



Analysis of Students' Opinions on the Online Computer Course during Covid 19 at the Lebanese University's Faculty of Tourism

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Abstract — Due to COVID 19, where people stayed in their houses to save themselves, several universities around the world are now offering online lessons. Furthermore, given that platforms such as MS Teams, Zoom, and others can be used for remote learning in both normal and non-normal situations, this study was done to analyze students' opinions and viewpoints on online education throughout the pandemic time. The computer applications course at Lebanese University's Faculty of Tourism and Hospitality was used as an example for this study in order to better understand how students loved and understood it, and to improve the computer course online teaching based on the findings. The classes were held online using the Microsoft Teams platform and the Internet. The major goal was to listen to the students' opinions in order to assist them and make the required improvements. The software SPSS was used; The "central tendency - dispersion - distribution" for each numerical question and the "frequency distribution table" for each categorical question were calculated; The Chi-square test, the ANOVA test, and the correlation test were used to examine the relationships between the various questions.

Keywords—Online Teaching, Lectures, Computer Applications, University Course.

I. INTRODUCTION

During Covid 19, many sectors have affronted it by staying in house in order to save them from being affected. One of the main sectors was the educational sector. The solution adopted in many countries and universities is to teach remotely the students through online platform like Zoom or MS team. For that, and since I teach the computer course in lab at the university, I decided to do this study to evaluate and understand how the students appreciated and learned the Computer Course during the COVID19 Pandemic, where the lectures have been executed online through internet and by using the platform ZOOM and MS Teams. This study has been done through different questions asked to all students registered in the course and in all departments. The designed questionnaire, which includes all proposed questions related to computer course online, has been designed on google form. Then the data collected has been extracted in an excel table and then transported to SPSS in order to do a complete analysis.

This aim of this paper is to treat the students' opinion about the computer online course, and to analyze deeply each question and the relationship between any two questions. In a prior work, a paper about the online exam was published in [1], that proposes a method to be adopted for online exam without proctored environment during COVID 19. Also a comparison of students' grades between the online exam and the written exam done on the

university campus for the computer application course at FTHM – LU, was published in [2].

The following is how the paper will be structured: Section II contains literature related work to online lectures; Section III lists the research steps used to conduct this study; Section IV explains the analysis results for each question; Section V tests the existence of a relationship between any two questions; and Section VI includes the conclusions.

II. LITERATURE RELATED WORK

There are numerous studies in the literature that deal with this topic. In this section, I'll go over a few relevant works. In [3], the author presents the impact of the pandemic on sport statistics learning "students' opinion," where students gave a positive assessment of their training in the course "Specific statistical methods in sports" during COVID-19, and the teacher used Zoom and Google classroom. General satisfaction was registered and 50% of the students have a desire to continue with the distance form of education after the end of the pandemic.

In [4], the author presents a case study on student perception of online lecturing in Australian universities, where it is noted that most graphs show scattered, clear signs of student weariness or saturation vis-à-vis online lecturing from 2019 to 2020.

In [5], the authors present the students' opinions on interactive classes, demonstrating through a simple questionnaire that more than 70% of students enjoy working with interactive lessons, which has a favorable impact on their attitudes on the subject.

In [6], the author presents the Students' Attitudes to the Online University Course of Management in the Context of COVID-19, where the author demonstrates that students are adaptable and flexible to the online lectures or online communications that are already part of their habits, and that it is necessary to work to successfully expand this habit by also covering the field of education and academic activities.

In [7], the authors present the impact of online lectures on medical students during the COVID-19 Pandemic and say that the online lectures became a crucial candlelight in the dark age of the worldwide blockade and that these lectures do not replace face-to-face lectures in the classroom. The study also recommends investigating the factors that influence students' and teachers' opinions and experiences about online learning and how these online lessons can meet students' needs for medical knowledge.

In [8], the authors present students' perceptions of online lecture delivery. The authors interviewed 279 undergraduate psychology students and the results showed that students appreciate the online lectures and the pre-recorded lectures. The students said that the pre-recorded online lectures are more useful for understanding the topic content, and students also show a strong preference for a hybrid approach.

III. RESEARCH STEPS

This section includes the research procedures as follows: starting with an explanation of the sample taken, the related population, and how to collect data; the different questions asked to students; and then the analysis approach.

A. Population, Sample and Data Collection

The population of the study is the students of the third year at the Faculty of Tourism at Lebanese University ("FTHM-UL"). A random sample of 56 students answered the questionnaire in Google form. The timing of the data collection from the students enrolled in the course is the fall semester of the 2020–2021 academic year, which started on October 1, 2020, and ended on February 12, 2021.

The data was imported from a Google form into an excel file, then the data was filtered by deleting some data that had been entered incorrectly, and finally the data was exported to SPSS software. The characteristics of each variable must be well defined in the variable view "Numeric or categorical - scale, ordinal or nominal - missing value - etc.". The data have been stored in a data view as each row represents a student profile answer and

each column represents the answers of all students to one question.

B. The Variety of Questions Asked to Students

There are many questionnaires proposed for online learning for students, like in [9] and [10]. The proposed questionnaire is based on our needs and is composed of 17 questions, as shown in Table 1, where there are 12 categorical questions (two nominal and nine ordinal and one binary) and 5 numerical questions.

Table 1: Different Questions.

Question	Type
Q1. Choose your department.	Categorical Nominal
Q2. What is your grade for the computer (3) exam?	Numerical Scale
Q3. Did you predict your mark accurately?	Categorical Ordinal
Q4. What do you think about the exam?	Categorical Ordinal
Q5. Do you agree that the online lecture for the computer course was helpful?	Categorical Ordinal
Q6. What do you think of the materials sent for you (PowerPoint, Exercises, and Videos)?	Categorical Ordinal
Q7. What did you think of the teacher's explanation during the lesson?	Categorical Ordinal
Q8. What is your overall GPA (over 100) in the third year?	Numerical Scale
Q9. How many courses did you pass?	Numerical Scale
Q10. How many hours do you study per week?	Numerical Scale
Q11. How many lessons are you missing in this online semester?	Numerical Scale
Q12. How do you generally feel about teaching online?	Categorical Ordinal
Q13. Do you have a computer for online teaching?	Categorical Binary
Q14. What device do you use for online teaching?	Categorical Nominal
Q15. How much time do you spend on average each day on online teaching?	Categorical Ordinal
Q16. How effective is online teaching for you?	Categorical Ordinal
Q17. How stressful is online teaching for you?	Categorical Ordinal

C. Analysis Approach

The analysis approach will be based on the questionnaire analysis guide part 1 [11] and part 2 [12] and the poster guide [13]. A full analysis will be done for each of the 17 questions: numerical, categorical binary, categorical nominal, and categorical ordinal. A full analysis will be done to test if there is any relationship between any two questions: two numerical, two categorical (binary, nominal, or ordinal), and one numerical and one categorical. The necessary descriptive statistics will be used for the sample, and the inferential statistics will be used to infer the results for the population. The descriptive statistics will be based on analyzing each:

- ✓ Numerical variable by computing the Central Tendency “Mean – Median - Mode”, computing dispersion “Standard deviation – Maximum - Minimum”, computing position “Quartile & Percentile”, computing distribution “Skewness & Kurtosis”, and drawing the histogram chart.
- ✓ Categorical variable by computing the frequency distribution table “FDT”, drawing bar chart or pie chart.
- ✓ Two categorical variables by computing the contingency table and the relative chart.
- ✓ Two numerical variables by computing their numerical descriptive statistics and the correlation between them.
- ✓ One categorical & one numerical variables by computing the numerical descriptive statistics for each option in the categorical variable.

Inferential statistics can be done for each variable and for two variables' relationships by proposing a null hypothesis and an alternative hypothesis. The null hypothesis is abbreviated by Ho, while the alternative hypothesis is abbreviated by Ha. The Ho means independent: no difference, no association, no correlation. While Ha means dependent: difference, association, and correlation. Knowing that; Ho is accepted if the p-value > 5%, else if the p-value < 5%, then Ha is accepted.

IV. ANALYSIS RESULTS FOR EACH QUESTION

In this section, the analysis results for each question will be presented.

A. Categorical Questions' Descriptive Statistics

The detailed descriptive statistics of the sample of the categorical variables or questions have been done by SPSS through the computing of the frequency distribution table and the relative pie chart. Summary of the descriptive statistics results are listed as follows:

- ✓ Students answered randomly from the three departments: 34% of the sample was from HM, 9% from TG, and 57% from TM.
- ✓ Students' prediction accuracy of the exam grade is 54% with near and very near levels, 27% with neutral levels, and 19% with far and very far levels.
- ✓ Only 5% of students think that the exam is difficult and very difficult, while 47% think it is easy and very easy, and 48% think neutral.
- ✓ 74% of the students strongly agree that the online lectures for the computer course are useful, 12% think so, and 14% disagree.
- ✓ Only 2% of students think that the materials sent (PowerPoint, Exercises, and Videos) are not useful, while 92% find them useful (very useful), and 6% neutral.
- ✓ 93% of students think that the teacher's explanations during the online lectures were useful and very useful, while 7% think they were moderately useful.

- ✓ 40% of students feel fair and poor about the overall vision of online teaching, while 48% feel good and 12% feel very good to excellent.
- ✓ 80% of students own a computer.
- ✓ 60% of students use smartphones and 40% use laptops or computers during the online lectures.
- ✓ 90% of students have 6 to 8 hours of online classes per day.
- ✓ 55% of students say that online teaching is moderately effective, 20% say it is very effective, and 25% say it is ineffective or poorly effective.
- ✓ 77% of students think that online teaching is moderately stressful to extremely stressful and 23% think it is mildly stressful.

For ordinal questions, "Mean, Median, and Mode (3M)" were calculated to measure the central tendency. Table 2 shows us the 3M along with the consensus values and shows that students appear to have consensus for all ordinal questions.

Table 2: Mean, Median, Mode and Consensus for Ordinal Questions.

Question	Median	Mode	Mean	Consensus Value	<i>The consensus value for all questions is greater than 0.5 and tends to 1, which indicates that all respondents have nearly the same opinion.</i>
Q3	4	4	3.45	0.507567	
Q4	3	3	3.52	0.715929	
Q5	4	4	3.88	0.668546	
Q6	4	4	4.3	0.752172	
Q7	5	5	4.54	0.775335	
Q12	3	3	2.57	0.609454	
Q16	3	3	2.8	0.552301	
Q17	3	3	3.4	0.632469	

B. Numerical Questions' Descriptive Statistics

The detailed descriptive statistics of the sample are reported in Table 3, where FS stands for "Fairly Symmetrical", NHS for Negatively Highly Skewed, PHS for Positively Highly Skewed, P for Platykurtic, and L for Leptokurtic. Each of the five numerical variables or questions has its own result: "central tendency, dispersion, distribution type, and position".

Table 3: Numerical Questions' Descriptive Statistics.

		Q2	Q8	Q9	Q10	Q11
Central tendency	Mean	37.7	66.2	7.2	8.6	3.6
	Median	37.0	66.0	8.0	7.0	2.0
	Mode	35.0	60.0	8.0	7.0	0.0
Dispersion	Std. Deviation	6.8	8.9	1.5	5.9	5.3
	Minimum value	27.0	50.0	0.0	0.0	0.0
	Maximum value	23.0	85.0	8.0	30.0	30.0
Skewness		-0.1	0.2	-2.9	1.3	3.2

	<0.5 or <1 or > 1	FS	FS	NH	PH	PH
	Kurtosis < or > 3	-0.8	-0.6	9.9	2.6	12.7
		P	P	L	P	L
Position	Q1 Value	33.0	60.0	7.0	4.5	0.0
	Q2 Value	37.0	66.0	8.0	7.0	2.0
	Q3 Value	44.0	71.0	8.0	13.0	4.0

The above table shows, for each numerical question, the central tendency "3M", the dispersion "Standard deviation, maximum and minimum", the distribution type "skewness and kurtosis", and the position "Quartiles 1, 2, and 3". It seems that the distribution of Q2 and the distribution of Q8 are FS and P, the distribution of Q9 is NHS and L, the distribution of Q10 is PHS and P, and the distribution of Q11 is PHS and L.

C. Inferential Statistics for All Variables

First, the null hypothesis (Ho) for each question must be defined. The Ho for ordinal questions assumes that the population significantly has the same median obtained from the sample, while the Ho for binary and nominal questions assumes that the population likely has the same expected percentage achieved by the sample. The Ho for numerical questions assumes that the population significantly has the same expected mean value as the sample or a proposed test value. The test type of the null hypothesis for each question is reported in Table 4. Note that Q1 and Q15 are not included because it was decided to not infer them.

If Ho is rejected, then the alternative hypothesis Ha is adopted, which means that the mean, the median, or the expected percentages of the sample cannot be inferred from the population.

Table 4: Test Type for Null Hypothesis for each question.

Questions	Type
Q3, Q4, Q5, Q6, Q7, Q12, Q16 and Q17	Categorical Ordinal / Wilcoxon signed rank test
Q13	Categorical Binary / One-sample binomial test
Q14	Categorical Nominal / One sample chi square test
Q2, Q8, Q9, Q10, and Q11	Numerical Scale / One sample t-test

1) Ordinal Questions

Table 5 shows the ordinal questions' results, where Ho is accepted in all questions except in Q5 and Q16, which means that the population likely has the same expected median in these two questions: In Q5, they agree that the online lecture for the computer course was helpful with a median score of 4 since the Wilcoxon signed rank test p-value was 24.7% > 5%; in Q16, they agree that online teaching is effective with a median score of 3 since the p-value was 7.5% > 5%. While in the other ordinal questions, the median of the sample cannot be inferred.

Table 5: Ordinal questions results.

Type	Median	p-value	Ho is accepted
Q3	4.00	0.3%	No
Q4	3.00	0%	No
Q5	4.00	24.7%	YES
Q6	4.00	0.1%	No
Q7	5.00	0%	No
Q12	3.00	0.7%	No
Q16	3.00	7.5%	YES
Q17	3.00	0.5%	No

2) Binary Question Q13

The null hypothesis was set to say that 75% of students have a computer for online teaching. The result shows us that Ho is accepted since the significance of the p-value of the one-sample binomial test is 22% > 5%. This means that 75% of the student population owns a computer.

3) Nominal Question Q14

The null hypothesis was set to say that 50% of the students use a computer for online teaching. The result shows us that Ho is accepted since the significance of the one-sample chi-square test p-value is 22.5% > 5%. This means that 50% of the population of students uses a computer during the online lectures.

4) Numerical Questions

The null hypothesis was set to say that the population mean has the same mean as the sample or of a proposed test value. Table 6 shows the results of the significance of the one sample t-test p-value of the numerical questions. It is clear from the table that Ho is accepted in all questions, which means that the population mean of each question can be equal to the proposed test value. For example, the population mean for the exam grade is equal to 37.5.

Table 6: Numerical questions results.

Question	Test value	p-value	Ho is accepted
Q2	37.5	81.3% > 5%	YES
Q8	66	88.6% > 5%	YES
Q9	7	33% > 5%	YES
Q10	8	49.1% > 5%	YES
Q11	4	54.9% > 5%	YES

V. TESTING RELATIONSHIP EXISTENCE BETWEEN ANY DIFFERENT TWO QUESTIONS

The results of the testing relationship existence between any two questions will be presented in this section.

A. Two Categorical Questions

We have 12 categorical variables or questions ("Q1, Q3, Q4, Q5, Q6, Q7, Q12, Q13, Q14, Q15, Q16, and Q17"), and we can test the dependency between any two variables using the chi-square test. If we want to test all the cases (66), we have to do the chi-square test 66 times.

First, the null hypothesis Ho must be defined as follows: the two categorical variables are independent. Then we

have to use the Chi-Square test by computing the significance p-value. If the p-value is greater than 5%, then the null hypothesis H_0 is accepted, and this leads us to say that the two variables are independent. Else If the p-value is less than 5%, the null hypothesis H_0 is rejected and the alternative is accepted, implying that the two variables are not independent (dependent).

All details of the descriptive statistics (the crosstabulation table) along with inferential statistics (the chi-square test) of all possible two categorical variables have been computed by SPSS. The results show us that 15 cases out of 66 cases have a p-value of less than 5% (H_0 is rejected; it means that the two variables are not independent); and the other 51 cases have a p-value greater than 5% (H_0 is accepted; it means that the two variables are independent).

We concentrate on the 15 Chi Square tests with a value of less than 5%, because it tells us that the two questions are not independent or they are dependent. We can check the dependency nature through the observation of the crosstabulation values in order to distinguish or describe the dependency. Table 7 shows the p-value only in the cases where the two questions are not independent.

Table 7: p-value of H_0 is rejected.

Question	Question	P Value
Q1	Q13	0.90%
Q13	Q14	0.60%
Q13	Q5	0.80%
Q3	Q13	2.10%
Q3	Q12	3.20%
Q3	Q4	1.80%
Q3	Q17	3.70%
Q12	Q17	0.00%
Q12	Q16	0.00%
Q12	Q5	0.00%
Q12	Q4	1.60%
Q7	Q6	0.00%
Q6	Q4	2.40%
Q16	Q5	1.20%
Q17	Q16	0.00%

The following are the sample cross-tabulation results for the different questions that are not independent (p-value < 5%), and as a result, these results can be inferred to the population:

- ✓ Q1-Q13: The majority of TG and TM students have a computer, while half of HM students do not have a computer.
- ✓ Q13-Q14: It is found that not all students who have a computer use it during online teaching. A third of students use smart phones, even if they have a computer.
- ✓ Q13-Q5: It is found that most students "who have a computer" agree and strongly agree that the online lectures for the computer course were helpful.
- ✓ Q3-Q13: The students "who have a computer" predict at near or very near levels their grades on the exam. This means that the computer is essential in

understanding the course, and students who use smart phones must change to laptops, especially in a practical course like the computer course.

- ✓ Q3-Q12: The students "who are satisfied with online lectures at a good level" predict well the exam grades at near and very near levels.
- ✓ Q3-Q4: The students "who think that the exam is easy to neutral level" predict their grades for the exam at neutral to very near levels.
- ✓ Q3-Q17: It is found that most students "who predict the exam grade at neutral to near levels" feel that the online teaching is slightly stressful to moderately stressful.
- ✓ Q12-Q17: The students "who feel that the online teaching is good" feel that the online teaching is moderately stressful and some of them feel very stressed.
- ✓ Q12-Q16: The students "who feel that the online teaching is good" feel that the online teaching is moderately effective.
- ✓ Q12-Q5: The students "who feel that the online teaching is good" agree and strongly agree that the online lecture for the computer course was helpful.
- ✓ Q12-Q4: The students "who feel that the online teaching is good" think that the exam is easy to neutral.
- ✓ Q7-Q6: It is found that most students "who feel that the teacher's explanation during the online lesson is very helpful/extremely helpful" also feel that the materials sent "PowerPoint and exercise" are very helpful/extremely helpful.
- ✓ Q6-Q4: It is found that most students "who feel that the difficulty of the exam is neutral to easy level" also feel that the materials sent for "PowerPoint and exercise" are very helpful/extremely helpful.
- ✓ Q16-Q5: It is found that students "who feel that the online teaching is moderately effective" agree and strongly agree that the online lecture for the computer course was helpful.
- ✓ Q17-Q16: the students "who feel that the online teaching is moderately effective" feel that the online teaching is moderately stressful to very stressful.

B. Two Numerical Questions

We have five numerical variables or questions ("Q2, Q8, Q9, Q10, Q11"). If we want to test all cases (10), we have to compute the correlation for all two different cases. Table 8 shows us the correlations for the 10 cases. The relationship between any two questions is relatively strong if the correlation value is greater than 0.4, else it is weak if the correlation value is less than 0.4. Also, it is considered a strong relationship if the correlation value is greater than 0.6. As a consequence, we concentrate only on two cases: 1- Q2 and Q8 have a strong correlation of 0.616; 2- Q9 and Q8 have a relatively strong correlation of 0.576.

Table 8: Correlations Values.

	Q2	Q8	Q9	Q10	Q11
Q2	1	0.616	0.226	0.023	0.184
Q8	0.616	1	0.576	-0.14	0.320
Q9	0.226	0.576	1	0.083	0.177
Q10	0.023	-0.14	0.083	1	0.033
Q11	0.184	0.320	0.177	0.033	1

In order to infer the results for the population, the p-value can be computed for the two cases as shown in Table 9. All p-values with values less than 5% mean that the two variables are dependent (Ho is rejected); else, "with values greater than 5%," the two variables are independent (Ho is accepted).

Table 9: p-value.

	Q2	Q8	Q9
Q2		0.0%	10.4%
Q8	0.0%		0.0%
Q9	10.4%	0.0%	

Based on the above two tables, then two regression equations can be proposed as shown in Table 10 (between Q8 & Q2 and between Q8 & Q9). These two regression equations tell us that if the student's overall GPA is high/low, we can expect and guess that the students grade exam "Q2" or the number of courses succeed "Q9" is high/low.

Table 10: Questions with regression equation.

Questions	Pearson Correlation	p-value	Regression equation
Q8 & Q2	0.616	0	Figure 1
Q8 & Q9	0.576	0	Figure 2

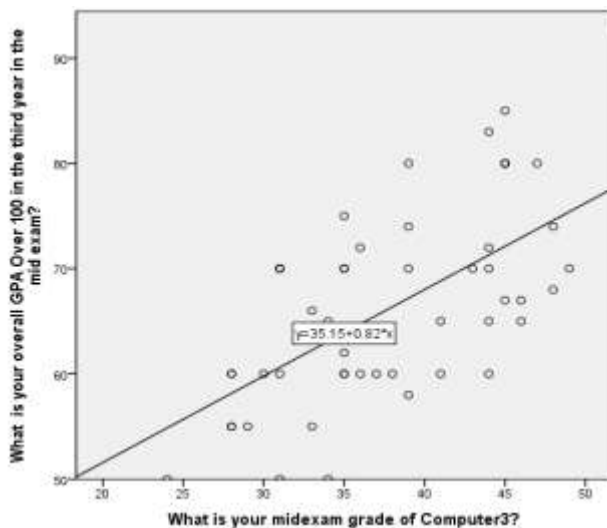


Figure 1: Regression equation between Q8 & Q2.

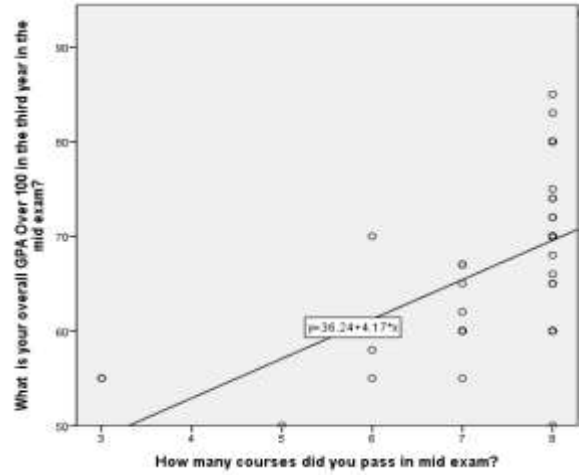


Figure 2: Regression equation between Q8 & Q9.

C. *One Categorical Question & One Numerical Question*
 We have 12 categorical variables or questions ("Q1, Q3, Q4, Q5, Q6, Q7, Q12, Q13, Q14, Q15, Q16, Q17") and we have 5 numerical variables or questions ("Q2, Q8, Q9, Q10, Q11"), then we can test each categorical with each numerical. ANOVA Test for Association "Compare Means" is used. We have to compute the test for all two different questions (12*5=60 cases). Table 11 shows us the p-value for all the different cases.

Table 11: p-value of ANOVA test between numerical questions and categorical questions.

	Q2	Q8	Q9	Q10	Q11
Q1	72.4%	54.1%	50.4%	56.0%	89.1%
Q3	0.0%	7.4%	3.3%	70.5%	17.6%
Q4	0.4%	11.3%	80.8%	69.2%	20.2%
Q5	9.0%	20.0%	20.0%	30.0%	90.0%
Q6	27.0%	0.0%	30.0%	0.0%	10.0%
Q7	10.0%	0.0%	80.0%	70.0%	30.0%
Q12	50.9%	32.7%	97.7%	64.0%	62.8%
Q13	34.5%	28.1%	25.0%	45.6%	31.0%
Q14	48.6%	53.4%	48.2%	19.9%	21.5%
Q15	12.3%	28.6%	0.0%	84.5%	1.2%
Q16	16.7%	12.8%	60.1%	76.3%	79.9%
Q17	43.7%	23.2%	56.5%	39.3%	84.8%

As shown in Table 11, all different cases are independent (null hypothesis is accepted where p-value > 5% - Means are the same for all options in the categorical question), except eight cases (Q11-Q15, Q6-Q10, Q15-Q9, Q3-Q2, Q4-Q2, Q3-Q9, Q6-Q8, and Q7-Q8) are not independent (null hypothesis is rejected where p-value < 5% - Means are not the same for all options in the categorical question). This means that we can describe which option has a greater or lower mean. The eight cases are explained as follows:

- ✓ Q3-Q2: The students' opinion prediction accuracy of the exam grade (very far, far, neutral, near, and very near levels) is dependent on the students' exam grades. This means that the students' opinions are influenced by their exam grades.

- ✓ Q3-Q9: The students' opinion prediction accuracy of the exam grade (very far, far, neutral, near, and very near levels) is dependent of the number of courses passed and succeed.
- ✓ Q4-Q2: It was found that students' opinions on the exams (very difficult, difficult, neutral, easy, very easy) are influenced by the scores obtained on them.
- ✓ Q6-Q10: The students' opinions about the materials sent, such as PowerPoint and exercises for the exam (very useful, useful, neutral, not useful) are influenced by the students' number of hours studied per week.
- ✓ Q7-Q8: It was found that students' opinion of the teacher's explanation during the online lesson (very useful, useful, neutral, unhelpful) is influenced by the students' overall GPA.
- ✓ Q15-Q9: The number of courses passed and successfully finished by students is influenced by the average time that students spend each day on online teaching.
- ✓ Q11-Q15: The number of lectures missed weekly by students is dependent on the average time that students spend each day on online teaching.

We can go in details with the ANOVA test with the above eight cases, and compute the post-hoc test to know which categories have a significant different mean. Also compute the Eta Squared (η^2) to see the effect size.

VI. CONCLUSION

In conclusion, in order to face the different problems of going to university to give lessons during COVID 19, we have to do online lectures. The goal of this paper is to get the analysis of the students' opinions in order to make the necessary improvements to help them. The results of the questionnaire asked of students can be briefly presented in this section. The descriptive statistics of the sample demonstrated that 73% of the students strongly agree that the computer course was useful, and 93% of them think that the teacher's explanations are useful and very useful, and 92% of the students think that the materials sent are useful. 80% of the students own a computer, while 50% of them use it during lectures, and the others use smartphones. 75% of the students say that online teaching is moderately effective to very effective, while 77% think online teaching is moderately stressful to extremely stressful. From this analysis, it appears that the students have consensus on all ordinary questions. The central tendency of the exam grades on the computer is nearly 37/50. The students have a 66% central tendency for their GPA and 7 hours of study per week.

Table 12 summarizes the null hypothesis results, showing that it is accepted in questions Q2, Q5, Q8, Q9, Q10, Q11, Q13, Q14, and Q16, implying that their sample results can be extrapolated to the population. While the null hypothesis is rejected in questions Q3, Q4, Q6, Q7, Q12, and Q17, then the results cannot be extrapolated to the population.

Table 12: Summary results for each question.

#	Question Type	p-value	Ho is accepted
Q2	Numerical Scale	43.20%	YES
Q3	Categorical Ordinal	0.30%	No
Q4	Categorical Ordinal	0%	No
Q5	Categorical Ordinal	24.70%	YES
Q6	Categorical Ordinal	0.10%	No
Q7	Categorical Ordinal	0%	No
Q8	Numerical Scale	88.60%	YES
Q9	Numerical Scale	33%	YES
Q10	Numerical Scale	49.10%	YES
Q11	Numerical Scale	54.90%	YES
Q12	Categorical Ordinal	0.70%	No
Q13	Categorical Binary	22%	YES
Q14	Categorical Nominal	22.50%	YES
Q16	Categorical Ordinal	7.50%	YES
Q17	Categorical Ordinal	0.50%	No

The results of testing the existence of any relationship between any two questions are shown in Table 7, Table 10, and Table 11. In Table 7, fifteen relationships between two different categorical questions (the two variables are dependent) have been cited. In Table 10, two relationships between two different numerical questions and then two regression equations have been proposed. In Table 11, eight relationships between categorical questions and numerical questions have been noted (the different options of the categorical questions have different mean). While in all other cases, the null hypothesis is accepted, which means that, in the case of two categorical, they will be considered independent. In the case of two numerical values, a regression equation cannot be proposed. In the case of one categorical and one numerical question, the different options for the categorical questions have the same mean.

The most important results of the two questions' relationship are that the students "who feel that the online teaching is good" feel that the online teaching is moderately stressful, and they feel that the online teaching is moderately effective. They also agree and strongly agree that the online lecture for the computer course was helpful, and they think that the exam is easy to neutral. The students "who have a computer" predict at near or very near levels their grades on the exam, and agree and strongly agree that the online lectures for the computer course were helpful. This means that the computer is essential in understanding the course, and students who use smart phones must change to laptops, especially in a practical course like the computer course. It is also found that most students "who feel that the teacher's explanation during the online lesson is very helpful or extremely helpful" also feel that the materials sent (PowerPoint and exercises) are very helpful or extremely helpful. Lastly, the students "who feel that the online teaching is moderately effective" agree and strongly agree that the online lecture for the computer course was helpful, and also feel that the online teaching is moderately stressful to very stressful.

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