**TUrkiye Student course experience report**

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# **Section A: Descriptive Analytics**

## **Introduction**

In the first section, the Turkiye student evaluation dataset will be analyzed using descriptive analytics. The dataset contains student responses to 28 different questions using a 5-point Likert scale. The questions are regarding course satisfaction and instructor satisfaction. Five other variables in the dataset are considered independent variables. For analysis, considering the course and instructor satisfaction, two hypothesis questions will be developed and analyzed.

**Q1:** Do the class, instructor, number of times the student has repeated the course, attendance, and difficulty of the course as perceived by the student influence course satisfaction rating?

**Q2:** Do the class, instructor, number of times the student has repeated the course, attendance, and difficulty of the course as perceived by the student influence instructor satisfaction rating?

## **Process**

After loading the dataset, the omit function is first used to see if there are any null values to omit but this dataset is clean and has no null values. The Keiser-Meyer-Olkin (KMO) test was then conducted to see if the data could support principal component analysis (PCA). The KMO was greater than 0.8(Overall MSA = 0.99). The dataset supports the PCA test- used to reduce the dimensionality of the dataset. A scree plot diagram is used to check how much variance is captured by looking at the elbow. Factor analysis showed 02 components to be retained, confirmed by the scree plot diagram as shown below in Figure 1.

Chart

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***Figure 1: scree plot diagram***

The PCA test then assigned the questions to both components – RC1 & RC2. The “RC1” has Q13-28 while “RC2” has Q1-12. Both components were then loaded into the original dataset. The normality of data was then checked by using Q-Q and density plot (qualitatively) as Shapiro(quantitative) cannot perform above n=5000 (which is 5820 in our case)

By looking at the plots, it seems that the data is not normal- breaking the parametric assumption. After that convert the IVs into factors. To check the homogeneity of data, the Levene test is performed.

* If the results of the Levene test are significant, it means that the homogeneity of the parametric assumption is violated. In that case, the Kruskal-Walli’s test is then performed. Getting significant results leads to the Dunn test (post hoc test - which measures the effect size).
* If the result of the Levene test is not significant, it means parametric assumptions are not violated then ANOVA will be used as there are 3 or more groups in each level. Even though the data is not normal, it still can provide powerful results. When getting the significant result, do the Tukey test to see where the effect is.

To check the difference, group means are extracted, and confidence intervals are plotted using the SJ library. After that performing MANOVA was to crosscheck the significant interaction between the variables. Lastly, two-way ANOVA was performed to find the interactions between two variables and plot the significant interactions.

## **Result:**

**Q-Q plots and density plots**

**Diagram, engineering drawing

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**RC1 ~ Instr**

The result of the omnibus test was significant [chi-squared (2) = 44.44, p < 0.05, partial eta-squared = 0.0076]. There is a significant difference between instructor 1 (Mean = -0.033) and instructor 2 (Mean = 0.15) (Z = -3.37, p < 0.05) and between instructor 2 (Mean = 0.15) and instructor 3 (Mean = -0.053) (Z = -6.66, p < 0.05). Whereas there is no significant difference between instructor 1 (Mean = -0.033) and instructor 3(Mean = -0.053) (Z = 6.67, p> 0.05). Instructor 2 received a higher instructor satisfaction rating than 1 and 3.

Chart, box and whisker chart

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***Figure 2: RC1 ~ Instr***

**RC1 ~ Class**

In figure 3, The results came out significant for many classes but there is also no significant difference in some classes as well

Chart, box and whisker chart

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***Figure 3: RC1 ~ Class***

**RC1 ~ nb.repeat**

There isa significant difference between students who repeated the course one time (Mean = 0.021) and students who repeated it two times (Mean = -0.098) (Mdiff = -0.119, 95% CI [-0.223,-0.016], p < 0.05). there is also a significant difference between nb. repeat 1 and 3(Mean = -0.141) (Mdiff = -0.162, 95% CI [-0.295,-0.030], p < 0.05). there is no significant difference between 2 & 3 (Mdiff = -0.043, 95% CI [-0.204,0.118], p > 0.05). Overall, figure 3 tells that a student repeating the course more, lower the instructor’s rating. The students who repeated the course 3 times rated the instructor’s lowest.

Chart, box and whisker chart

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***Figure 4: RC1 ~ nb.repeat***

**RC1~attendance**

There is a significant difference between all levels except attendance 3 -4 (Z = -0.38, p > 0.05). overall, figure 5 tells that the higher the level of attendance by students higher the instructor satisfaction score. Students with attendance level 4 are the most satisfied with the instructor.

Chart, box and whisker chart

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***Figure 5: RC1~attendance***

**RC1~difficulity**

The result of the omnibus test was significant [chi-squared = 277.09, p < 0.05, eta-squared = 0.048]. the result tells that there was a significant difference between all except 2 - 3 where 2 (Mean = 0.1) and 3 (Mean = 0.207) (Z = -2.297, p > 0.05), 2 (Mean = 0.1) and 4 (Mean = 0.147) (Z = -0.864, p > 0.05), 3 (Mean = 0.207) and 4 (Mean = 0.147) (Z = 1.825, p > 0.05), 1 (Mean = -0.295) and 5 (Mean = -0.19) (Z = -1.804, p > 0.05). Figure 5 tells that when the difficulty level was lowest (1) and the highest (5). Student-instructor satisfaction was the lowest. But students’ instructor satisfaction was higher when the difficulty of the course they perceived was moderate (2,3 & 4).

Chart, box and whisker chart

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***Figure 6: RC1~ difficulty***

**RC2~instr**

The result of the Kruskal Wallis test was significant [chi-squared = 122.35, p < 0.05, eta-squared = 0.021]. there is a significant difference between all 3 instructors. 1 (Mean = 0.275) and 2 (Mean = 0.104) (Z = 3.82, p < 0.05), 1 (Mean = 0.275) and 3 (Mean = -0.1) (Z = 9.87, p < 0.05), 2 (Mean = 0.104) and 3 (Mean = -0.1) (Z = 7.09, p < 0.05). instructor 1 got the highest course satisfaction while instructor 3 got the lowest course satisfaction score.

Chart, box and whisker chart

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***Figure 7: RC2~instr***

**RC2~attendance**

The result of the omnibus test came out significant [chi-squared = 24.268, p < 0.05, eta-squared = 0.004]. there was no significant difference between other levels except 0 (Mean = -0.0475) and 3 (Mean = 0.042) (Z = -3.15, p < 0.05), 0 (Mean = -0.0475) and 4 (Mean = 0.099) (Z = -4.19, p < 0.05), 1 (Mean = -0.051) and 4 (Mean = 0.099) (Z = -3.52, p < 0.05). course satisfaction increased as the attendance level of students increased.

Chart, box and whisker chart

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***Figure 8: RC2~attendance***

**RC2 ~ difficulty**

The result of the omnibus test came out significant [chi-squared = 64.579, p < 0.05, eta-squared = 0.011]. there was a significant difference among many groups. The course satisfaction came out lowest when the difficulty perceived by students was highest (level 5). While satisfaction was high when the difficulty level was moderate.

Chart, box and whisker chart

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***Figure 9: RC2 ~ difficulty***

### **MANOVA**

Overall MANOVA showed a significant effect where instr [F(2,5796) = 40.908, p < 0.001, V = 0.03], class [F(11,5796) = 11.973, p < 0.001, V = 0.04], nb.repeat [F(2,5796) = 4.070, p < 0.005, V = 0.003], difficulty [F(4,5796) = 37.239, p < 0.001, V = 0.05], attendance [F(4,5796) = 13.442, p < 0.001, V = 0.02]. all other variables have significant interaction except RC2 on nb. repeat- no significant interaction, ANOVA applied also showed the same, so it’s verified

### **Two-way ANOVA**

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***Figure 10: RC1 ~ class\* Attendance***

Figure 10 tells the interaction of class and attendance on instructor satisfaction rating. Students of class 4, having an attendance level of 2 rated the instructor lower but as the attendance level goes up to 3 and 4, the instructor’s satisfaction goes up. On the contrary, students of class 12, who have lower attendance levels (0) gave lower instructor ratings. The satisfaction increased gradually but at level 4 the rating dropped.

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***Figure 11: RC1 ~ difficulty \* class***

Figure 11 tells the interaction between class and difficulty in instructor satisfaction rating. Overall, for most of the classes, the instructor satisfaction is gradually decreasing as the level of difficulty of the course increases.

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***Figure 12: RC1 ~nb.repeat \* attendance***

It tells the interaction between the number of times a student has repeated a course and attendance on instructor rating. It simply tells the more the level of attendance, the higher the instructor rating.

Chart, radar chart

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***Figure 13: RC1 ~attendance \* difficulty***

The interaction between attendance and difficulty in instructor rating is shown in this figure 13. The student with attendance at level 0 was rated the instructor lowest at difficulty level 1 but the same student attendance level rated the instructor high at level 2 difficulty level. The students with the highest level of attendance rated the instructor best when the difficulty they perceive was at level 3.

Chart, line chart

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***Figure 14: RC2 ~ instr \*attendance***

Figure 14 tells which instructor based on the level of attendance has got the best and lowest course satisfaction rating. It seems that instructor 1 scored the highest overall rating as the level of attendance increased. Course satisfaction for instructor 3 was the lowest among the two even after the increase in the level of attendance.

Chart, line chart

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***Figure 15: RC2 ~ instr \* difficulty***

Students rate the course lower for all 3 instructors when the difficulty they perceived was the lowest (1) and the highest (5).

Chart

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***Figure 16: RC2 ~ class \* difficulty***

Between the class and the level of difficulty, the overall outcome nearly remained the same. The satisfaction score was almost close for each class despite the increase in the level of difficulty.

Chart, line chart

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***Figure 17: RC2 ~difficulty \* nb.repeat***

This graph tells the interaction between nb. repeat and difficulty in the course satisfaction. Students who repeated courses 1 and 2 times rated the course best on difficulty level 3 but their satisfaction drops badly on difficulty levels 4 and 5. The case is different for nb. repeat 3 students, who are satisfied most on difficulty levels 4 and 5 as they rated the course satisfaction higher on that level.

# **Section C: Prescriptive Analytics**

## **Client: HigherEdCo ltd**

### **Executive summary**

Analysis of student survey was done with results indicating different factors that impact instructor and course satisfaction rating. The three variables i.e., instructor, the difficulty of the course, and level of attendance came out crucial in that analysis. Different recommendations were provided based on the results derived which were impacting the instructor and course rating. All these steps were taken eventually to make the student experience more personalized and enhance the quality of education given.

### **Aims and Objectives**

The main aim of doing the survey was to get insights from the students about the course and instructor. so that experience of students can be enhanced by analyzing the data. To provide the students with not just education but quality education, a survey was done with 5 variables that were instructor, class, attendance number of times a student has repeated the course, and the level of difficulty of course perceived by the student along with 28 Likert scale question which was related to the course and instructor satisfaction.

### **Analysis**

Different statistical techniques were used to derive the results of the analysis. Instructor 2 got higher instructor satisfaction but for course satisfaction, instructor 1 got the highest satisfaction among the 3. Instructor 3 got the lowest satisfaction in both. It seems from the results of the analysis (Appendix – Figure 4) that instructor 1 was teaching 3, instructor 2 was teaching 4 while instructor 3 was 7 classes. The instructor’s satisfaction goes down for students who repeat the course more than one time. For attendance, the satisfaction rating increases as the level of attendance increases. Students rated both the instructor and course higher when the difficulty they perceived was moderate (2,3 &4).

As the difficulty level increased, students at all attendance levels rated the instructor lower. Only the students who repeated the course 3 times rate the course satisfaction higher even at difficulty level 5.

### **Recommendation**

Based on the analysis following recommendations are provided to **HigherEdCo ltd.**

* There should be a balance of division of classes among the instructors or hire new instructors depending on the budget. Because due to overburden on the instructor, productivity decreases.
* There should be some measures on attendance. As the students who do not attend the classes very often do not know their instructors and course well. A higher level of attendance leads to higher course satisfaction in general.
* The courses should be designed in such a way that the students who perceive the difficulty of the course high may get an understanding of the course better. The level of involvement, in that case, will increase.

### **Limitations**

There are many limitations like the budget of institutions for hiring new instructors. Also, some factors are hurdles in mandatory attendance such as students living far from the institution’s proximity, illness, and any disability issues. The difficulty of the course can be dealt with at some level, but it depends on the student involvement as well. Despite making the nature of the course more interesting, some students still take the course not very seriously. Also, the nature of some courses is difficult.

# **Appendix**

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***Figure 1: RC2~class***

Chart, box and whisker chart

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***Figure 2: RC2~nb.repeat***

Chart, diagram

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***Figure 3: RC1~ nb.repeat & class***

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***Figure 4: RC1 ~ instr & class***

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***Figure 5: RC2 ~ instr & class***

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***Figure 6: RC1 ~ nb.repeat & difficulty***

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***Figure 7: RC2 ~ class & attendance***