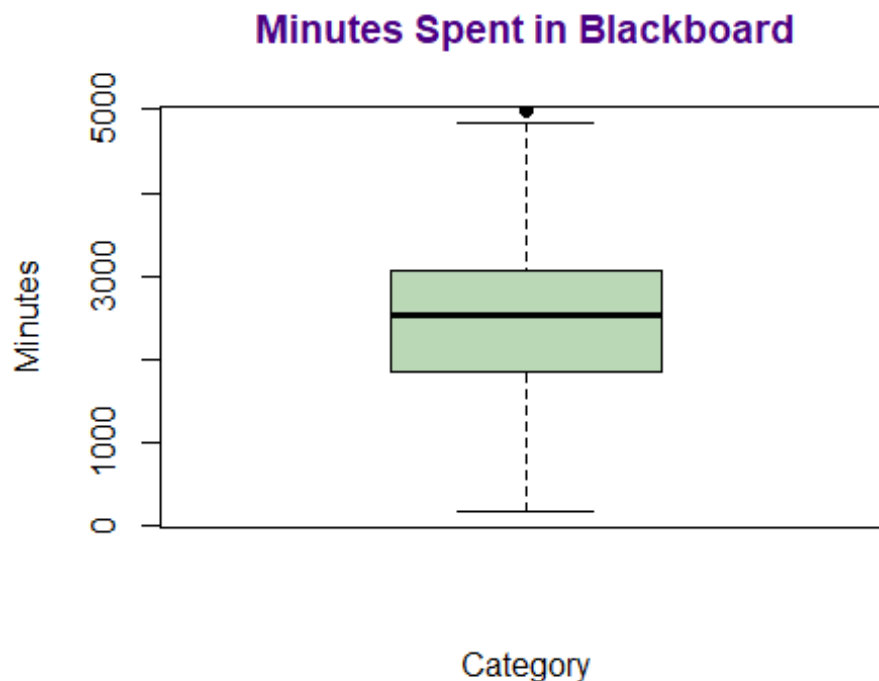
```
## |      **Max**      |      2861.00 |
## |    **Std.Dev**    |      529.56 |
## |    **IQR**        |      673.50 |
## |  **Skewness**     |       0.02 |
## |  **Kurtosis**     |      -0.21 |
## |    **N.Valid**    |      312.00 |
```

##Box Plot for Blackboard

```
boxplot(Data$Blackboard_Minutes, names=c("Blackboard"), main="", xlab="Category", ylab="Minutes", col="#BAD8B6", outline=FALSE)
title(main="Minutes Spent in Blackboard", col.main="#4B0082", font.main=2)
```

Solid Outliers for Everything Else

```
outliers <- boxplot(Data$Blackboard_Minutes, plot=FALSE)$out
points(outliers, pch=16, col="#000000")
```



##Box Plot for Minutes Everything Else

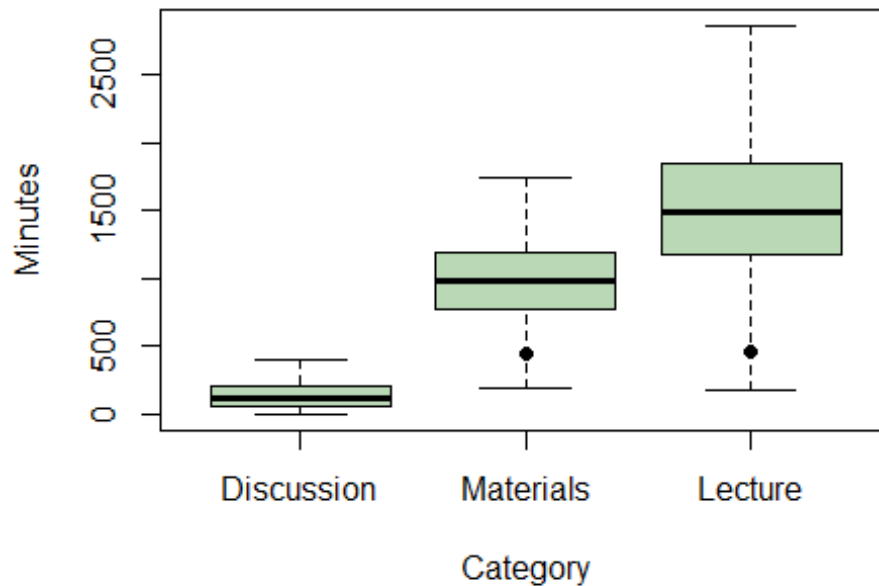
```
boxplot(Data$Discussion_Minutes, Data$Materials_Minutes, Data$Lecture_Minutes, names=c("Discussion", "Materials", "Lecture"), main="", xlab="Category", ylab="Minutes", col="#BAD8B6", outline=FALSE)
title(main="Minutes Spent on Discussion, Materials, & Lecture", col.main="#4B0082", font.main=2)
```

Solid Outliers for Everything Else

```
outliers <- boxplot(Data$Blackboard_Minutes, Data$Discussion_Minutes, Data$Ma
```

```
terials_Minutes, Data$Lecture_Minutes, plot=FALSE)$out
points(outliers, pch=16, col="#000000")
```

Minutes Spent on Discussion, Materials, & Lectur



##Scores to Letter Grades

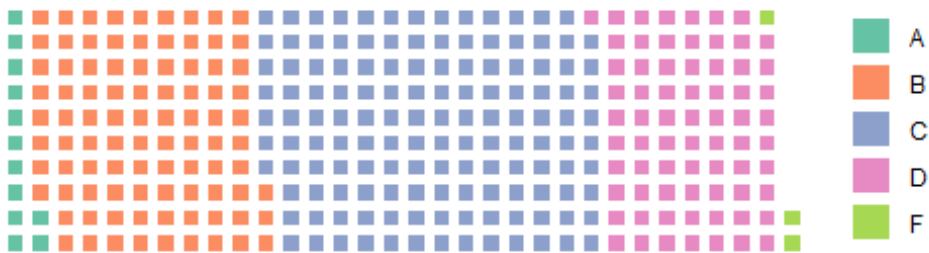
```
scores <- Data$Final_Course_Points

grades <- cut(scores,
breaks = c(-Inf, 539, 629, 710, 809, Inf),
labels = c("F", "D", "C", "B", "A"))
```

##Waffle Chart

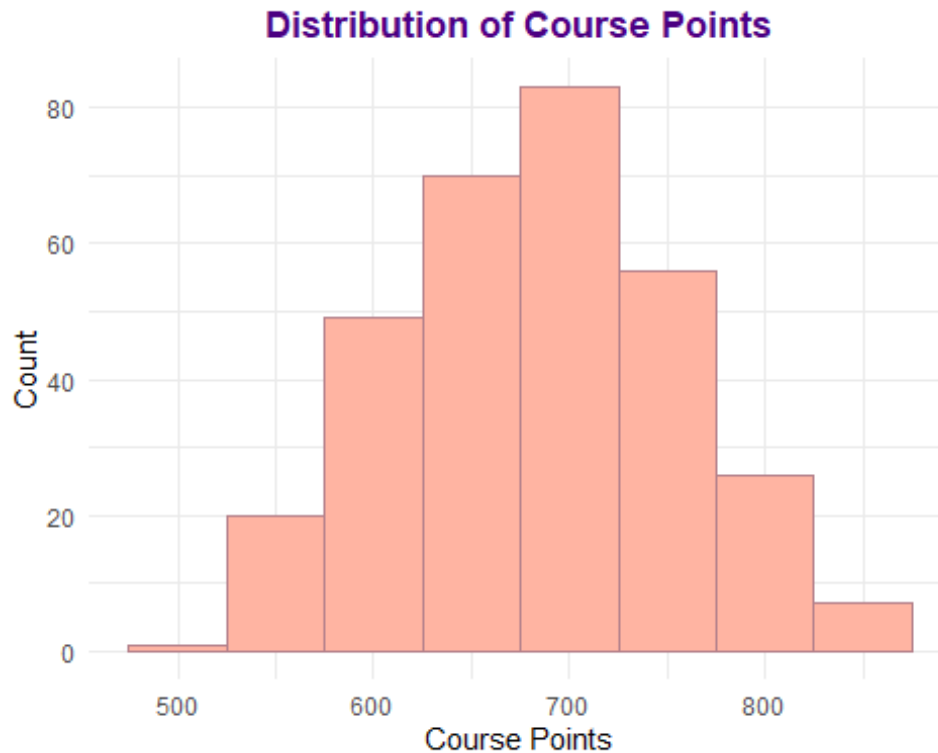
```
grade_counts <- c(A = 12, B = 91, C = 136, D = 70, F = 3)
waffle(grade_counts, rows = 10, title = "Grade Distribution") +
theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082")
))
```

Grade Distribution



##Frequency Histogram for a distribution of course points

```
ggplot(Data, aes(x = Final_Course_Points)) +  
geom_histogram(binwidth = 50, fill = "#FFB4A2", color = "#B5828C") +  
theme_minimal() +  
labs(title = "Distribution of Course Points", x="Course Points", y="Count") +  
theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082"  
))
```

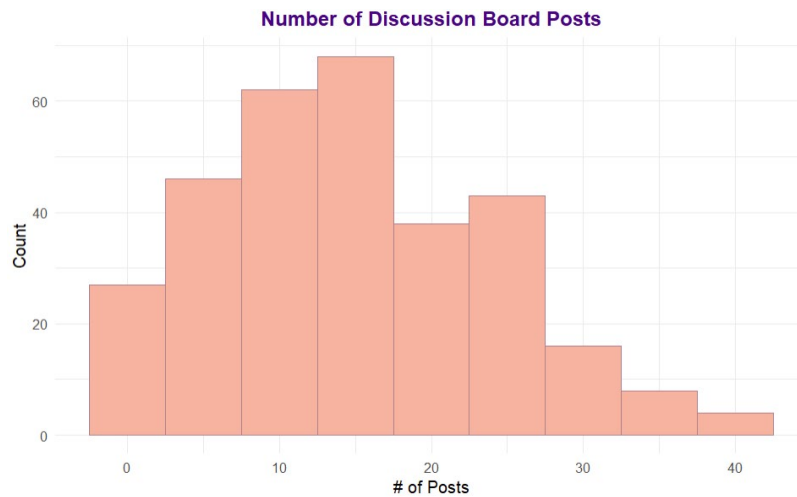


##Descriptive

```
summarytools::descr(Discussion_Posts,stats=c("mean","sd","skewness","min", "max", "kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##
## |      &nbsp; | Discussion_Posts |
## |-----:|-----:|
## | **Mean** |      14.74 |
## | **Std.Dev** |      9.07 |
## | **Skewness** |      0.42 |
## | **Min** |      0.00 |
## | **Max** |     42.00 |
## | **Kurtosis** |     -0.35 |
## | **N.Valid** |     312.00 |
```

```
ggplot(Data, aes(x = Discussion_Posts)) +
  geom_histogram(binwidth = 5, fill = "#FFB4A2", color = "#B5828C") +
  theme_minimal() +
  labs(title = "Number of Discussion Board Posts", x="# of Posts", y="Count") +
  theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082"))
```



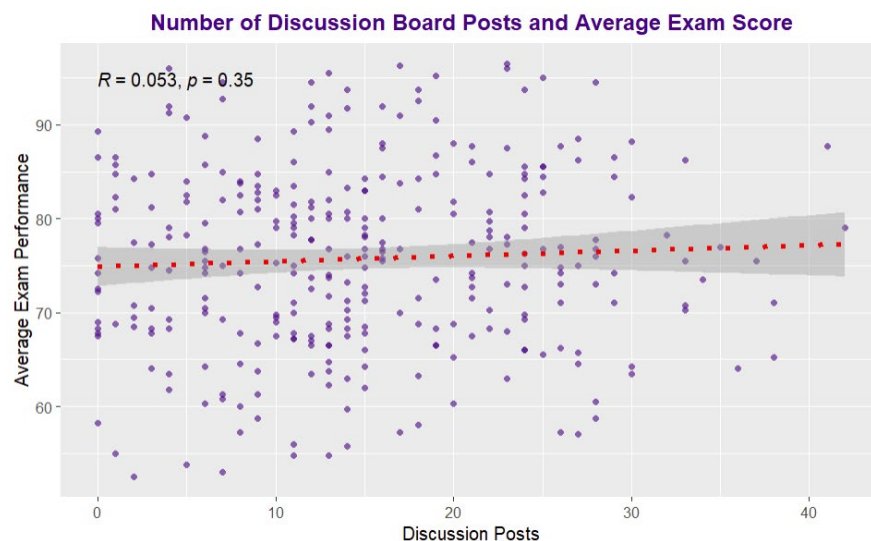
##Exam Average

```
Data$Average_Exam_Performance <- rowMeans(Data[, c("Exam_Score_1", "Exam_Score_2", "Exam_Score_3", "Exam_Score_4")])
```

##Scatterplot for # of Posts and Exam Score

```
ggplot(Data, aes(x = Discussion_Posts, y = Average_Exam_Performance)) +
  geom_point(color = "#4B0082", alpha = 0.6, shape = 16) +
  geom_smooth(method = "lm", color = "red", linetype = "dotted", linewidth = 1.5, se = TRUE) +
  labs(title = "Number of Discussion Board Posts and Average Exam Score", x = "Discussion Posts", y = "Average Exam Performance") +
  stat_cor() +
  theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082"))
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



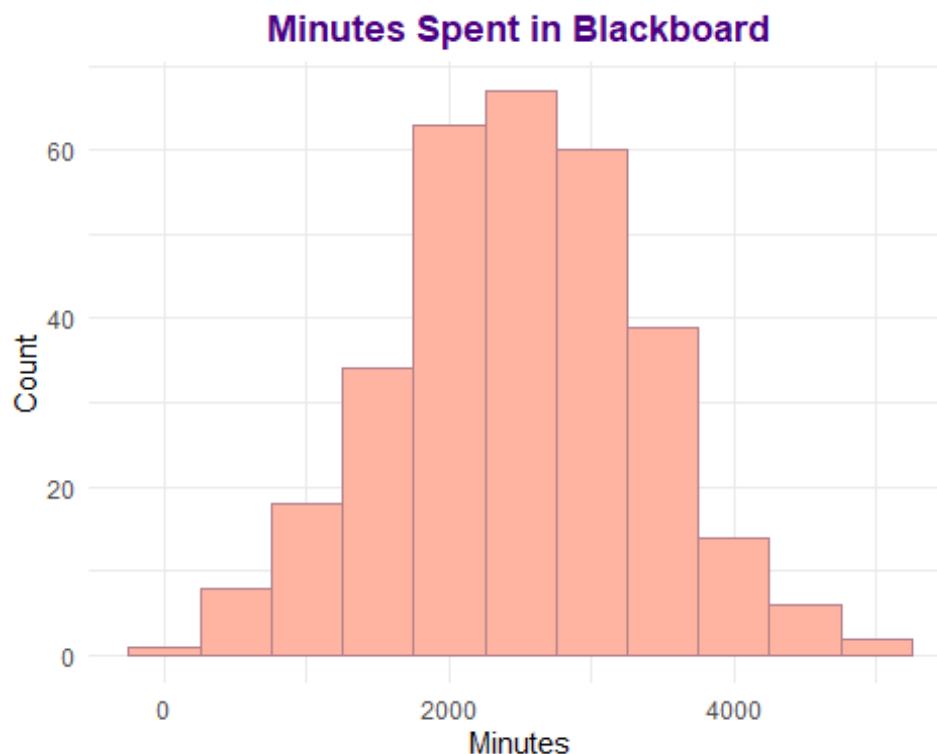
##Descriptive

```
summarytools::descr(Blackboard_Minutes,stats=c("mean","sd","skewness","min",  
"max", "kurtosis","N.valid"),style="rmarkdown",headings=FALSE)
```

```
##  
## |      &nbsp; | Blackboard_Minutes |  
## |-----:|-----:|  
## | **Mean** | 2486.33 |  
## | **Std.Dev** | 881.35 |  
## | **Skewness** | 0.04 |  
## | **Min** | 180.00 |  
## | **Max** | 4978.00 |  
## | **Kurtosis** | -0.20 |  
## | **N.Valid** | 312.00 |
```

##Blackboard Minutes Histogram

```
ggplot(Data, aes(x = Blackboard_Minutes)) +  
geom_histogram(binwidth = 500, fill = "#FFB4A2", color = "#B5828C") +  
theme_minimal() +  
labs(title = "Minutes Spent in Blackboard", x="Minutes", y="Count") +  
theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082"  
))
```

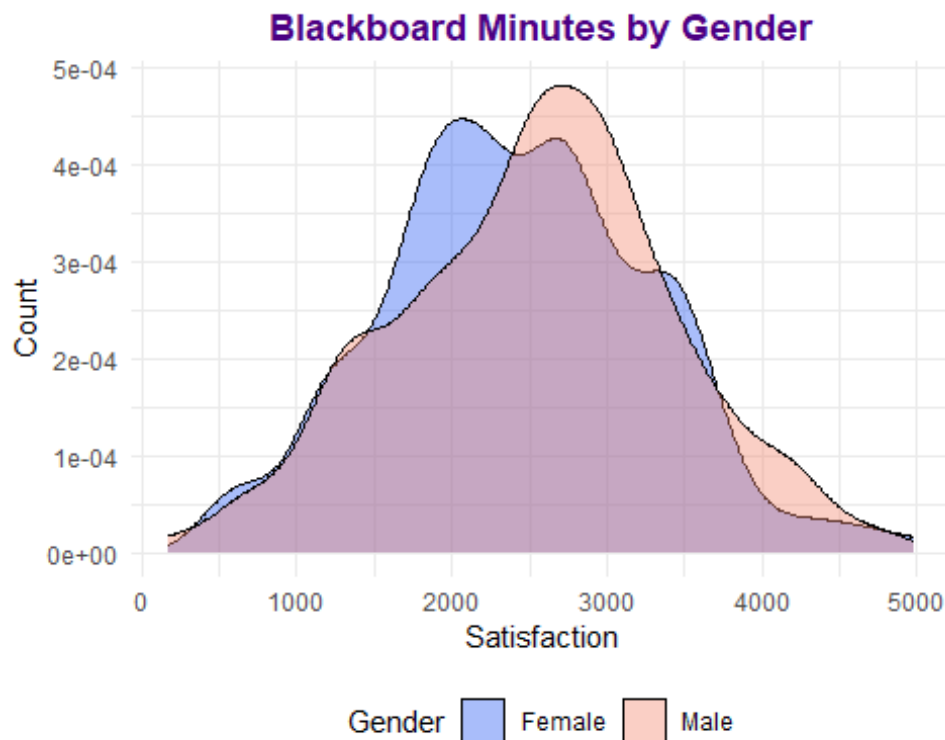


```
ggplot(Data, aes(x = Blackboard_Minutes, fill = as.factor(Gender))) +  
geom_density(alpha = 0.4, bw = 200) +  
labs(title = "Blackboard Minutes by Gender", fill = "Gender", x="Satisfaction
```

```

", y="Count") +
scale_fill_manual(values = c("#275AF2", "#F2866D")) +
theme_minimal() +
theme(legend.position = "bottom", plot.title = element_text(hjust = 0.5, face
= "bold", color = "#4B0082"))

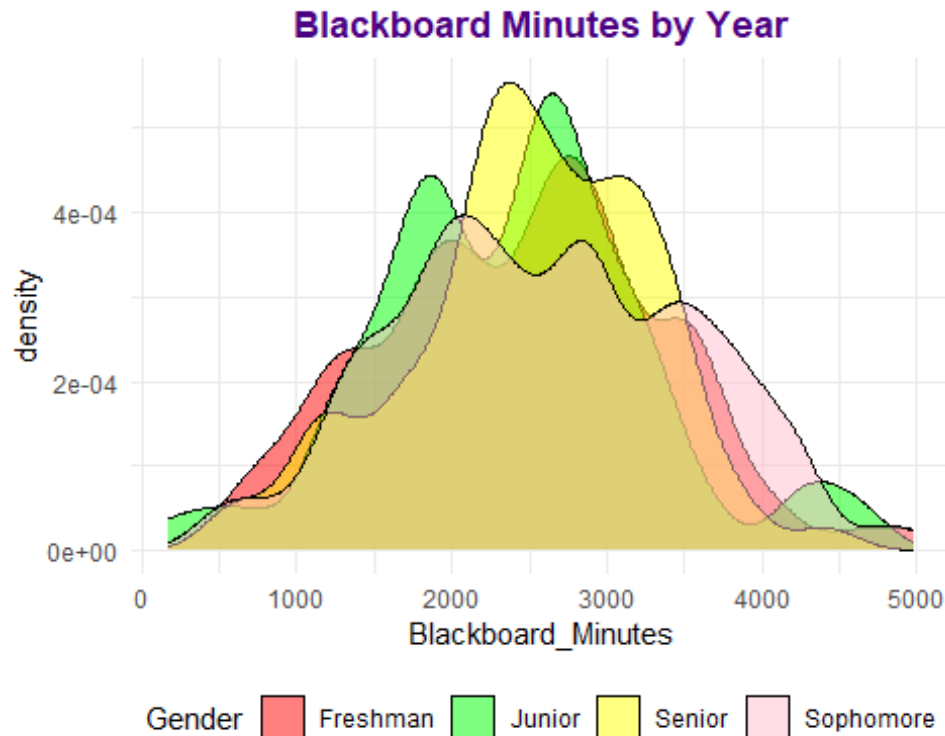
```



```

ggplot(Data, aes(x = Blackboard_Minutes, fill = as.factor(Academic_Level))) +
geom_density(alpha = 0.5, bw = 200) +
labs(title = "Blackboard Minutes by Year", fill = "Gender") +
scale_fill_manual(values = c("red", "green", "yellow", "pink")) +
theme_minimal() +
theme(legend.position = "bottom", plot.title = element_text(hjust = 0.5, face
= "bold", color = "#4B0082"))

```

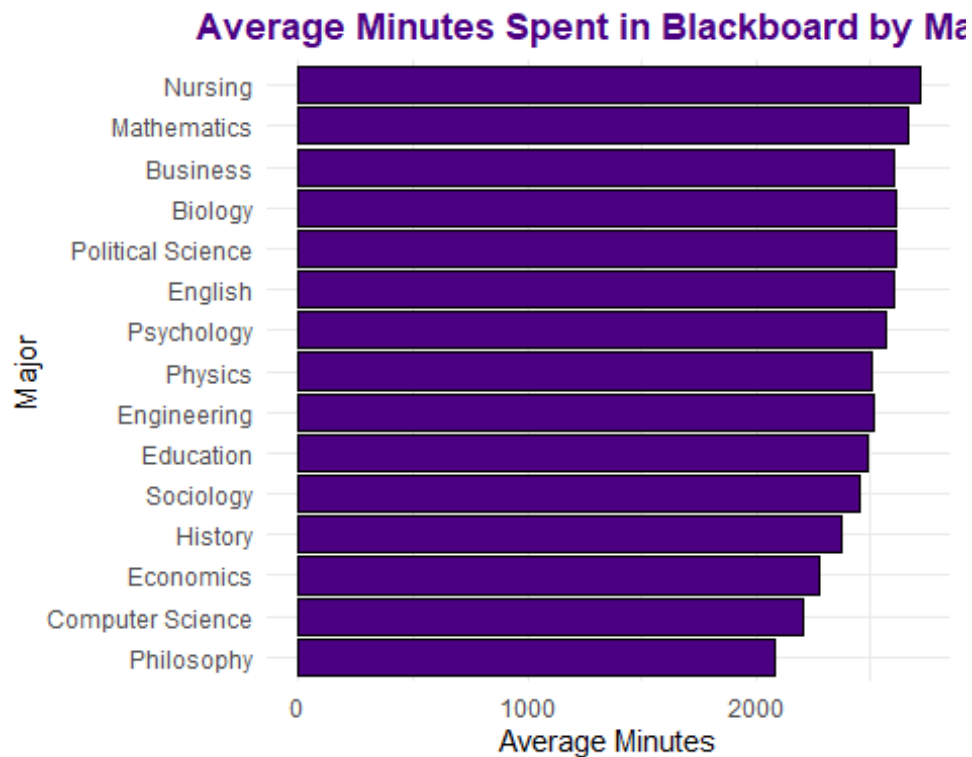


```
##Filter
avg_minutes <- Data %>%
filter(Major %in% c("Philosophy", "Computer Science", "Economics", "History",
  "Sociology", "Education", "Engineering", "Physics", "Psychology", "English",
  "Political Science", "Biology", "Business", "Mathematics", "Nursing")) %>%
group_by(Major) %>%
summarize(Average_Minutes = mean(Blackboard_Minutes, na.rm = TRUE))

# Correct Order
avg_minutes$Major <- factor(avg_minutes$Major, levels = c("Philosophy", "Comp
uter Science", "Economics", "History", "Sociology", "Education", "Engineering
", "Physics", "Psychology", "English", "Political Science", "Biology", "Busin
ess", "Mathematics", "Nursing"))

##Bar Chart

ggplot(avg_minutes, aes(x = Major, y = Average_Minutes)) +
geom_bar(stat = "identity", fill = "#4B0082", color = "black") +
theme_minimal() +
labs(title = "Average Minutes Spent in Blackboard by Major", x = "Major", y =
  "Average Minutes") +
theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082"
), legend.position = "none") +
coord_flip()
```



##Assignment, Quiz, and Exam Total

```
Data$Total_Assignment_Score <- rowSums(Data[, grep("Assignment_Score_", colnames(Data))], na.rm = TRUE)
```

```
Data$Total_Quiz_Score <- rowSums(Data[, grep("Quiz_Score_", colnames(Data))], na.rm = TRUE)
```

```
Data$Total_Exam_Score <- rowSums(Data[, grep("Exam_Score_", colnames(Data))], na.rm = TRUE)
```

Select Columns

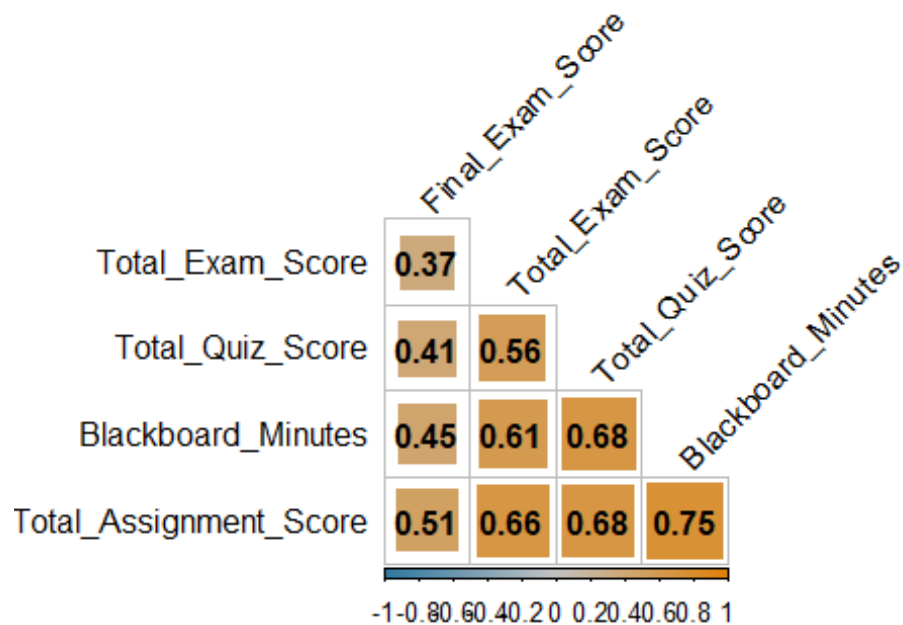
```
selected_data <- Data[, c("Blackboard_Minutes", "Total_Assignment_Score", "Total_Quiz_Score", "Total_Exam_Score", "Final_Exam_Score")]
```

#Compute Correlation

```
cor_matrix <- cor(selected_data, use = "complete.obs")
```

#Corrplot

```
corrplot(cor_matrix, method = "square", type = "lower", order = "hclust", col = colorRampPalette(c("#2f79a1", "#c2c2c2", "#e08209"))(100), tl.col = "black", tl.srt = 45, addCoef.col = "black", diag = FALSE)
```



##Assignment, Quiz, and Exam Total

```
Data$Total_Assignment_Score <- rowSums(Data[, grep("Assignment_Score_", colnames(Data))], na.rm = TRUE)
Data$Total_Quiz_Score <- rowSums(Data[, grep("Quiz_Score_", colnames(Data))], na.rm = TRUE)
Data$Total_Exam_Score <- rowSums(Data[, grep("Exam_Score_", colnames(Data))], na.rm = TRUE)
```

Select Columns

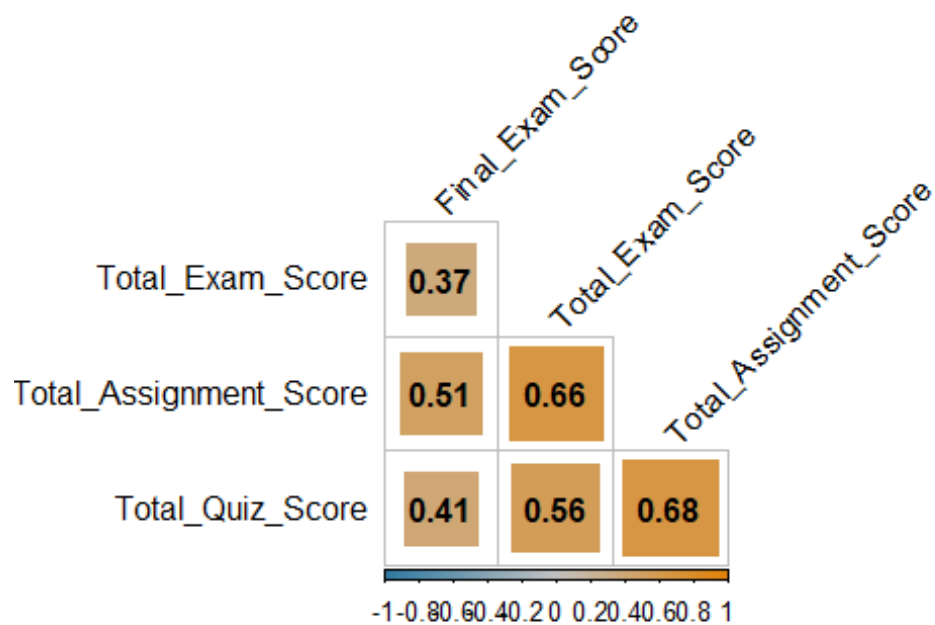
```
selected_data <- Data[, c("Total_Assignment_Score", "Total_Quiz_Score", "Total_Exam_Score", "Final_Exam_Score")]
```

#Compute Correlation

```
cor_matrix <- cor(selected_data, use = "complete.obs")
```

#Corrplot

```
corrplot(cor_matrix, method = "square", type = "lower", order = "hclust", col = colorRampPalette(c("#2f79a1", "#c2c2c2", "#e08209"))(100), tl.col = "black", tl.srt = 45, addCoef.col = "black", diag = FALSE)
```



##Average Scores Data Frame

```
avg_ass1 <-mean(Assignment_Score_1)
avg_ass2 <-mean(Assignment_Score_2)
avg_ass3 <-mean(Assignment_Score_3)
avg_ass4 <-mean(Assignment_Score_4)
avg_ass5 <-mean(Assignment_Score_5)
avg_ass6 <-mean(Assignment_Score_6)
avg_ass7 <-mean(Assignment_Score_7)
avg_ass8 <-mean(Assignment_Score_8)
avg_ass9 <-mean(Assignment_Score_9)
avg_ass10 <-mean(Assignment_Score_10)
```

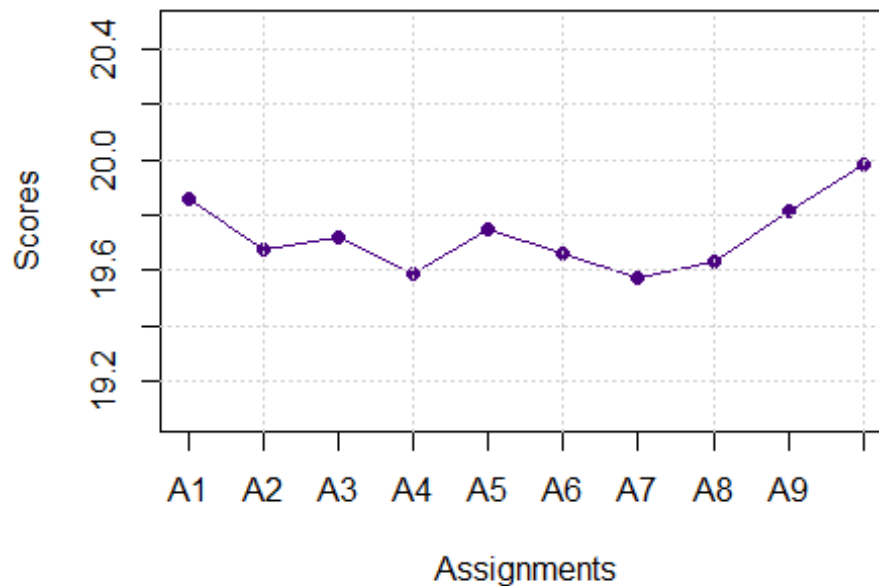
```
Ass_Avg_scores<-c(avg_ass1,avg_ass2,avg_ass3,avg_ass4,avg_ass5,avg_ass6,avg_a
ss7,avg_ass8,avg_ass9,avg_ass10)
```

```
time_points<-c("A1", "A2", "A3", "A4", "A5", "A6", "A7", "A8", "A9", "A10")
```

Average Scores Timeline

```
plot(Ass_Avg_scores, type="o", xlab="Assignments", ylab="Scores", main="Assig
nment Scores Over Time", xaxt="n", col="#4B0082", pch=16, ylim=c(min(Ass_Avg_
scores) - 0.5, max(Ass_Avg_scores) + 0.5))
axis(1, at=1:10, labels=time_points)
title(main="Assignment Scores Over Time", col.main="#4B0082", font.main=2)
grid()
```

Assignment Scores Over Time



```

avg_exam1 <-mean(Exam_Score_1)
avg_exam2 <-mean(Exam_Score_2)
avg_exam3 <-mean(Exam_Score_3)
avg_exam4 <-mean(Exam_Score_4)

Exam_Avg_scores<-c(avg_exam1,avg_exam2,avg_exam3,avg_exam4)

time_points<-c("E1", "E2", "E3", "E4")

plot(Exam_Avg_scores, type="o", xlab="Exams", ylab="Scores", main="Exam Scores Over Time", xaxt="n", col="#4B0082", pch=16, ylim=c(min(Exam_Avg_scores) - 0.5, max(Exam_Avg_scores) + 0.5))
axis(1, at=1:4, labels=time_points)
title(main="Exam Scores Over Time", col.main="#4B0082", font.main=2)
grid## Data Frame for Academic Level

Data_Academic_Level_Freshman <- Data %>% filter(Academic_Level == "Freshman")
Data_Academic_Level_Sophomore <- Data %>% filter(Academic_Level == "Sophomore")
Data_Academic_Level_Junior <- Data %>% filter(Academic_Level == "Junior")
Data_Academic_Level_Senior <- Data %>% filter(Academic_Level == "Senior")

##Summary for Assignments

##Assignment 1

```

```
summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_1, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_1
## **N:** 96
##
## |      &nbsp; | Assignment_Score_1 |
## |-----:|-----:|
## | **Mean** | 19.56 |
## | **Std.Dev** | 3.10 |
## | **Skewness** | 0.13 |
## | **Kurtosis** | -1.10 |
## | **N.Valid** | 96.00 |
```

```
summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_1, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_1
## **N:** 70
##
## |      &nbsp; | Assignment_Score_1 |
## |-----:|-----:|
## | **Mean** | 20.13 |
## | **Std.Dev** | 2.91 |
## | **Skewness** | -0.05 |
## | **Kurtosis** | -0.91 |
## | **N.Valid** | 70.00 |
```

```
summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_1, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_1
## **N:** 70
##
## |      &nbsp; | Assignment_Score_1 |
## |-----:|-----:|
## | **Mean** | 20.14 |
## | **Std.Dev** | 2.98 |
## | **Skewness** | -0.14 |
## | **Kurtosis** | -0.99 |
## | **N.Valid** | 70.00 |
```

```
summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_1, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_1
## **N:** 76
##
## |      &nbsp; | Assignment_Score_1 |
## |-----:|-----:|
## | **Mean** | 19.74 |
## | **Std.Dev** | 2.93 |
## | **Skewness** | 0.02 |
## | **Kurtosis** | -0.95 |
## | **N.Valid** | 76.00 |
```

##Assignment 2

```
summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_2, stats =
c("mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings
= TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_2
## **N:** 96
##
## |      &nbsp; | Assignment_Score_2 |
## |-----:|-----:|
## | **Mean** | 19.32 |
## | **Std.Dev** | 3.19 |
## | **Skewness** | 0.33 |
## | **Kurtosis** | -1.00 |
## | **N.Valid** | 96.00 |
```

```
summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_2, stats =
c("mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", heading
s = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_2
## **N:** 70
##
## |      &nbsp; | Assignment_Score_2 |
## |-----:|-----:|
## | **Mean** | 19.67 |
## | **Std.Dev** | 2.95 |
## | **Skewness** | 0.28 |
## | **Kurtosis** | -0.86 |
## | **N.Valid** | 70.00 |
```

```
summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_2, stats = c(
"mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings =
TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_2
## **N:** 70
##
## |      &nbsp; | Assignment_Score_2 |
## |-----:|-----:|
## | **Mean** | 20.20 |
## | **Std.Dev** | 2.98 |
## | **Skewness** | -0.10 |
## | **Kurtosis** | -0.79 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_2, stats = c(
"mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings =
TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_2
## **N:** 76
##
## |      &nbsp; | Assignment_Score_2 |
## |-----:|-----:|
## | **Mean** | 19.63 |
## | **Std.Dev** | 3.05 |
## | **Skewness** | 0.10 |
## | **Kurtosis** | -1.05 |
## | **N.Valid** | 76.00 |

##Assignment 3

summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_3, stats =
c("mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings
= TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_3
## **N:** 96
##
## |      &nbsp; | Assignment_Score_3 |
## |-----:|-----:|
## | **Mean** | 19.85 |
## | **Std.Dev** | 3.26 |
## | **Skewness** | 0.17 |
## | **Kurtosis** | -1.13 |
## | **N.Valid** | 96.00 |

summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_3, stats =
c("mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", heading
s = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_3
## **N:** 70
##
## |      &nbsp; | Assignment_Score_3 |
## |-----:|-----:|
## | **Mean** | 19.64 |
## | **Std.Dev** | 2.70 |
## | **Skewness** | 0.09 |
## | **Kurtosis** | -0.70 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_3, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_3
## **N:** 70
##
## |      &nbsp; | Assignment_Score_3 |
## |-----:|-----:|
## | **Mean** | 19.86 |
## | **Std.Dev** | 3.07 |
## | **Skewness** | 0.21 |
## | **Kurtosis** | -0.96 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_3, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_3
## **N:** 76
##
## |      &nbsp; | Assignment_Score_3 |
## |-----:|-----:|
## | **Mean** | 19.50 |
## | **Std.Dev** | 3.07 |
## | **Skewness** | 0.30 |
## | **Kurtosis** | -0.93 |
## | **N.Valid** | 76.00 |

##Assignment 4

summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_4, stats =
c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings
= TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_4
## **N:** 96
##
## |      &nbsp; | Assignment_Score_4 |
## |-----:|-----:|
## | **Mean** | 19.44 |
## | **Std.Dev** | 3.19 |
## | **Skewness** | 0.24 |
## | **Kurtosis** | -1.22 |
## | **N.Valid** | 96.00 |

summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_4, stats =
  c("mean","sd","skewness","kurtosis","N.valid"), style = "markdown", heading
s = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_4
## **N:** 70
##
## |      &nbsp; | Assignment_Score_4 |
## |-----:|-----:|
## | **Mean** | 19.30 |
## | **Std.Dev** | 2.90 |
## | **Skewness** | 0.11 |
## | **Kurtosis** | -1.15 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_4, stats = c(
  "mean","sd","skewness","kurtosis","N.valid"), style = "markdown", headings =
  TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_4
## **N:** 70
##
## |      &nbsp; | Assignment_Score_4 |
## |-----:|-----:|
## | **Mean** | 19.89 |
## | **Std.Dev** | 2.95 |
## | **Skewness** | 0.14 |
## | **Kurtosis** | -0.78 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_4, stats = c(
  "mean","sd","skewness","kurtosis","N.valid"), style = "markdown", headings =
  TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_4
## **N:** 76
```

```
##
## |      &nbsp; | Assignment_Score_4 |
## |-----:|-----:|
## |    **Mean** |      19.78 |
## |   **Std.Dev** |      2.92 |
## |  **Skewness** |     -0.02 |
## |  **Kurtosis** |     -1.00 |
## |   **N.Valid** |     76.00 |
```

##Assignment 5

```
summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_5, stats =
c("mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings
= TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_5
## **N:** 96
```

```
##
## |      &nbsp; | Assignment_Score_5 |
## |-----:|-----:|
## |    **Mean** |      19.76 |
## |   **Std.Dev** |      3.04 |
## |  **Skewness** |      0.31 |
## |  **Kurtosis** |     -1.06 |
## |   **N.Valid** |     96.00 |
```

```
summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_5, stats =
c("mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", heading
s = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_5
## **N:** 70
```

```
##
## |      &nbsp; | Assignment_Score_5 |
## |-----:|-----:|
## |    **Mean** |      19.99 |
## |   **Std.Dev** |      3.09 |
## |  **Skewness** |     -0.17 |
## |  **Kurtosis** |     -1.09 |
## |   **N.Valid** |     70.00 |
```

```
summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_5, stats = c(
"mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings =
TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_5
## **N:** 70
##
```

```
## |      &nbsp; | Assignment_Score_5 |
## |-----:|-----:|
## |    **Mean** | 19.47 |
## |   **Std.Dev** | 3.07 |
## |  **Skewness** | 0.19 |
## |  **Kurtosis** | -1.12 |
## |   **N.Valid** | 70.00 |
```

```
summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_5, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_5
## **N:** 76
```

```
##
## |      &nbsp; | Assignment_Score_5 |
## |-----:|-----:|
## |    **Mean** | 19.78 |
## |   **Std.Dev** | 3.39 |
## |  **Skewness** | 0.03 |
## |  **Kurtosis** | -1.20 |
## |   **N.Valid** | 76.00 |
```

##Assignment 6

```
summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_6, stats =
c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings
= TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_6
## **N:** 96
```

```
##
## |      &nbsp; | Assignment_Score_6 |
## |-----:|-----:|
## |    **Mean** | 19.62 |
## |   **Std.Dev** | 2.99 |
## |  **Skewness** | 0.16 |
## |  **Kurtosis** | -0.99 |
## |   **N.Valid** | 96.00 |
```

```
summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_6, stats =
c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", heading
s = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_6
## **N:** 70
```

```
##
## |      &nbsp; | Assignment_Score_6 |
```

```
## |-----:|-----:|
## |      **Mean**      |      20.31 |
## |    **Std.Dev**    |      3.22 |
## |    **Skewness**   |     -0.12 |
## |    **Kurtosis**   |     -1.24 |
## |    **N.Valid**    |     70.00 |

summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_6, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_6
## **N:** 70
##
## |      &nbsp; | Assignment_Score_6 |
## |-----:|-----:|
## |      **Mean**      |      19.31 |
## |    **Std.Dev**    |      3.18 |
## |    **Skewness**   |      0.05 |
## |    **Kurtosis**   |     -1.26 |
## |    **N.Valid**    |     70.00 |

summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_6, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_6
## **N:** 76
##
## |      &nbsp; | Assignment_Score_6 |
## |-----:|-----:|
## |      **Mean**      |      19.43 |
## |    **Std.Dev**    |      3.22 |
## |    **Skewness**   |      0.18 |
## |    **Kurtosis**   |     -1.16 |
## |    **N.Valid**    |     76.00 |

##Assignment 7

summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_7, stats =
c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings
= TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_7
## **N:** 96
##
## |      &nbsp; | Assignment_Score_7 |
## |-----:|-----:|
```

```
## |      **Mean** |      19.61 |
## |    **Std.Dev** |      2.84 |
## |    **Skewness** |      0.19 |
## |    **Kurtosis** |     -0.74 |
## |    **N.Valid** |     96.00 |
```

```
summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_7, stats =
  c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", heading
s = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_7
## **N:** 70
```

```
##
## |      &nbsp; | Assignment_Score_7 |
## |-----:|-----:|
## |    **Mean** |      19.79 |
## |    **Std.Dev** |      3.03 |
## |    **Skewness** |     -0.15 |
## |    **Kurtosis** |     -1.10 |
## |    **N.Valid** |     70.00 |
```

```
summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_7, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_7
## **N:** 70
```

```
##
## |      &nbsp; | Assignment_Score_7 |
## |-----:|-----:|
## |    **Mean** |      19.14 |
## |    **Std.Dev** |      2.62 |
## |    **Skewness** |      0.32 |
## |    **Kurtosis** |     -0.48 |
## |    **N.Valid** |     70.00 |
```

```
summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_7, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_7
## **N:** 76
```

```
##
## |      &nbsp; | Assignment_Score_7 |
## |-----:|-----:|
## |    **Mean** |      19.74 |
## |    **Std.Dev** |      2.84 |
## |    **Skewness** |      0.05 |
```

```
## | **Kurtosis** | -0.93 |
## | **N.Valid** | 76.00 |
```

##Assignment 8

```
summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_8, stats =
c("mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings
= TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_8
## **N:** 96
##
## |      &nbsp; | Assignment_Score_8 |
## |-----:|-----:|
## | **Mean** | 19.67 |
## | **Std.Dev** | 2.90 |
## | **Skewness** | 0.21 |
## | **Kurtosis** | -0.93 |
## | **N.Valid** | 96.00 |
```

```
summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_8, stats =
c("mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", heading
s = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_8
## **N:** 70
##
## |      &nbsp; | Assignment_Score_8 |
## |-----:|-----:|
## | **Mean** | 19.49 |
## | **Std.Dev** | 3.06 |
## | **Skewness** | 0.13 |
## | **Kurtosis** | -0.98 |
## | **N.Valid** | 70.00 |
```

```
summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_8, stats = c(
"mean","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings =
TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_8
## **N:** 70
##
## |      &nbsp; | Assignment_Score_8 |
## |-----:|-----:|
## | **Mean** | 19.79 |
## | **Std.Dev** | 3.29 |
## | **Skewness** | -0.04 |
```

```
## | **Kurtosis** | -1.33 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_8, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_8
## **N:** 76
##
## |      &nbsp; | Assignment_Score_8 |
## |-----:|-----:|
## | **Mean** | 19.59 |
## | **Std.Dev** | 3.25 |
## | **Skewness** | 0.03 |
## | **Kurtosis** | -1.31 |
## | **N.Valid** | 76.00 |

##Assignment 9

summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_9, stats =
c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings
= TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_9
## **N:** 96
##
## |      &nbsp; | Assignment_Score_9 |
## |-----:|-----:|
## | **Mean** | 19.78 |
## | **Std.Dev** | 3.24 |
## | **Skewness** | -0.04 |
## | **Kurtosis** | -1.20 |
## | **N.Valid** | 96.00 |

summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_9, stats =
c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", heading
s = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_9
## **N:** 70
##
## |      &nbsp; | Assignment_Score_9 |
## |-----:|-----:|
## | **Mean** | 19.86 |
## | **Std.Dev** | 2.79 |
## | **Skewness** | 0.33 |
```

```
## | **Kurtosis** | -0.66 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_9, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_9
## **N:** 70
##
## |      &nbsp; | Assignment_Score_9 |
## |-----:|-----:|
## | **Mean** | 19.81 |
## | **Std.Dev** | 3.12 |
## | **Skewness** | 0.18 |
## | **Kurtosis** | -1.18 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_9, stats = c(
"mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings =
TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_9
## **N:** 76
##
## |      &nbsp; | Assignment_Score_9 |
## |-----:|-----:|
## | **Mean** | 19.82 |
## | **Std.Dev** | 3.02 |
## | **Skewness** | 0.02 |
## | **Kurtosis** | -1.03 |
## | **N.Valid** | 76.00 |

##Assignment 10

summarytools::descr(Data_Academic_Level_Freshman$Assignment_Score_10, stats =
c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", heading
s = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Assignment_Score_10
## **N:** 96
##
## |      &nbsp; | Assignment_Score_10 |
## |-----:|-----:|
## | **Mean** | 20.11 |
## | **Std.Dev** | 3.07 |
## | **Skewness** | -0.07 |
```

```
## | **Kurtosis** | -1.07 |
## | **N.Valid** | 96.00 |

summarytools::descr(Data_Academic_Level_Sophomore$Assignment_Score_10, stats
= c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headin
gs = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Assignment_Score_10
## **N:** 70
##
## |      &nbsp; | Assignment_Score_10 |
## |-----:|-----:|
## | **Mean** | 19.74 |
## | **Std.Dev** | 3.08 |
## | **Skewness** | 0.17 |
## | **Kurtosis** | -0.93 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Junior$Assignment_Score_10, stats = c
("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings
= TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Assignment_Score_10
## **N:** 70
##
## |      &nbsp; | Assignment_Score_10 |
## |-----:|-----:|
## | **Mean** | 19.79 |
## | **Std.Dev** | 2.92 |
## | **Skewness** | 0.06 |
## | **Kurtosis** | -0.95 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Senior$Assignment_Score_10, stats = c
("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings
= TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Assignment_Score_10
## **N:** 76
##
## |      &nbsp; | Assignment_Score_10 |
## |-----:|-----:|
## | **Mean** | 20.21 |
## | **Std.Dev** | 2.82 |
## | **Skewness** | -0.15 |
## | **Kurtosis** | -1.03 |
## | **N.Valid** | 76.00 |
```

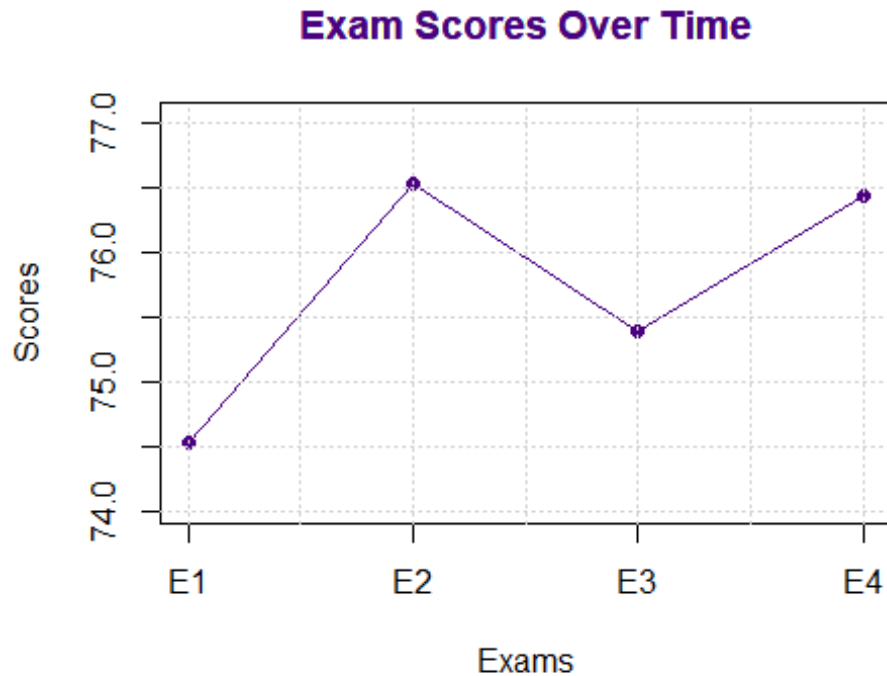
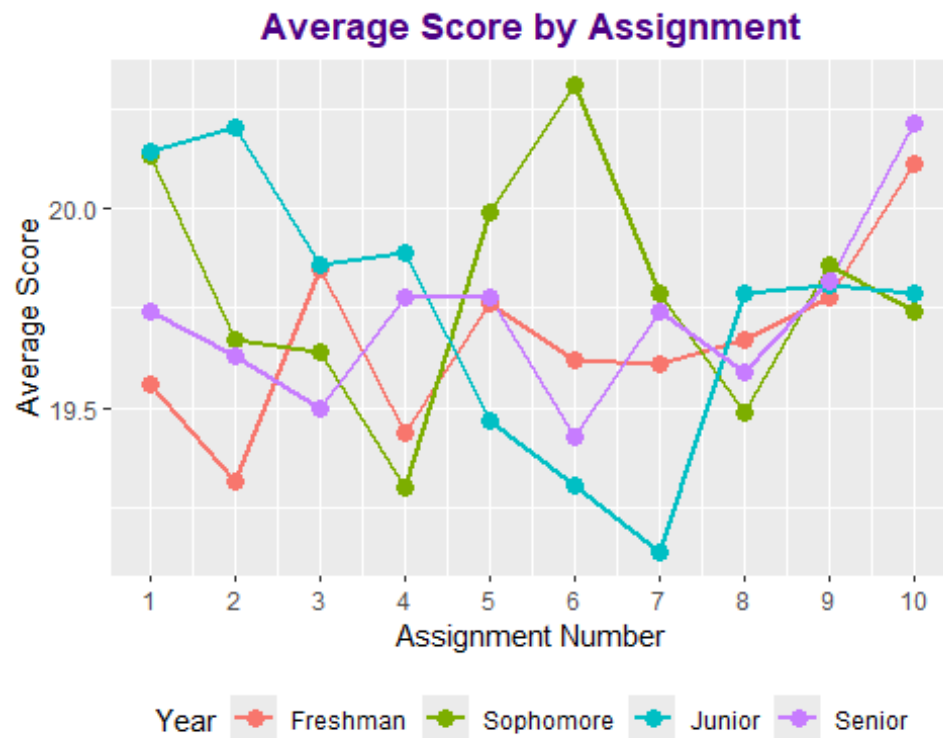
```

## Assignment Average Data Frame
Assignment_Scores2 <- data.frame(
  Assignment_Number = 1:10,
  Assignment_Avg = c(19.56, 19.32, 19.85, 19.44, 19.76, 19.62, 19.61, 19.67, 19.
.78, 20.11,
                    20.13, 19.67, 19.64, 19.30, 19.99, 20.31, 19.79, 19.49, 19.86,
19.74,
                    20.14, 20.20, 19.86, 19.89, 19.47, 19.31, 19.14, 19.79, 19.81,
19.79,
                    19.74, 19.63, 19.50, 19.78, 19.78, 19.43, 19.74, 19.59, 19.82,
20.21),

  Year = factor(rep(c("Freshman", "Sophomore", "Junior", "Senior"), each = 10),
levels = c("Freshman", "Sophomore", "Junior", "Senior"))
)

## Spaghetti Plot
ggplot(Assignment_Scores2, aes(x = Assignment_Number, y = Assignment_Avg, col
or = Year, group = Year)) +
  geom_line(size = 1) +
  geom_point(size = 3) +
  labs(title = "Average Score by Assignment", x = "Assignment Number", y = "Ave
rage Score", color = "Year") +
  theme(legend.position = "bottom") +
  theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082"
)) +
  scale_x_continuous(breaks = seq(1, 10, 1))
()

```



Data Frame for Academic Level

```
Data_Academic_Level_Freshman <- Data %>% filter(Academic_Level == "Freshman")
```

```
Data_Academic_Level_Sophomore <- Data %>% filter(Academic_Level == "Sophomore")
Data_Academic_Level_Junior <- Data %>% filter(Academic_Level == "Junior")
Data_Academic_Level_Senior <- Data %>% filter(Academic_Level == "Senior")
```

##Summary for Exams

##Exam 1

```
summarytools::descr(Data_Academic_Level_Freshman$Exam_Score_1, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "markdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Exam_Score_1
## **N:** 96
##
## |      &nbsp; | Exam_Score_1 |
## |-----:|-----:|
## | **Mean** | 74.95 |
## | **Std.Dev** | 15.06 |
## | **Skewness** | 0.04 |
## | **Kurtosis** | -1.19 |
## | **N.Valid** | 96.00 |
```

```
summarytools::descr(Data_Academic_Level_Sophomore$Exam_Score_1, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "markdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Exam_Score_1
## **N:** 70
##
## |      &nbsp; | Exam_Score_1 |
## |-----:|-----:|
## | **Mean** | 74.76 |
## | **Std.Dev** | 15.05 |
## | **Skewness** | -0.10 |
## | **Kurtosis** | -1.03 |
## | **N.Valid** | 70.00 |
```

```
summarytools::descr(Data_Academic_Level_Junior$Exam_Score_1, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "markdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Exam_Score_1
## **N:** 70
##
## |      &nbsp; | Exam_Score_1 |
## |-----:|-----:|
## | **Mean** | 73.36 |
```

```
## | **Std.Dev** | 14.58 |
## | **Skewness** | 0.11 |
## | **Kurtosis** | -1.08 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Senior$Exam_Score_1, stats = c("mean",
"sd", "skewness", "kurtosis", "N.valid"), style = "markdown", headings = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Exam_Score_1
## **N:** 76
##
## | &nbsp; | Exam_Score_1 |
## |-----:|-----:|
## | **Mean** | 74.89 |
## | **Std.Dev** | 14.63 |
## | **Skewness** | 0.03 |
## | **Kurtosis** | -0.96 |
## | **N.Valid** | 76.00 |

##Exam 2

summarytools::descr(Data_Academic_Level_Freshman$Exam_Score_2, stats = c("mea
n", "sd", "skewness", "kurtosis", "N.valid"), style = "markdown", headings = TRU
E)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Exam_Score_2
## **N:** 96
##
## | &nbsp; | Exam_Score_2 |
## |-----:|-----:|
## | **Mean** | 75.02 |
## | **Std.Dev** | 16.28 |
## | **Skewness** | -0.09 |
## | **Kurtosis** | -1.32 |
## | **N.Valid** | 96.00 |

summarytools::descr(Data_Academic_Level_Sophomore$Exam_Score_2, stats = c("me
an", "sd", "skewness", "kurtosis", "N.valid"), style = "markdown", headings = TR
UE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Exam_Score_2
## **N:** 70
##
## | &nbsp; | Exam_Score_2 |
## |-----:|-----:|
## | **Mean** | 74.81 |
## | **Std.Dev** | 15.24 |
## | **Skewness** | 0.10 |
```

```
## | **Kurtosis** | -1.09 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Junior$Exam_Score_2, stats = c("mean",
"sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Exam_Score_2
## **N:** 70
##
## | &nbsp; | Exam_Score_2 |
## |-----:|-----:|
## | **Mean** | 78.23 |
## | **Std.Dev** | 16.14 |
## | **Skewness** | -0.43 |
## | **Kurtosis** | -1.12 |
## | **N.Valid** | 70.00 |

summarytools::descr(Data_Academic_Level_Senior$Exam_Score_2, stats = c("mean",
"sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Exam_Score_2
## **N:** 76
##
## | &nbsp; | Exam_Score_2 |
## |-----:|-----:|
## | **Mean** | 78.45 |
## | **Std.Dev** | 14.80 |
## | **Skewness** | -0.22 |
## | **Kurtosis** | -1.01 |
## | **N.Valid** | 76.00 |

##Exam 3

summarytools::descr(Data_Academic_Level_Freshman$Exam_Score_3, stats = c("mean",
"sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Exam_Score_3
## **N:** 96
##
## | &nbsp; | Exam_Score_3 |
## |-----:|-----:|
## | **Mean** | 73.85 |
## | **Std.Dev** | 14.93 |
## | **Skewness** | 0.14 |
## | **Kurtosis** | -1.09 |
## | **N.Valid** | 96.00 |
```

```
summarytools::descr(Data_Academic_Level_Sophomore$Exam_Score_3, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Exam_Score_3
## **N:** 70
##
## |      &nbsp; | Exam_Score_3 |
## |-----:|-----:|
## | **Mean** |      75.31 |
## | **Std.Dev** |     15.28 |
## | **Skewness** |      0.11 |
## | **Kurtosis** |     -1.07 |
## | **N.Valid** |     70.00 |
```

```
summarytools::descr(Data_Academic_Level_Junior$Exam_Score_3, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Exam_Score_3
## **N:** 70
##
## |      &nbsp; | Exam_Score_3 |
## |-----:|-----:|
## | **Mean** |      78.11 |
## | **Std.Dev** |     14.91 |
## | **Skewness** |     -0.23 |
## | **Kurtosis** |     -0.93 |
## | **N.Valid** |     70.00 |
```

```
summarytools::descr(Data_Academic_Level_Senior$Exam_Score_3, stats = c("mean", "sd", "skewness", "kurtosis", "N.valid"), style = "rmarkdown", headings = TRUE)
```

```
## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Exam_Score_3
## **N:** 76
##
## |      &nbsp; | Exam_Score_3 |
## |-----:|-----:|
## | **Mean** |      74.92 |
## | **Std.Dev** |     15.64 |
## | **Skewness** |      0.02 |
## | **Kurtosis** |     -1.14 |
## | **N.Valid** |     76.00 |
```

##Exam 4

```
summarytools::descr(Data_Academic_Level_Freshman$Exam_Score_4, stats = c("mea
```

```

n","sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Freshman$Exam_Score_4
## **N:** 96
##
## |      &nbsp; | Exam_Score_4 |
## |-----:|-----:|
## | **Mean** |      74.47 |
## | **Std.Dev** |     15.66 |
## | **Skewness** |     -0.07 |
## | **Kurtosis** |     -1.07 |
## | **N.Valid** |     96.00 |

summarytools::descr(Data_Academic_Level_Sophomore$Exam_Score_4, stats = c("mean",
"sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Sophomore$Exam_Score_4
## **N:** 70
##
## |      &nbsp; | Exam_Score_4 |
## |-----:|-----:|
## | **Mean** |      76.90 |
## | **Std.Dev** |     16.56 |
## | **Skewness** |     -0.08 |
## | **Kurtosis** |     -1.24 |
## | **N.Valid** |     70.00 |

summarytools::descr(Data_Academic_Level_Junior$Exam_Score_4, stats = c("mean",
"sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings = TRUE)

## ### Descriptive Statistics
## ##### Data_Academic_Level_Junior$Exam_Score_4
## **N:** 70
##
## |      &nbsp; | Exam_Score_4 |
## |-----:|-----:|
## | **Mean** |      78.03 |
## | **Std.Dev** |     13.58 |
## | **Skewness** |     -0.08 |
## | **Kurtosis** |     -0.77 |
## | **N.Valid** |     70.00 |

summarytools::descr(Data_Academic_Level_Senior$Exam_Score_4, stats = c("mean",
"sd","skewness","kurtosis","N.valid"), style = "rmarkdown", headings = TRUE)

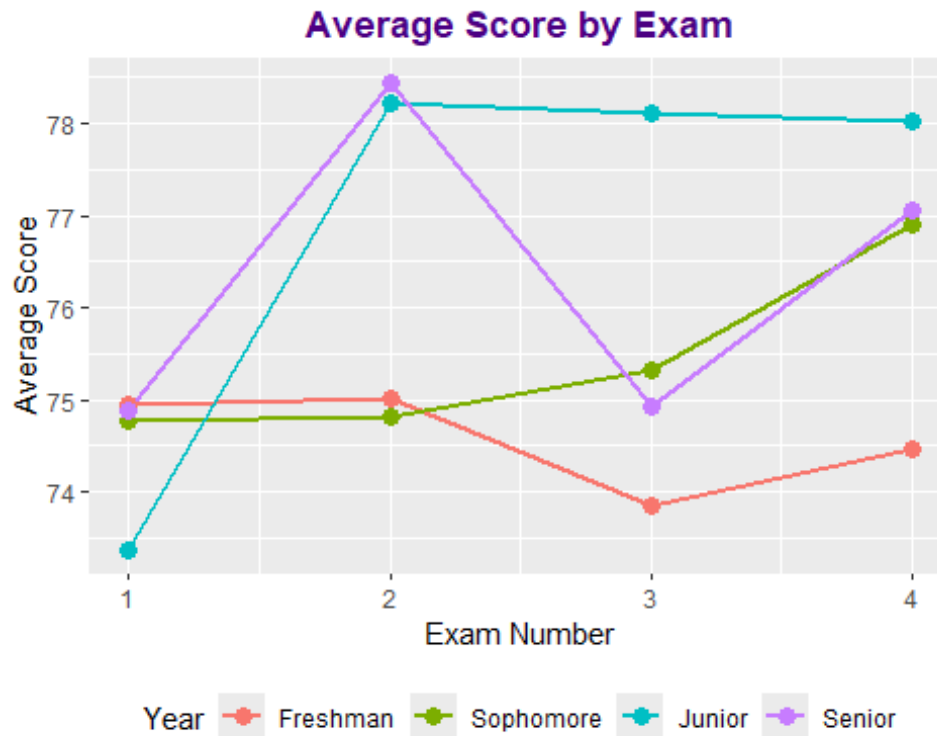
## ### Descriptive Statistics
## ##### Data_Academic_Level_Senior$Exam_Score_4

```

```
## **N:** 76
##
## |      &nbsp; | Exam_Score_4 |
## |-----:|-----:|
## | **Mean** | 77.05 |
## | **Std.Dev** | 14.95 |
## | **Skewness** | -0.24 |
## | **Kurtosis** | -1.01 |
## | **N.Valid** | 76.00 |

## Exam Average Data Frame
Exam_Scores <- data.frame(
  Exam_Number = 1:4,
  Exam_Avg = c(74.95, 75.02, 73.85, 74.47,
               74.76, 74.81, 75.31, 76.90,
               73.36, 78.23, 78.11, 78.03,
               74.89, 78.45, 74.92, 77.05),
  Year = factor(rep(c("Freshman", "Sophomore", "Junior", "Senior"), each = 4),
                levels = c("Freshman", "Sophomore", "Junior", "Senior"))
)

## Spaghetti Plot
ggplot(Exam_Scores, aes(x = Exam_Number, y = Exam_Avg, color = Year, group =
Year)) +
  geom_line(size = 1) +
  geom_point(size = 3) +
  labs(title = "Average Score by Exam", x = "Exam Number", y = "Average Score",
       color = "Year") +
  theme(legend.position = "bottom") +
  theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082"))
  scale_x_continuous(breaks = seq(1, 10, 1))
```



```
#t-test
t.test(Final_Course_Points ~ SELFI_Complete, data = Data)

##
## Welch Two Sample t-test
##
## data: Final_Course_Points by SELFI_Complete
## t = -0.29426, df = 159.36, p-value = 0.7689
## alternative hypothesis: true difference in means between group No and group Yes is not equal to 0
## 95 percent confidence interval:
## -20.43286 15.13357
## sample estimates:
## mean in group No mean in group Yes
## 680.3956 683.0452

##Box Plot
library(ggplot2)

##Summary Statistics
summary_stats <- Data %>%group_by(SELFI_Complete) %>%
summarise(
Min = min(Final_Course_Points, na.rm = TRUE),
Max = max(Final_Course_Points, na.rm = TRUE),
Mean = mean(Final_Course_Points, na.rm = TRUE))
```

```
##Box Plot
ggplot(Data, aes(x = SELF_Complete, y = Final_Course_Points, fill = SELF_Complete)) +
  geom_boxplot() +
  labs(title = "Final Course Points by SELF_Completion",
       x = "SELF_Completion",
       y = "Final Course Points") +
  theme_minimal() +
  theme(plot.title = element_text(hjust = 0.5, face = "bold", color = "#4B0082"))
```

