The Impact of E-Learning Strategy on Students' Academic Achievement

Case Study: Al- Quds Open University

Yousef Abdel Latif Abdel Jawad[1] & Basem Shalash[1]

[1] Al-Quds Open University, Palestine

Correspondence: Yousef Abdel Latif Abdel Jawad, Al-Quds Open University, Palestine.

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Abstract

This study examines the effect of E-learning during COVID-19 pandemic on the students' Academic Achievement at Al-Quds Open University. The study has randomly selected 382 students' GPA from the University's official records. It is mainly based on Statistical Package for Social Sciences program (SPSS.20) to make Paired Samples T-test and to study the hypotheses. The study has revealed that there are statistically significant differences in the students' Academic Achievements during the implementation of the E-learning strategy in COVID-19 pandemic. This study shows that in general the GPA of students has increased about 2.188 points; but in particular the GPA of male students is affected more than female's by just a slight difference of 1,198 point. On the other hand, looking at the Program of Study at the University; the Community Service is affected most with an increase by 3,276 points, Then Business Administration, Accounting and Finance are respectively affected more with having 2.6 points more on students' GPA. However, the greatest effect on GPA is largely noticed on the students whose GPA is low in which the increase is about 6.568 points. The study results shows the importance of the implementation of E-learning strategy in higher education institutions so as to improve the students' Academic Achievements. In addition, it sheds the light on the necessity of taking into consideration the specific features of some learning programs such as the Arabic Language and the Social Studies.

Keywords: E-Learning strategy, E-Learning impacts, ICT in learning, online learning

1. Introduction

Communications and information technology has changed our life in one way or another. With the development of information and communications technology, the term E-learning, which is the acquisition, use, distribution, and facilitation of knowledge in the first place by electronic means, has emerged. This type of learning depends on the Internet and computers. (Tossy, 2017).

The adoption of E-learning in education, especially in the higher education institutions, has many benefits when it comes to its flexibility with time and space for the learners and institutions at the time of conducting meetings. This gives a greater chance to access enormous amount of information with less time and effort.

E-learning is also a cost-effective method as the students do not need to travel and move every day, at the same time, the higher education institutions are less required to offer huge buildings and a large number of faculty members to keep on the progress of the educational process. (Arkorful and Abaidoo, 2014).

On the other hand, E-learning may cause a decrease in the institutions and teachers' roles; also, it may affect the values, the educational process and the social life of students negatively. In addition, unacceptable disciplinary actions of the students such as cheating could be hardly controlled, and the educational system is also likely to be not protected and may be a victim to piracy or plagiarism. Moreover, by using E-learning methods, it is not possible to study some scientific fields which requires physical presence, for instance conducting experiments in laboratories or doing close training. (Arkorful and Abaidoo, 2014).

E-learning has six types: Physical presence of the students and the teachers away of the electronic communication (face to face contact), e-learning without attendance or electronic communication (self-learning), e-learning without the presence and with electronic communication (asynchronous), e-learning through the virtual presence and electronic communication (synchronous), e-learning with occasional presence and electronic communication

(blended/hybrid-asynchronous), and learning by the presence and electronic communication (blended/hybrid-synchronous). (Zare, et al, 2016).

As COVID- 19 pandemic has spread in some parts of Palestine, the authorities imposed a state of emergency restricting the movement and gatherings of citizens. The procedures included closing all the Palestinian Higher Education Institutions. Therefore, to keep the educational process going on, Al-Quds Open University Administration has implemented a full E-learning system during the second semester 2019 – 2020, i.e. the third and fourth types mentioned above. As possible closure for other semesters emerged, significant studies on the effect of applying the e-learning strategy has increased to maintain progress of the educational process especially the students' academic achievement.

As E-learning has already been seen as a substitute learning model, and due to the shortage of the local studies on such model. It is necessary then to conduct a study to measure the effect of applying the E-learning strategy on the students' Academic Achievement in Palestine to help the decision makers take appropriate actions to help make the students' Academic Achievement better.

2. Literature Review

With the widespread use of information and communications technology in many aspects of life, several studies have emerged to discuss the impact of the ICT use on the educational process as successful educational process achieves sustainable development.

In a study (Elfaki, et.al., 2019) at Najran University in Saudi Arabia, the researchers wanted to reveal the impact of e-learning on the students' academic performance. The study was designed in a quasi-experimental manner, whereby 80 students from the Faculty of Nursing were targeted, 40 of them as an experimental group and the other 40 as a control group. This methodology is similar to the method used in the study (Tegegne, 2014) at the University of Gemma in Ethiopia, which targeted 144 students of basic algebra, and the results were varying between the two studies. The results of the study (Elfaki, et al, 2019) showed that the average score of students for the experimental group is higher and statistically significant than the average score of students for the control group, whereas, according to a study (Tegegne, 2014), there were no statistically significant differences between the students' marks using traditional learning and the students' scores using ICT-supported learning. The reason for the different results may be due to the nature of some subjects that are better taught traditionally rather than relying on information and communications technology.

In a study by (Abooki and Kitawi, 2014) at Strathmore University in Kenya to compare the average student results for the first semester of 2008 in subjects using information and communications technology and those that do not use information and communication technology, the study concluded that the e-learning strategy had a positive impact on the academic performance of the students, and this is similar to the results of the study (Elfaki, et.al., 2019) but varies with the results of the study of (Tegegne, 2014).

(Basri, et. Al., 2018) examined the impact of the adoption of communications and information technology on the students' performance according to gender, educational program, and level of academic achievement at four Saudi universities. The study found that female performance was better than male performance, and the students with the higher educational achievement were better than the students with the low achievement, in addition to that, the students other than those enrolled in computer programming had better performance when applying a learning strategy based on information and communication technology. These results are close to the results of a study by (Kumar and Bajpai, 2015) at Sikkim University in India, but the academic achievement of males was higher than that of females, and the reason for the difference between the results of the two studies may be due to the social conditions surrounding males and females in each country.

Investigating the impact of the learning strategy on motivation among the students, a study by (Salamat, et. Al., 2018) at the University of Lahore using questionnaire research tool collected data for 205 students randomly. 21 questions were asked, each question has a scale of three degrees (Agree, Neutral, Disagree). The study found out that e-learning encourages self-learning, and gives a feeling of comfort in use and interaction promoting greater flexibility in learning time, in addition to motivating the students and enhancing their academic performance.

(Pham and Huynh, 2018) at King Khalid University conducted a study to reveal the factors affecting the educational attainment through the e-learning system making a model after collecting data from 263 respondents. The model contained five independent variables, namely: the self-efficacy of the computer, the ability to self-study, ease and benefit, interaction via e-mail, and social presence. The results of the multiple regression analysis showed that all independent variables have a positive effect on learning and knowledge transfer through the e-learning system.

Using a different methodology from the above, (Mothibi, 2015) study used the Meta-Analysis methodology where a sample of 15 research studies was used between 2010 – 2013. It was concluded that the information and communications technology had a positive and statistically significant effect on the students' academic achievement, who mainly use e-learning model.

3. Study Hypotheses

The hypotheses have been set according to the objectives framed. All hypotheses are presented as a null hypothesis to ease analysis process:

According to studies (Kumar and Bajpai, 2015; Elfaki, et.al., 2019; Pham and Huynh, 2018; Mothibi, 2015; Abooki and Kitawi, 2014; Basri, et al, 2018; Salamat, et al, 2018), The implementation of the E-learning strategy has a positive and statistically significant impact on the students' academic achievement. This is due to many reasons, including that E-learning helps in accessing enormous amount of information with less time and effort, and provides more flexibility in learning taking into account the individual differences. However, according to a study by (Tegegne, 2014), there is no difference in the students' achievement between traditional learning and ICT-supported learning. Thus, the null hypothesis will be as follows:

$H_0$1: There is no significant difference in the students' academic achievement when implementing the e-learning strategy.

The academic achievement sometimes varies between males and females. According to the study by (Basri, et.al., 2018), the academic achievement of females is higher than males' achievement when adopting e-learning, however, the study by (Kumar and Bajpai, 2015) concluded that the academic achievement of males is higher. As a result, the null hypothesis will be as follows:

$H_0$2: There is no significant difference in the students' academic achievement due to gender when implementing the e-learning strategy.

Some educational programs depend mainly on communications and information technology, however, others require physical presence and could hardly be taught using E-learning model. According to the study by (Tegegne, 2014), there is no statistically significant effect on the students' performance when teaching basic algebra through e-learning or traditional education. Likewise, according to the study by (Basri, et.al., 2018), E-learning has a greater impact on the students other than those enrolled in computer programming due to the dependence of the programming students on the natural situation on technology, and therefore, the impact of e-learning will be greater on other disciplines. Thus, the null hypothesis will be as follows:

$H_0$3: There is no significant difference in the students' academic achievement due to academic program when implementing the e-learning strategy.

According to the study by (Basri, et al, 2018), the students' response to e-learning may differ according to the previous academic level. The adoption of information and communications technology has a greater positive impact on the students with higher achievement than those with lower one. Consequently, the null hypothesis will be as follows:

$H_0$4: There is no significant difference in the students' academic achievement due to their academic level when implementing the e-learning strategy.

4. Methodology and Data

Achieving the objectives, this study is based on the descriptive and quantitative research methods. Besides, Statistical Package for Social Sciences program (SPSS.20) is used to make Paired Samples T-test and to study the hypotheses.

This study aims at investigating statistical significant differences in the students' GPA in the first semester (partial implementation of e-learning) and their GPA the second semester (full implementation of e-learning during Covid-19) of the academic year 2019 – 2020. The study also takes into account the following variables; gender, The Program of Study at the University and the students' academic achievement.

The research has randomly selected 382 students out of 47,730; the total number of students in Al-Quds Open University. Here in the sample, the percentage of males is 30.1% to 69.9% for females.

As for the source of the data, it is mainly taken from the official records of Al-Quds Open University. However, the study doesn't include in its sample the students in their First Academic Year, students who withdraws from one of the two semesters, students who changes their Academic Major during the study period, and preparatory-year

students (According to the University Policy, the students whose Tawjihi average; the twelfth class at school, is more than 50 and below 60 are given the chance to study two subjects to be enrolled in the university as any other student).

5. Analysis and Results

In this section, the study hypotheses will be tested to show the statistically significant differences in the students' GPA in the first semester (partial implementation of e-learning) and their GPA the second semester (full implementation of e-learning during COVID-19) of the academic year 2019 – 2020.

The number of students at Al-Quds Open University at the beginning of the first semester of 2019/2020 is 47730 students, 33.2% of them are males, and 66.8% are females. Concerning the Programs of study, 64% of the university students study at the Faculty of Administrative and Economic Sciences and at the Faculty of Educational Sciences.

$H_0$1: There is no significant difference in the students' academic achievement when implementing the e-learning strategy.

Table (1) shows that GPA for the students in the first semester, i.e. before fully implementing the e-learning strategy is 70.66%, while the GPA for the students in the second semester is 72.85%, i.e. a difference of 2.188 degrees.

From Table (2), it turns out that P-value = 0.000 <0.05, therefore, the null hypothesis is rejected. Therefore, the difference between the average score of the students is statistically significant.

$H_0$2: There is no significant difference in the students' academic achievement due to gender when implementing the e-learning strategy.

Table (3) illustrates that GPA of the female students in the first semester is 72.85%, while the GPA of the male students for the same semester is 65.56%, i.e. a difference of 7.29 degrees. Meanwhile, the GPA of the female students in the second semester is 74.68%, and 68.58% for the males, which means that the difference has been narrowed to 6.1 degrees. The effect of implementing E-learning strategy is greater on male students than on females since the female rate has increased by 1,828 degrees, while the male students rate has increased by 3.026 degrees.

From Table (4), it turns out that P-value = 0.000 <0.05, therefore, the null hypothesis is abandoned. Consequently, the difference between GPA of the students according to gender is statistically significant.

$H_0$3: There is no significant difference in the students' academic achievement due to academic program when implementing the e-learning strategy.

The sample has included 15 programs from different colleges. The percentage of the students in Accounting is 18.3%, in Business Administration is 19.1%, in Primary Education is 9% and in the English language and literature program is 8.1%. Table (5) shows the percentage of each program in the sample.

From Table (6), it is clear that the GPA has generally increased in all of the programs in the second semester after applying the E-learning strategy. As for the Community Services program, it is largely affected by having 3.276 points more on their GPA. Then, it is followed by the Accounting, Business Administration, and Finance Programs by a rough increase of 2.6 points. The less affected program is English language and literature which gets a very slight rise of 0.774 degrees.

Table (7) shows that P-value = 0.000 <0.05 for all programs except for the Arabic and Social Studies programs. There are statistically significant differences in the students' GPA according to programs, except for the Arabic and Social Studies programs.

$H_0$4: There is no significant difference in the students' academic achievement due to their academic level when implementing the e-learning strategy.

Table (8) illustrates that the percentage of students with an excellent GPA (over 85%) is about 9.7%, while the percentage of those with an Academic Warning (less than 60%) is about 11.5% and the percentage of those with a good average score (from 65% - 74%) is about 40.8%.

From Table (9), it highlights that the one who gets more points on their GPA during the implementation of E-learning is the students who have Academic warning; in which they get 6.568 points. By contrast, the students whose GPA is excellent, they are negatively affected with a decrease of 0.405. However, the students with a good GPA is in between; in which they have 2.93 points.

Table (10) shows that P-value = 0,000 <0.05 for all academic levels, except the excellent score average. There are statistically significant differences in the students' score averages for all academic levels, except for the students with excellent scores.

6. Conclusion and Discussion

After fully implementing the E-learning strategy at Al-Quds Open University, the study has examined the effect of e-learning on the students' academic achievements at the university level taking into consideration gender, the Programs of Study and academic level.

A random sample of 382 students is chosen from the university students official records excluding First-year, withdrawal and preparatory year students besides the students who changes their programs during the study period.

The study shows that the implementation of the E-learning strategy has a positive impact and statistically significant differences on the students' GPA. This result is consistent with the results of studies (Kumar and Bajpai, 2015; Elfaki, et.al., 2019; Pham and Huynh, 2018; Mothibi, 2015; Abooki and Kitawi, 2014; Basri, et al, 2018; Salamat, et al, 2018) in which E-learning model helps access enormous amount of information with less time and effort, and provides more flexibility in learning taking into account the individual differences.

The study sheds light on that there are statistically significant differences in the GPA of the males and females. As it is presented the GPA of the females is higher than males'. However, when E-learning strategy is implemented males get more points on their GPA; which makes the differences between them and the females less. Thus, this result corresponds to the result of a study (Basri, et al, 2018) and conflicts with the result of a study (Kumar and Bajpai, 2015) which concludes that the academic achievement of males is higher than that of females when adopting the e-learning strategy.

The study has also revealed that there are statistically significant differences in the academic achievements according to Program of Study. It is shown that the GPA of the students has been positively affected in all of the programs except for Arabic Language, Social Studies, and Community Service Programs as the differences are not statistically significant in these programs. The reason for this is that teaching these programs does not depend on technology, but rather on the traditional methodology. This result is inconsistent with the result of a study by (Tegegne, 2014) which shows that there is no effect of applying the E-learning strategy to the results of students in the field of Mathematics. It also differs with the result of a study by (Basri, et al, 2018) which shows that E-learning strategy has a greater impact on Educational programs other than non-computer ones.

On the academic level, the results of the study have indicated that there are statistically significant differences in the students' GPA according to the academic level. As a result of implementing E-learning, the greatest positive impact takes place among the students who has warnings. This result is opposite to the result of a study by (Basri, et al, 2018) that shows e-learning with a higher positive impact on the students with high academic achievement.

After discussing the results presented, the study recommends apply E-learning strategy in the higher education institutions so as to enhance the Academic achievement of the students taking into account the specific features of some programs such as the Arabic Language and the Social Studies. It Also recommends conduct more studies on the factors that affect E-learning whether they are related to students, lecturers or infrastructure; which plays a great role in improving the performance of the university and students to a greater level.

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Appendixes

Table 1. Descriptive Statistics of the GPA of all students

	N	Minimum	Maximum	Mean	Std. Dev
AVG_SEM.1	382	35	97	70.66	9.754
AVG_SEM.2	382	52	96	72.85	8.352

- SEM refers to semester.

Table 2. Paired Samples Test (for all students)

	Paired Differences					t	df	Sig.
	Mean	Std. Dev	Std. Error mean	95% Confidence Interval of the Difference				
				Lower	Upper			
AVG_SEM_1 AVG_SEM_2	-2.188	3.579	.183	-2.549	-1.828	-11.951	381	.000

Table 3. Descriptive Statistics of GPA by Gender

Gender		N	Minimum	Maximum	Mean	Std. Dev
Female	AVG_SEM.1	267	50	97	72.85	9.321
	AVG_SEM.2	267	56	96	74.68	8.190
Male	AVG_SEM.1	115	35	91	65.56	8.816
	AVG_SEM.2	115	52	91	68.58	7.096

Table 4. Paired Samples Test (by gender)

Gender		Paired Differences					t	df	Sig.
		Mean	Std. Dev	Std. Error mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Female	AVG_SEM_1 AVG_SEM_2	-1.828	2.796	.171	-2.165	-1.491	-10.680	266	.000
Male	AVG_SEM_1 AVG_SEM_2	-3.026	4.853	.453	-3.923	-2.130	-6.687	114	.000

Table 5. Number and Percentage of each Major in the Sample

	Frequency	Percent
Accounting	70	18.3
Arabic and literature language	12	3.1
Business Administration	73	19.1
Community development	7	1.8
Community service	29	7.6
Computer information systems	25	6.5
English language and literature	31	8.1
Finance	13	3.4
Health Management	16	4.2
Islamic education	5	1.3
Marketing	23	6
Math	21	5.5
Primary education	35	9.2
Social studies	11	2.9
Teaching qualification	11	2.9
Total	382	100

Table 6. Descriptive Statistics of the GPA according to the Specialization

SPECIALIZATION		N	Minimum	Maximum	Mean	Std. Dev
Accounting	AVG_SEM.1	70	35	91	69.76	10.577
	AVG_SEM.2	70	56	91	72.34	8.344
Arabic and literature language	AVG_SEM.1	12	61	97	73.92	10.774
	AVG_SEM.2	12	62	96	74.08	10.166
Business Administration	AVG_SEM.1	73	48	91	66.23	8.950
	AVG_SEM.2	73	52	91	68.82	7.759
Community development	AVG_SEM.1	7	54	84	73.14	9.873
	AVG_SEM.2	7	68	84	76.57	5.711
Community service	AVG_SEM.1	29	52	91	70.28	8.464
	AVG_SEM.2	29	60	91	73.55	6.604
Computer information systems	AVG_SEM.1	25	63	88	72.28	7.882
	AVG_SEM.2	25	66	88	74.60	6.988
English language and literature	AVG_SEM.1	31	62	95	76.77	8.778
	AVG_SEM.2	31	62	95	77.55	8.390
Finance	AVG_SEM.1	13	54	73	64.46	6.253
	AVG_SEM.2	13	56	75	67.15	5.550
Health Management	AVG_SEM.1	16	59	85	73.00	8.254
	AVG_SEM.2	16	63	86	74.69	6.760
Islamic education	AVG_SEM.1	23	57	94	75.48	9.769
	AVG_SEM.2	23	59	94	76.83	9.054
Marketing	AVG_SEM.1	5	57	71	64.20	5.404
	AVG_SEM.2	5	60	73	66.60	5.814
Math	AVG_SEM.1	21	54	88	73.43	8.914
	AVG_SEM.2	21	62	88	75.05	7.978
Primary education	AVG_SEM.1	35	50	93	70.60	10.561
	AVG_SEM.2	35	56	93	72.51	9.221
Social studies	AVG_SEM.1	11	59	58	68.55	8.454
	AVG_SEM.2	11	61	83	70.18	6.210
Teaching qualification	AVG_SEM.1	11	62	90	74.45	8.407
	AVG_SEM.2	11	66	88	78.00	6.723

Table 7. Paired Samples Test (by specialization)

SPECIALIZATION		Paired Differences					t	df	Sig.
		Mean	Std. Dev	Std. Error mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Accounting	AVG_SEM_1 AVG_SEM_2	-2.586	5.052	.604	-3.790	-1.381	-4.282	69	.000
Arabic and literature language	AVG_SEM_1 AVG_SEM_2	-.167	1.115	.322	-.875	.542	-.518	11	.615
Business Administration	AVG_SEM_1 AVG_SEM_2	-2.589	3.722	.436	-3.458	-1.721	-5.943	72	.000
Community development	AVG_SEM_1 AVG_SEM_2	-3.429	5.711	2.159	-8.711	1.854	-1.588	6	.163
Community service	AVG_SEM_1 AVG_SEM_2	-3.276	3.605	.669	-4.647	-1.905	-4.894	28	.000
Computer information systems	AVG_SEM_1 AVG_SEM_2	-2.320	2.545	.509	-3.370	-1.270	-4.558	24	.000
English language and literature	AVG_SEM_1 AVG_SEM_2	-.774	1.586	.285	-1.356	-.193	-2.719	30	.011
Finance	AVG_SEM_1 AVG_SEM_2	-2.692	1.702	.472	-3.721	-1.664	-5.703	12	.000
Health Management	AVG_SEM_1 AVG_SEM_2	-1.688	3.156	.789	-3.369	-.006	-2.139	15	.049
Islamic education	AVG_SEM_1 AVG_SEM_2	-1.348	1.774	.370	-2.115	-.581	-3.644	22	.001
Marketing	AVG_SEM_1 AVG_SEM_2	-2.400	2.191	.980	-5.120	.320	-2.449	4	.070
Math	AVG_SEM_1 AVG_SEM_2	-1.619	2.224	.485	-2.632	-.607	-3.336	20	.003
Primary education	AVG_SEM_1 AVG_SEM_2	-1.914	2.974	.503	-2.936	-.893	-3.808	34	.001
Social studies	AVG_SEM_1 AVG_SEM_2	-1.636	5.537	1.669	-5.356	2.083	-.980	10	.350
Teaching qualification	AVG_SEM_1 AVG_SEM_2	-3.545	3.205	.966	-5.699	-1.392	-3.669	10	.004

Table 8. Number and Percentage of each Classification in the Sample

	Frequency	Percent
Excellent	37	9.7
Fail	44	11.5
Good	156	40.8
Satisfactory	66	17.3
Very Good	79	20.7
Total	382	100

Table 9. Descriptive statistics of GPA by Classification

CLASSIFICATION		N	Minimum	Maximum	Mean	Std. Dev
Excellent	AVG_SEMESTER 1	37	85	97	88.81	3.170
	AVG_SEMESTER 2	37	75	96	88.41	3.869
Fail	AVG_SEM.1	44	35	75	55.41	5.337
	AVG_SEM.2	44	52	76	61.98	5.138
Good	AVG_SEM.1	156	59	75	69.72	3.022
	AVG_SEM.2	156	61	81	71.57	3.223
Satisfactory	AVG_SEM.1	66	60	66	62.71	1.496
	AVG_SEM.2	66	61	75	65.65	2.820
Very Good	AVG_SEM.1	79	75	85	79.14	2.982
	AVG_SEM.2	79	74	86	80.14	3.091

Table 10. Paired Samples Test (by Classification)

CLASSIFICATION		Paired Differences					t	df	Sig.
		Mean	Std. Dev	Std. Error mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Excellent	AVG_SEM_1 AVG_SEM_2	.405	1.878	.309	-.221	1.031	1.313	36	.197
Fail	AVG_SEM_1 AVG_SEM_2	-6.568	6.479	.977	-8.538	-4.599	-6.725	43	.000
Good	AVG_SEM_1 AVG_SEM_2	-1.853	2.499	.200	-2.248	-1.457	-9.261	155	.000
Satisfactory	AVG_SEM_1 AVG_SEM_2	-2.939	2.866	.353	-3.644	-2.235	-8.333	65	.000
Very Good	AVG_SEM_1 AVG_SEM_2	-1.000	1.553	.175	-1.348	-.652	-5.725	78	.000