

Middle East Technical University

Department of Statistics



STAT 365

Survey and Sampling Techniques
Term Project

Perspective of METU Students to University and
Department

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1. INTRODUCTION

Universities are well placed to inspire and educate students. However, students take the university and department choice decision, which is so essential for their lives, at a very early age. Students encounter both beauties and difficulties in their universities and departments. Many factors affect their satisfaction during that academic process. In this study, we investigate whether they are happy with their choices and how internal and external factors affect their satisfaction. METU conducts similar surveys at regular intervals to examine whether METU students are satisfied with the courses, instructors, and tools and equipment used. In addition to these studies, this survey differs from other studies by asking more specific and in-depth questions. In addition, the fact that the research is prepared by the students, who are also the target audience, provides a more insider perspective. Readers will be able to gain knowledge and appreciate the principles of university students' causes for contentment and dissatisfaction after completing this research. It allows readers to generate or build an idea in order to understand the reasoning that lies beneath it, which will be described through hypothesis tests, statistical methods, and graphical visualization.

1.1 Data Description

This data set consists of 24 questions and 224 answers given by the participants to these questions. Two hundred twenty-four people participated in the survey. Of these, 119 (53.1%) were men, 103 (46%) were women, and two respondents (0.9%) did not specify gender. Participants were Middle East Technical University students studying in their departments. These participants described their goals and lifestyles through our questions.

A total of 36 (16.1%) students reported their age as 18-20, 168(75%) as age 21-23, 19(8.5%) as age 24-26, and just one for the 27 and above. Participants included 217 (96.9%) local students, 7 (3.1%) foreign students. 86(38.4%) of those who answered our survey stay in the dormitories, 27% stay student flats, 31.7% stay in the family house and rest which is 5% didn't want to specify it. Moreover, 51% of participants represent faculty of engineering, 23.3% of participants represent faculty of arts and sciences, 14.8% of participants represent faculty of economic and administrative sciences, and 6.3% of participants represent faculty of architecture. Additionally, 49% of participants are in 3rd grade, 27.7% are in 4th grade, 16.1% are in the 2nd grade, and 7.1% of participants are in the 1st grade. And lastly, 30.8% of participants have between 3.0 - 3.49 cumulative GPA, 29.9% of participants have between 2.5 - 2.99 cumulative GPA, 14.7% of

participants have between 3.5 - 4 cumulative GPA, 13.8% of participants have between 2.0 - 2.49 cumulative GPA, 6.3% of participants have below 2.0 cumulative GPA, and 4.5% of participants choose the option of not having a cumulative GPA yet.

Variable	Description
Age	Student's Age
Gender	Student's Gender
Nationality	Student's Nationality
Degree	Student's Degree
CGPA	Cumulative Grade Point Average
Income	Student's income
Income satisfaction	Student's income satisfaction
Location	Student's residence
Location satisfaction	Student's satisfaction with Ankara
Faculty	Student's faculty
Department	Student's department
Department satisfaction	Student's department satisfaction
Aim	Student's aimed department
Reason of department	Reason for choosing department
Changed department	Whether changed department or not
Change to plan	Planning to change department
Is difficult	Department is difficult

Social	Free time for social activities
Online	Handled online education period
Instructor	Satisfied with instructor at online period
Job_related	Planning a job related to the department
Worry	Worry about finding job
Facilities	University Facilities
Club	Active member of University Club

1.2 Significance of the Study

The survey aims to find out whether there is a relationship between the departments and itself of Middle East Technical University and the happiness of students. In order to reach this aim, there are several questions asked to students like whether they are studying in their wanted departments or not, if they wish to change their departments or not, if they want to find their departments challenging to study, whether they could find free time to spend on student clubs or not and lastly whether the university facilities are sufficiently asked.

The majority of the participants, 59.8%, say that they are happy with their department. Only 20.1% of the participants are unhappy.

2. LITERATURE REVIEW

Many factors affect university students' perspectives on their schools and departments, and these factors can change over time. For a long time, different universities and institutions have done many researches and developed hypotheses on this subject. Although the results of different studies vary slightly according to the countries and schools where they were conducted, in general, similar results were obtained. For example, Astin (1993) claims that regular interaction between students and faculty is one of the most beneficial types of student involvement and is associated with college happiness more strongly than any other student background or institutional trait. Also,

student and faculty relation has been shown to enhance college students' grade point average (GPA) in earlier studies (Anaya & Cole 2001; Dika 2012; Kim 2010; Kim & Sax 2009). Moreover, individual student satisfaction with studies and thoughts on the current university experience is influenced by the quality of the faculty, learning environment, learning activities, tutoring, and extracurricular activities. (Clark 2004; Jones 2009; Hussein and Bahmani 2012)

3. AIM OF RESEARCH

3.1 Main Objective

Our primary purpose in this research is to find and analyze university students' perspectives at METU towards their departments and school and the factors that affect them.

3.2 Minor Objective

1. Investigate whether the year and gender affect students' level of happiness from their department.
2. To understand whether students' tendency toward changing their departments shows that they are happy in that department.
3. Investigate whether the online education past year and a half, which was mandated by the coronavirus, affected the student's perspective on the department.
4. Analyze the effect of the student's satisfaction with the department on their CGPA.

3.3 Research Philosophy

This research has been done by considering the critical realist point of view. The critical realist claims that what we perceive with our eyes is merely represents of the actual item, not the genuine thing itself. It is a scientific inquiry that focuses on the reality projected by our senses as truth. This philosophical method made us to be aware that the data obtained may vary in different situations (school, department, country, education system) and time. It also enabled the

development of observations and analyses according to the scientific method. In this way, we can comment on the factors that affect the students' perspectives on the school and departments.

4. SURVEY METHODOLOGY

4.1. SURVEY DESIGN

4.1.1 Sample Design

Throughout this research, a total of 224 responses were collected from undergraduate METU students through the google questionnaire. The 224 responses collected were all used for research analysis.

4.1.2 Data Collection

This survey was performed online due to the Covid-19 circumstances. Since snowball sampling is used, one respondent sent the questionnaire to the other respondent, allowing us to obtain a sample. A Google form was utilized to collect information. METU students were the target demographic. In addition, we received the total number of students in each faculty required for utilizing strata sampling method we used in our analysis via an e-mail sent to the METU student affairs department.

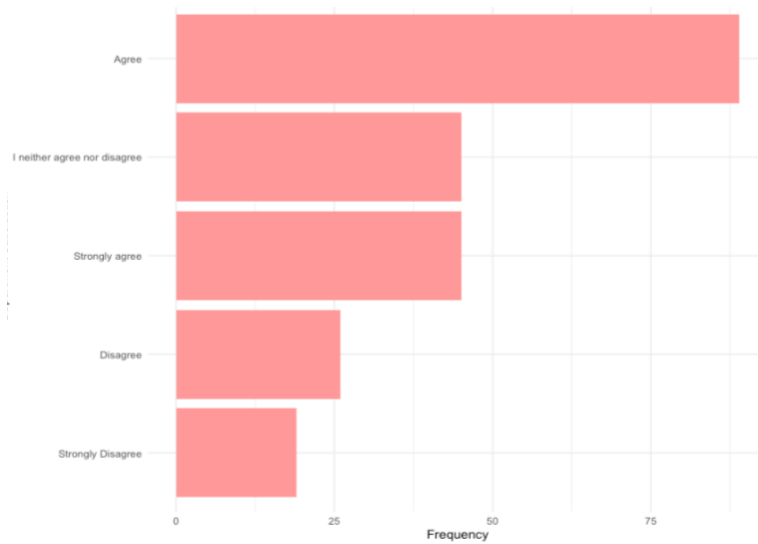
R programming was used to analyze the data and make charts in this investigation.

4.2 METHODS OF ANALYSIS

Frequency tables and pie charts are included in descriptive statistics, which are used to briefly explain some of the essential data used before starting the analysis. Afterward, the chi squared test and linear model were applied in to analyze for the research questions.

4.2.1 Descriptive Statistics

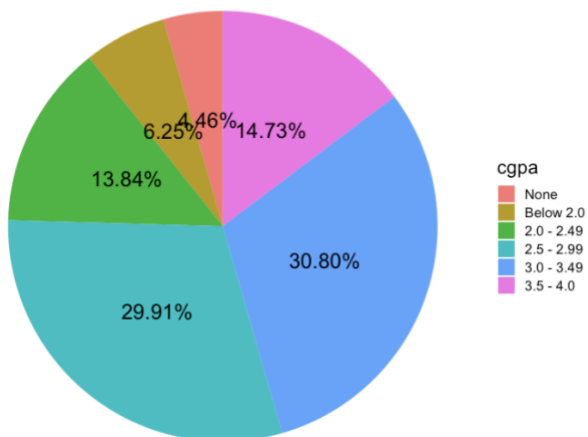
Frequencies Based on Department Satisfaction



The frequency table shows what students voted for. It is observed that almost 90 people are happy with their department, in line with the answers received from this question, which asked about the happiness of the students from their department.

CGPA of the students who participated in the survey

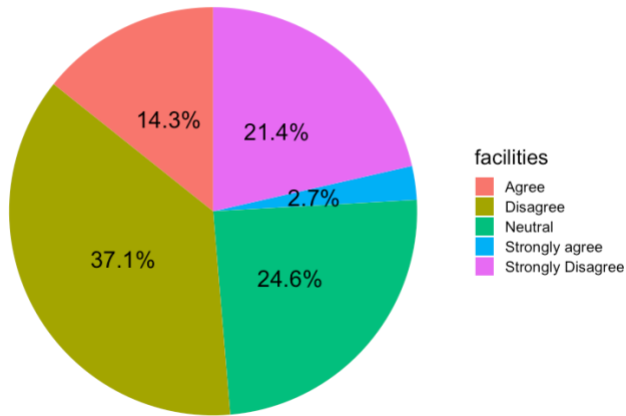
Plot of answers by percentage



The pie chart demonstrates the distribution of answers. According to the answers obtained with the participation of students from different departments and degrees, the CGPA of the students is observed.

Students' Perspective on School Facilities

Plot of answers by percentage



As can be seen from the pie chart, it is observed that the students are mostly unhappy with the opportunities provided by METU.

4.2.2 Statistical Tests

Chi-squared Test

‘svychisq’ function is used to do the chi-squared test of association for strata weighted data.

Linear Models

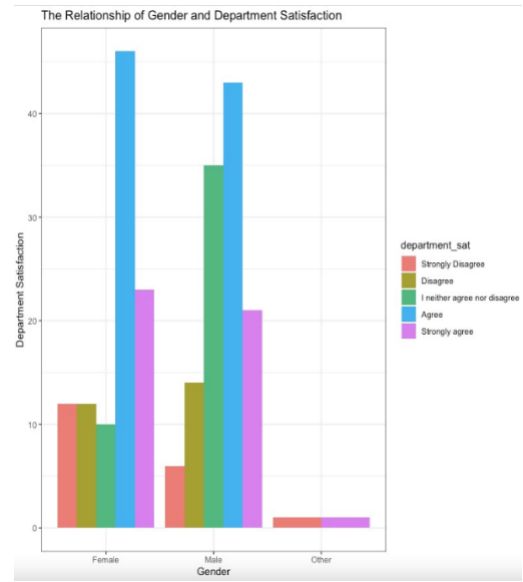
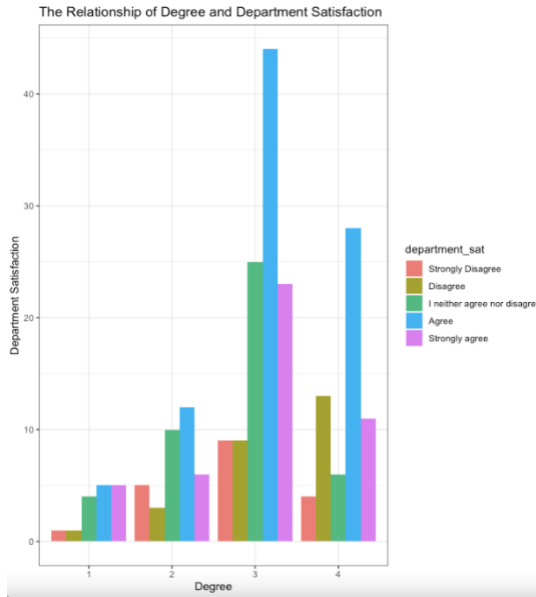
‘svyglm’ function is used to analyze strata weighted generalized linear models.

Two-way ANOVA Test

It is used to analyze how the mean of a quantitative variable changes according to the levels of two categorical variables.

5. DATA ANALYSIS, FINDINGS AND DISCUSSIONS

5.1 Does the degree and gender of the students affect the level of happiness from the department they study?



The effects of gender and degree on department satisfaction are seen in the tables below separately.

	Df	Sum Sq	Mean	F	P value
Degree	3	2.97	0.98	0.713	0.545
Gender	2	0.61	0.304	0.219	0.0803
Degree*Gender	4	11.66	2.91	2.10	0.081
Residual	214	296.72	1.38		

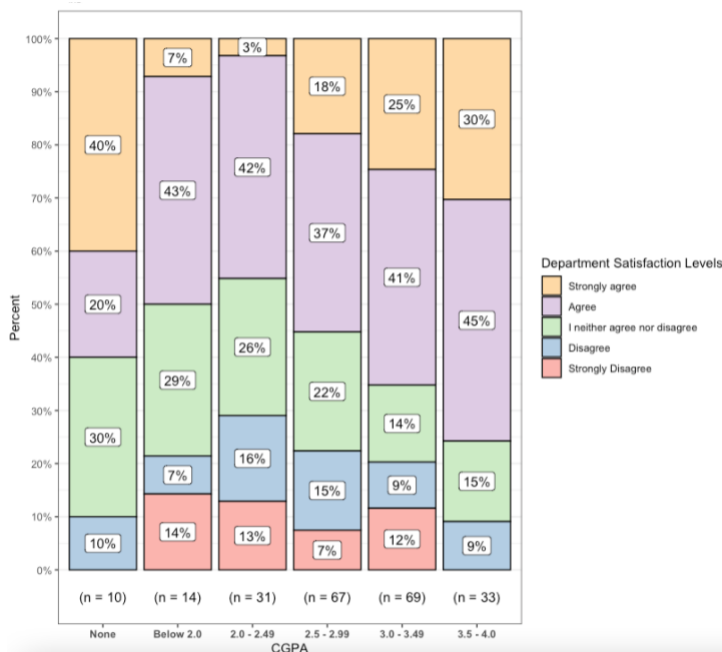
Two-way ANOVA test is conducted to analyze the relationship between student's department satisfaction and both their gender and degrees. The results of these analyzes showed us that gender, degree and gender-degree interaction has almost no effect on department satisfaction.

5.2 Is there a relationship between students' tendency toward changing their departments and being happy in that department?

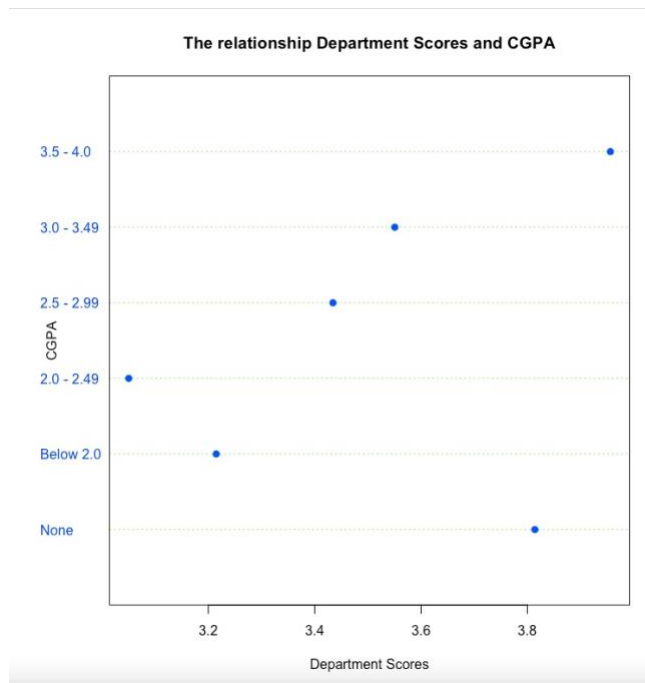
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	3.72021	0.07753	47.986	< 2e-16 ***
Not sure to change	-1.57118	0.19731	-7.963	9.34e-14 ***
Willing to change	-0.77465	0.35985	-2.153	0.0324 *

After it was understood that there was no relationship between gender and degree and the level of happiness in the departments, the relationship between students' willingness to change their departments and their satisfaction with their departments was examined. To test this relationship, faculty weighted linear model is conducted with 95% confidence interval. It can be seen from the above table, p-values are smaller than the significance level (0,05). Hence, the hypothesis is rejected and concluded that there is a significant relationship between student's attitudes towards their department satisfaction and their desire to change their departments.

5.3 Is there a linear relationship between the student's satisfaction and the department on the CGPA?

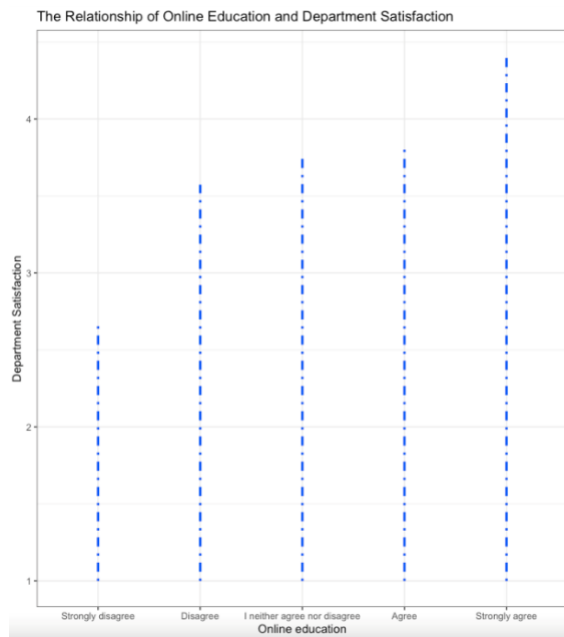


The relationship between students' academic success and their satisfaction with their departments is observed in the graphic above. As you can see, there is no apparent connection between them. Surprisingly, those students who are only in their first term (none on the chart) are mostly happy with their department.



A similar picture emerges when the results are statistically evaluated using the chi-squared test. Since a p-value (0.2784) greater than 0.05 is encountered, it is not possible to talk about a statistically significant relationship.

5.4 Did online education on time from Covid-19 affect the student's perspective on the department?



The effect of the negative factors experienced in the distance education process, which emerged due to the compulsory conditions for almost 1.5 years, on the happiness of the students in their departments was investigated. To see if there is a significant difference between the student's perspective on online education process and department satisfaction, a chi-squared test is conducted. As the result of the chi-squared test, the p-value (0.0002071) is less than the significance level 0.05. Hence, it is concluded that there is a significant relationship. It also can be observed from the above graph.

6. CONCLUSION AND RECOMMENDATION

In this research, hypotheses were formed, and data were analyzed using linear model, chi-squared test and two-way ANOVA. While it was concluded that gender degree and CGPA had no effect on students' department satisfaction, it was observed that online education and the tendency toward changing their departments has a significant impact. It is important that the questions in this project, which aims to investigate the students' situation in the school and in their departments, are prepared by the students who are the addressees of the same subjects. For the most part, the

answers and analysis results came out as expected. For instance, university facilities were expected to be inadequate, which was reflected in the survey results. However, there were also a few surprising responses. To illustrate, while it was thought that the online education process was carried out very well, it was observed that the opposite was confirmed as a result of the answers we received and the analyses we made.

This study was prepared with the participation of 224 students in the METU; although it can be generalized for METU students, the average department satisfaction measurement can be made for Turkey by participating in the sampling process of students from other universities. Moreover, a broader analysis can be made of what are the variables that determine this department's satisfaction.

“Luck does not exist. It is only statistical chance.”

Eduardo

7.REFERENCES

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8.APPENDIX

Questionnaires

Perspective of METU students to school and their department

1)What is your age?

- a) Under 18
- b) 18-20
- c) 21-23
- d) 24-26
- e) 27+

2) What is your gender?

- a) Female
- b) Male
- c) Other

3) What is your gender?

- a) Local student
- b) Foreign Student

4) What is your current degree?

- a) 1.
- b) 2.
- c) 3.
- d) 4.

5) What is your current CGPA?

- a) 3.5 – 4.0
- b) 3.0 – 3.49
- c) 2.5 – 2.99
- d) 2.0 – 2.49
- e) Below 2.0
- f) None

6) What is your monthly personal income, including financial aid and family contribution?

- a) 0 - 999₺
- b) 1.000₺ - 1.999₺
- c) 2.000₺ - 2.999₺
- d) 3.000₺ - 3.999₺
- e) 4.000₺ - 4.999₺
- f) 5.000₺ +

7) How satisfied are you with your financial situation?

- a) Very satisfied
- b) Satisfied
- c) Neutral
- d) Unsatisfied
- e) Very unsatisfied

8) Where do you stay?

- a) Dormitory
- b) Student flat
- c) Family house
- d) Other

9) Are you satisfied with living in Ankara?

- a) Yes
- b) Neutral
- c) No
- d) I do not live in Ankara

10) What is your Faculty?

- a) Faculty of Architecture
- b) Faculty of Arts and Sciences
- c) Faculty of Economic and Administrative Sciences
- d) Faculty of Education
- e) Faculty of Engineering
- f) School of Foreign Languages

11) What is your department? (e.g., ME, ECON, CENG, BA, PSY etc.)

12) I am happy with my department.

- a) Strongly agree
- b) Agree
- c) I neither agree nor disagree
- d) Disagree
- e) Strongly Disagree

13) *I'm studying in the department that I aimed.*

- a) Strongly agree
- b) Agree
- c) I neither agree nor disagree
- d) Disagree
- e) Strongly Disagree

14) *If not what is the reason for choosing your department?*

- a) Reputation of the school
- b) External Factors (Family, Teacher etc.)
- c) Others

15) *Have you ever changed your department?*

- a) Yes
- b) No

16) *Are you planning to change your department?*

- a) Yes
- b) No
- c) Not sure

17) *My department is difficult for me.*

- a) Strongly agree
- b) Agree
- c) I neither agree nor disagree
- d) Disagree
- e) Strongly Disagree

18) *I have enough time for social activities.*

- a) Strongly agree
- b) Agree
- c) I neither agree nor disagree
- d) Disagree
- e) Strongly Disagree

19) *My department handled the online education period well.*

- a) Strongly agree
- b) Agree
- c) I neither agree nor disagree
- d) Disagree
- e) Strongly Disagree

20) *I am satisfied with my instructors.*

- a) Strongly agree
- b) Agree
- c) I neither agree nor disagree
- d) Disagree
- e) Strongly Disagree

21) *Are you planning to work in a job related to the department you are studying?*

- a) Yes
- b) No
- c) Can't say yes or no

22) *Are you worried about finding a job?*

- a) Yes
- b) No
- c) Neutral

23) *The university facilities are sufficient. (Library, cafeteria etc.)*

- a) Strongly agree
- b) Agree
- c) I neither agree nor disagree
- d) Disagree
- e) Strongly Disagree

24) *Have you been an active member of any university club?*

- a) Yes
- b) No

```

library("readxl");#install.packages("epiDisplay");library(productplots);library(dplyr);library(CGPfunctions);l
ibrary(ggplot2);library(forcats);#install.packages("poliscidata");library(poliscidata);#install.packages("survey
");library(survey);library(stats);library("MASS");library(dplyr);#install.packages("gtsummary");library(gtsu
mmmary);library("devtools");#install.packages("likert");library("likert");survey <-
read_excel("SurveyResponses.xlsx");colnames(survey) <-
c("time","age","gender","nationality","degree","cgpa","income","income_sat","location","location_sat","facu
lty","department","department_sat","aim","reason_dep","changed_dep","change_plan","is_difficult","social",
"online","instructor","job_related","worry","facilities","club");survey[] <-lapply(survey,
factor);str(survey);description <-
data.frame(variable=c("age","gender","nationality","degree","cgpa","income","income_sat","location","locati
on_sat","faculty","department","department_sat","aim","reason_dep","changed_dep","change_plan","is_diffi
cult","social","online","instructor","job_related","worry","facilities","club"), description=c("Student's
Age","Student's Gender","Student's Nationality","Student's Degree","Cumulative Grade Point Average",
"Student's income","Student's income satisfaction","Student's residence","Student's satisfaction with
Ankara","Student's faculty","Student's department","Student's department satisfaction","Student's aimed
department","Reason for choosing department","Whether changed department or not","Planning to change
department","Department is difficult","Free time for social activities","Handled online education
period","Satisfied with instructor at online period","Planning a job related to the department","Worry about
finding job","University Facilities","Active member of University Club"));knitr::kable(description);data <-
data.frame(faculty=c("Faculty of Economic and Administrative Sciences","Faculty of Engineering","Faculty
of Architecture","Faculty of Arts and Sciences","Faculty of
Education"),fpc=c(2162,9294,1412,4423,1806));summary(survey);survey %>% tbl_summary();survey$cgpa
<- factor(survey$cgpa, levels=c("None", "Below 2.0", "2.0 - 2.49", "2.5 - 2.99", "3.0 - 3.49", "3.5 - 4.0"
));survey$department_sat <- factor(survey$department_sat, levels=c("Strongly Disagree", "Disagree", "I
neither agree nor disagree", "Agree", "Strongly agree" ));ggplot(survey,
aes(fct_rev(fct_infreq(department_sat)))) + geom_bar(fill="#FF9999") + coord_flip() + labs(x="Department
Satisfaction", y="Frequency", title="Frequencies Based on Department Satisfaction") + theme_minimal();df2
<- survey %>% group_by(cgpa) %>% count() %>% ungroup() %>% mutate(perc = `n` / sum(`n`)) %>%
arrange(perc) %>% mutate(labels.2 = scales::percent(perc));ggplot(df2, aes(x = "", y = perc, fill = cgpa)) +
geom_col() + geom_text(aes(label = labels.2),position = position_stack(vjust = 0.5)) +coord_polar(theta =
"y") + theme_void()+ labs(title = "CGPA of the students who participated in the survey",subtitle = "Plot of
answers by percentage");df3 <- survey %>% group_by(facilities) %>% count() %>% ungroup() %>%
mutate(perc = `n` / sum(`n`)) %>% arrange(perc) %>% mutate(labels.2 = scales::percent(perc));ggplot(df3,
aes(x = "", y = perc, fill = facilities)) +geom_col() +geom_text(aes(label = labels.2),position =
position_stack(vjust = 0.5)) +coord_polar(theta = "y") + theme_void() + labs(title = "Students' Perspective on
School Facilities",subtitle = "Plot of answers by percentage");new<-
left_join(survey,data,on=faculty);sat_convert <- data.frame(department_sat = c("Strongly

```

```

Disagree", "Disagree", "I neither agree nor disagree", "Agree", "Strongly agree"), dep_scores =
c(1,2,3,4,5));new1<- left_join(new,sat_convert);cgpa_convert <- data.frame(cgpa = c("None", "Below 2.0",
"2.0 - 2.49", "2.5 - 2.99", "3.0 - 3.49", "3.5 - 4.0"), cgpa_scores = c(1,2,3,4,5,6));new77<-
left_join(new1,cgpa_convert);degree_convert <- data.frame(degree = c("1", "2", "3", "4"), degree_scores =
c(1,2,3,4));new78<- left_join(new77,degree_convert);adesign <-
svydesign(id=~1,strata=~faculty,data=new78,fpc=~fpc);adesign;svymean(~degree_scores+
dep_scores,adesign);svytable(~degree+department_sat, adesign) ;svytable(~gender+department_sat+degree,
adesign);g <- ggplot(survey, aes(x = degree, fill = department_sat)) + xlab("Degree") + ylab("Department
Satisfaction") + ggtitle("The Relationship of Degree and Department Satisfaction ");g +
geom_bar(position="dodge");f <- ggplot(survey, aes(x = gender, fill = department_sat)) + xlab("Gender") +
ylab("Department Satisfaction") + ggtitle("The Relationship of Gender and Department Satisfaction ");f +
geom_bar(position="dodge");two_way <- aov(dep_scores ~ degree + gender + degree:gender, data = new78)
;summary(two_way);mod <- svyranktest(dep_scores ~ gender+ degree+ gender:degree, adesign,test=
"KruskalWallis");mod;mode99 <- svyglm(dep_scores ~ gender+ degree+ gender:degree, adesign)
;aov(mode99);adesign <- svydesign(id=~1,strata=~faculty,data=new1,fpc=~fpc);model1 <-
svyglm(dep_scores ~ change_plan,
adesign);model1;summary(model1);svytable(~change_plan+department_sat, adesign);out <-
svymean(~department_sat,adesign);byby <- svyby(~dep_scores,
by=~cgpa,adesign,svymean,T);dotchart(byby,lcolor = "green",color="blue", xlab = "Department Scores",
ylab = "CGPA",main = "The relationship Department Scores and CGPA")
;svychisq(~cgpa+department_sat,adesign);PlotXTabs2(data = survey, y =department_sat,x
=cgpa,label.fill.alpha = 3,title = "Department Satisfaction",xlab = "CGPA",palette = "Pastell1",legend.title =
"Department Satisfaction Levels");out3 <-
svyglm(dep_scores~cgpa,adesign);summary(out3);new2<left_join(survey,data,on=faculty);on_convert <-
data.frame(online = c("Strongly disagree", "Disagree", "I neither agree nor disagree", "Agree", "Strongly
agree"), on_scores = c(1,2,3,4,5));new79<- left_join(new78,on_convert);cdesign <-
svydesign(id=~1,strata=~faculty,data=new79,fpc=~fpc);svymean(~on_scores,cdesign);svychisq(~department
_sat+online,adesign) ;dataa <-svyby(~dep_scores,by=~online, adesign,svymean) ;dataa$online <-
factor(dataa$online, levels=c("Strongly disagree", "Disagree", "I neither agree nor disagree",
"Agree", "Strongly agree"));ggplot(dataa, aes(x=dataa$online, y=dataa$dep_scores)) +geom_segment(
aes(x=dataa$online, xend=dataa$online, y=1, yend=dataa$dep_scores) , size=1, color="blue",
linetype="dotdash" ) +xlab("Online education") + ylab("Department Satisfaction") + ggtitle("The
Relationship of Online Education and Department Satisfaction ");geom_point()

```