The Open Nursing Journal

Content list available at: https://opennursingjournal.com

RESEARCH ARTICLE

Nursing Students' Academic Performance using the Online Teaching Methods: The Experience from Jordan

Ghadeer Al-Dweik[1,*], Aaliyah Momani[1], Abeer Al Zaghmouri[1], Nabeel Al-Yateem[2] and Mohannad Eid AbuRuz[1]

[1]*Faculty of Nursing, Applied Science Private University, Amman, 11931-166 Jordan*
[2]*Department of Nursing, College of Health Sciences, University of Sharjah, United Arab Emirates*

Abstract:

Objectives:

As a result of the COVID-19 pandemic, all courses shifted to online teaching. This paper aimed to estimate the impact of online *vs.* face-to-face course delivery on students' Grade Point Average (GPA) and to find if there is any difference in students' GPA based on selected sociodemographic characteristics.

Methods:

A cross-sectional design was used. A total of 3445 students enrolled in all faculties were included. Paired t-test, independent t, and ANOVA were used to answer research questions.

Results:

The online GPA was significantly higher than face-to-face GPAs among the total study population. The online GPAs for female students, students in middle years, and those from mainly theoretical fields or faculties were significantly higher than face-to-face GPAs.

Conclusion:

This study found that online instruction improved the academic performance of some students at certain phases. Online teaching benefited female students, colleges offering largely theoretical knowledge (law, Islamic studies, social studies), and middle-year students. Health and medical faculties were less suited for entirely online instruction. This study proposes online teaching as a valid and effective teaching method equivalent to face-to-face teaching methods under specific criteria: Entirely in theoretical disciplines or as part of programs as standing modules in practical fields, Female and middle-years students, especially those taking theoretical courses. The study also recommends that online teaching is a valid possibility amid extreme weather, health, natural, or political situations. Finally, online teaching should be implemented continuously to prepare staff and students for the application of online teaching during emergencies.

Keywords: Academic performance, COVID 19, Face-to-Face, GPA, Online teaching, University students.

Article History	Received: November 11, 2022	Revised: February 01, 2023	Accepted: March 16, 2023

1. INTRODUCTION

The Covid-19 pandemic started in December 2019 in Wuhan, China, extended around the world quickly, and affected all areas of life, including education [1]. According to the World Health Organization (WHO), until early December 2020, the total number of confirmed cases globally was more than 650 million cases, with over 1.5 million deaths worldwide (WHO, 2020). Due to the rapid spread of this virus, most countries implemented physical distancing measures to decelerate the spread of the infection; this included closing educational institutions and converting teaching to online mode [2, 3].

Like the rest of the world, in Jordan, there was an unplanned and sudden shift to online teaching within days across all universities in the country in mid-March 2020. This represented a total paradigm shift in education compared to the pre-pandemic period during which online teaching was not implemented. Online courses were considered inferior by many educational institutions compared to face-to-face courses [3,4], the sudden shift to online teaching meant that there was little

* Address correspondence to this author at the Faculty of Nursing, Head of Nursing Department at Applied Science Private University, Amman, 11931-166 Jordan; Tel: 00962795087119; E-mail: g_aldwik@asu.edu.jo

time to prepare for the online course delivery and that students and teachers had no choice other than to conduct the courses online. This sudden and unplanned shift to online teaching differs from the planned online teaching offered in some educational institutions. Planned online courses have been delivered as a well-planned and flexible study option [4].

The complete switch to online learning was an accepted alternative in the higher education context, as it ensured the continuity of the educational process. However, it presented challenges for educators and students, especially in medical and health sciences education. These fields of education depend on practical ad-hoc clinical training in direct patient care settings and simulation laboratories. Like many other countries, clinical training and simulation were stopped and moved online in Jordan. Clinical settings also canceled student training, especially for the foundational years which offered as preparatory courses taught in the first year of educational program [3].

Also, successful online teaching depends on main principles and criteria, such as flexible timetables that suit different learner lifestyles, students' independence, and also engagement in the educational process [5, 6], adequate Institutional support for learners and teachers and the availability of needed resources, such as content designers, media designers, specialized I.T. support [5 - 7], and special training for instructors to be able to connect with students, form relationships, and be present on the online platform.

Unfortunately, in the Jordanian and similar regional contexts, these requirements were not available. What happened was conducting traditional didactic teaching through an online medium [3]. The lack of preparation for students and instructors and the absence of resources have created numerous obstacles and diminished the actual values and benefits of online teaching [4 - 6]. As a result, the participants in online teaching in Jordan and the region reported a suboptimal process and less than the desired learning for students using the online process [3].

The evidence regarding the effectiveness of online teaching is confusing and appears inconsistent sometimes. On the one hand, some evidence suggests that online health science education is as effective or superior to traditional learning and should be encouraged [8 - 10]. A large-scale study that included 140,444 students over four years in a large public university in the United States of America showed that students in online courses tend to achieve higher academic GPAs despite total credit hours enrolled [11].

On the other hand, online teaching was found to have a negative impact on course persistence and final course grade. One large study reported this, which used data from 34 community and technical colleges over five years in the USA [12]. Even those studies that reported positive results about online teaching methodologies and encouraged their use; seem to have been undertaken in contexts where online teaching is mature, planned, and well-resourced. Also, these studies did not consider the pandemic teaching situation and taught single modules or courses rather than entire programs. They considered partial or blended online learning.

As noted in the majority of previous literature, it is U.S.A based. Given the different contexts of Jordan and the countries in the region, this study aimed to estimate the impact of online *vs.* face-to-face course delivery on students' academic performance in Jordanian universities. The results will help inform educators and policymakers on the future usability of this methodology in the education system.

2. RESEARCH QUESTIONS

1. Is there any difference in students' academic performance based on teaching methods (online *versus* face-to-face course delivery method)?

2. Do students' gender, major, and academic level affect their academic performance through the online learning method?

3. METHODS

3.1. Design, Sample, Setting

A cross-sectional design was used in this study. A consecutive sample including all the students who meet the inclusion criteria as part of the sample was used as the sampling method. All students (3445) enrolled in all faculties and registered at least 12 credit hours for each of the first and second semesters and at least 6 hours for the summer semester of the academic year of 2019/2020 were included in the study. Students who registered less than these numbers of credit hours due to graduation; were accepted into the study.

The study was conducted at one private university in Amman, Jordan. This university is the largest private university in Jordan and contains nine faculties with approximately 9000 students. This university receives students from all over the country and nearby Arabic countries and is well-known for its rank in the country and in the region.

3.2. Measurement of Variables

All needed information was obtained from the students' electronic records from the registrar's office. This information included the student's gender, GPA at the beginning of the first semester of 2019/2020, and GPA at the end of the summer semester of the academic year 2019/2020. Also, faculty types were classified as the following: 1) health sciences, including nursing and pharmacy, 2) scientific, including engineering and information technology, and 3) humanistic, including art and science; business; sharia and Islamic studies; law; and art and design.

Furthermore, the registrar's office provided us with the academic level of the students, which was classified as the following based on the number of credit hours completed by the student: first year, 36 hours, second year 72 hours, third year 108, fourth-year 144, and fifth-year $\geq$ 145 hours.

3.3. Procedure and Ethical Considerations

The authors followed the guidelines of the Helsinki Declarations, the Institutional Review Board Committee at the university approved the study (IRB # 2020-1). The study was anonymous; no student identifiers were collected. The principal

investigator contacted the registrar's office director with a formal letter asking for the needed information.

3.4. Data Analysis

SPSS version 25 was used to analyze the data. A p-value of less than 0.05 was considered statistically significant. Research question number one was answered by paired t-test. Research question number two was answered either by independent t, paired t, or ANOVA with post hoc, according to the number of groups and the nature of the comparison. The least significant difference post hoc test was used to determine which group was responsible for the difference when the ANOVA test was significant. Adjustment of the p value for multiple comparisons was taken into consideration using the following formula 1-(1-0.05/number of comparisons (m)^{m}, while m is the number of comparisons [13].

4. RESULTS

Demographic characteristics of university students are presented in Table **1**. More than half of the sample was male. The first year consisted of 11.3% of the total sample, while the second, third, and fourth years were approximately equally distributed. The fifth year contributed minimally to the sample with nearly 7% only.

The results of the paired t-test showed that the academic performance represented by the GPA was significantly higher than the face-to-face GPA (mean (S.D.), 75.85 (9.67) *vs.* 72.43 (11.02), P < .001). Both male and female students had significantly higher GPAs in online teaching than face-to-face, (mean (SD), 72.60 (9.00) *vs.* 68.67(10.19), P < .001), and, 79.76 (8.96) *vs.* 76.61(10.53), P < .001) respectively. Furthermore, the results of independent t-tests showed that female students have significantly higher levels of both face-to-face and online GPAs compared to male students (mean (SD), 76.61 (10.53) *vs.* 68.97 [10. 19], P < .001) and (mean (SD), 79.64 (8.96) *vs.* 72.60 (9.00), P < .001) respectively.

Regarding faculty type, there was a significant difference in total face-to-face GPAs among the three types of faculties ($F_{(2,3442)}$ =3.82, p<0.05). Post hoc analyses showed that health sciences faculties were responsible for the significant main effect. They have higher levels of face-to-face GPA (73.35 ± 10.72) than scientific faculties (72.26 ± 10.58) and higher levels than humanistic faculties (72.05 ± 11.56). There was no significant difference between scientific and humanistic faculties as shown in Table **2**.

There was a significant difference in total online GPA among the three types of faculties ($F_{(2,3442)}$ =15.10, p<0.001). Post hoc analyses showed that health sciences faculties were responsible for the significant main effect. They have higher levels of online GPA (77.40 ± 9.16) than scientific faculties (75.06 ± 9.60) and higher levels than humanistic faculties (75.66 ± 9.93). There was no significant difference between scientific and humanistic faculties, as presented in Table **2**.

Moreover, the results of the paired t-test showed that the online GPA for humanistic faculties was significantly higher than the face-to-face GPA (mean (SD), 75.66 (9.93) *vs.* 72.05 (11.56), P < .001). Similarly, the online GPA for the scientific faculties was significantly higher than the face-to-face GPA (mean (SD), 75.06 (9.60) *vs.* 72.26 (10.58), P < .001). Likewise, the online GPA for the health sciences faculties was significantly higher than the face-to-face GPA (mean (SD), 77.40 (9.16) *vs.* 73.35 (10.72), P < .001).

At the academic level, there was a significant difference in total face-to-face GPAs among the five academic years ($F_{(4,3440)}$ =8.73, p<0.001). Post hoc analyses showed that the fifth- and the first-year levels were responsible for the significant main effect. The fifth-year has the lowest mean among all the academic levels. The first year has lower levels than the third- and fourth years (Table **3**).

There was a significant difference in total online GPA among the five academic years ($F_{(4,3440)}$ =29.32, p<0.001). Post hoc analyses showed that the fifth-, fourth- and first-year levels were responsible for the significant main effect. Whether the fifth or the fourth years, the final years have the lowest mean among all the academic levels (Tables **4** and **5**). All other comparisons were insignificant.

Table 1. Demographic characteristics of the sample.

Variable N (%)	
Gender	
Male	1883 (54.7)
Female	1562 (45.3)
Academic level	
First	388 (11.3)
Second	918 (26.6)
Third	936 (27.2)
Forth	964 (28)
Fifth	239(6.9)
Faculty Type	
Humanistic Faculties	1360 (39.5)
Scientific Faculties	1268 (36.8)
Health Science Faculties	817(23.7)

Table 2. Post hoc LSD test for differences of total face to face and online GPAs among different types of faculties.

Significance	Mean Difference	Compared With	Faculty Type	Dependent Variable
<0.01 <0.05	1.30 1.09	Humanistic Scientific	Health sciences	Face to face GPA
<0.001 <0.001	1.74 2.34	Humanistic Scientific	Health sciences	Online GPA

Table 3. Post hoc LSD test for differences of total face to face GPAs among different educational years.

Educational Year	Compared With	Mean (SD) *vs.* Mean (SD)	Significance
First	Third	71.25 (11.48) *vs.* 73.35 (11.10)	<0.05
	Fourth	71.25 (11.48) *vs.* 72.82 (10.68)	<0.05
Fifth	First	69.06 (8.74) *vs.* 71.25 (11.48)	<0.05
	Second	69.06 (8.74) *vs.* 72.48 (11.44)	<0.001
	Third	69.06 (8.74) *vs.* 73.35 (11.10)	<0.001
	Forth	69.06 (8.74) *vs.* 72.82 (10.68)	<0.001

Table 4. Post hoc LSD test for differences of total face to face GPAs among different educational years.

Educational Year	Compared with	Mean [SD] *vs.* Mean [SD]	Significance
First	Second	78.09 (8.63) *vs.* 76.93 (9.66)	<0.05
	Third	78.09 (8.63) *vs.* 76.24 (9.73)	<0.05
Fourth	First	74.84 (9.81) *vs.* 78.09 (8.63)	<0.001
	Second	74.84 (9.81) *vs.* 76.93 (9.66)	<0.001
	Third	74.84 (9.81) *vs.* 76.24 (9.73)	<0.05
Fifth	First	70.65 (8.20) *vs.* 78.09 (8.63)	<0.001
	Second	70.65 (8.20) *vs.* 76.93 (9.66)	<0.001
	Third	70.65 (8.20) *vs.* 76.24 (9.73)	<0.001
	Fourth	70.65 (8.20) *vs.* 74.84 (9.81)	<0.001

Table 5. Paired t-tests comparing online GPA with face-to-face GPA between different academic levels.

Academic Level	Online GPA (SD) *vs.* Face to Face GPA (SD)	t	Significance
First year	78.09 (8.63) *vs.* 71.25 (11.48)	22.12	<0.001
Second year	76.93 (9.66) *vs.* 72.49 (11.44)	33.33	<0.001
Third year	76.24 (9.73) *vs.* 73.35 (11.10)	26.79	<0.001
Fourth year	74.84 (9.81) *vs.* 72.82 (10.68)	30.42	<0.001
Fifth year	70.65 (8.20) *vs.* 69.06 (8.74)	20.63	<0.001

5. DISCUSSION

This study revealed that the online GPA was significantly higher than the face-to-face GPA. The results of the previous studies were inconsistent and indicated that the GPA of face-to-face classes was significantly higher than that of online class students [14]. Another study revealed no significant difference in academic performance between online and face-to-face teaching [15]. However, students advocated online teaching components not only for their flexibility with regard to time and place but also appreciated it for their possibilities for exercising and applying one's knowledge and for applying metacognitive self-regulation strategies such as monitoring one's learning progress. As a result, students believed that acquiring skills in self-regulated learning can be better supported in online learning than in face-to-face learning sessions [15].

Although our study did not explore why online teaching may be more successful, one factor that might have supported the success of online teaching in this study context is the change in the assessment and evaluation strategies that the instructor adopted. As they switched to online teaching, instructors also used none direct assessment methods such as written assignments and take-home exams to be more flexible with students during this challenging situation. There are two interpretations for this; the first is that the students preferred this strategy and performed better, or it was not very controlled, and the students' marks do not reflect their academic gains.

The study also showed that the GPAs for male and female students during online learning were significantly higher than face-to-face GPAs. In addition, the study showed that female

students have significantly higher GPAs in face-to-face and online learning than male students. This was similar to the Erdem, Şentürk, and Arslan (2007) study in Turkey [16].

The female out-performance of males in online learning was consistent with one study which showed that females found online learning more advantageous than face-to-face making the enrollment rate for online 56% but only 41% of face-to-face classes among female students [14]. This result was consistent with Aliakbari and Mahjub (2010), who indicated that female students prefer online classes more than male students because of their flexibility and less structured requirements [17]. Furthermore, Arbaugh (2000) indicated that males tended to be more confident in traditional settings, *i.e.*, face-to-face teaching [18]. The female students' preferences for online teaching can be understood given the country's and region's cultural and religious context. Within this context, females feel more comfortable at home, and there might be some restrictions on their movements and behaviors when leaving home. Therefore they prefer online teaching to free them from these restrictions and show their full potential. The results also showed that health sciences faculties have higher levels of face-to-face GPA than scientific faculties and humanistic faculties.

The current study's findings regarding the faculty type influence were consistent with previous research studies that confirmed the less suitability of online teaching for health sciences teaching. Health sciences and medical teaching depend largely on interaction between students, students and lectures, laboratory and simulated training, and actual clinical application of knowledge. The literature emphasized the advantage of face-to-face learning to the predominantly practical fields such as health and medical faculties [3, 19 - 21]. On the other hand, in faculties where the learning is mainly about theoretical information, such as humanities and social sciences, online education seems to positively impact GPA [22, 23].

The academic level also seems to influence the preference toward online learning and its effect on GPA. Middle years seem to be more influenced by online learning, while first and last-year students seem to be less affected. This could be attributed to the bulk and nature of learning in the middle years. In these years, the bulk of studying is taking place, and the flexible nature of online teaching might have provided a window of breathing for these students and allowed them to concentrate on their studies instead of the logistics of commuting from and to the campus for attending classes. Also, the diversifying of the assessment and evaluation strategies helped these students more as they were engaged in their main specialty courses. Usually, the last year of study is clinically focused, while the first-year study is preparatory years. Therefore, in these years, face-to-face seems to be a better option than online teaching, which may not be the most appropriate option.

CONCLUSION

This study revealed that online teaching has positively affected the academic performance of some groups of students at particular stages of their studies. For example, online teaching was more beneficial for female students and for students in colleges that teach mainly theoretical knowledge such as law, Islamic studies, social studies, *etc.* The middle years of study rather than the beginning of the final years. Online teaching was less appropriate in practical faculties such as the health and medical faculties.

This study could inform the policymakers' decisions when planning the academic teaching methods. Therefore, this study recommends the adoption of the online teaching method as a valid and effective teaching method equivalent to the face-to-face teaching methods within some criteria:

1. Entirely in theoretical fields or as part of programs in the form of standing modules in the fields of practical nature.

2. Online teaching options may be provided as a study option for some student populations, such as the female students and those in their middle years, especially for their theoretical courses. This might free them from the pressure of computing and physical attendance to do their essential study duties.

3. Online teaching is a valid option during exceptional periods such as extreme weather conditions, health or natural emergencies, or political emergencies.

4. The implementation of online teaching should be continuous so that faculty and students are continuously updated and ready should it be required on an emergency basis.

LIMITATIONS AND FUTURE RECOMMENDATIONS

Several concerns regarding generalizability need to be taken into account. First, this study focused on students from one private university. Second, the operationalization measure of “grade” or “score” to determine performance level may lack scope and depth. Third, other indicators in future research may be recommended as course nature, evaluation strategies, available resources, and length of teaching modalities. Finally, conducting further quantitative and qualitative research about the impact of teaching modalities on students' academic performance is recommended.

LIST OF ABBREVIATIONS

GPA	=	Grade Point Average
ANOVA	=	Analysis of Variance

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Institutional Review Board Committee at the university (IRB # 2020-1).

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committees and with the 1975 Declaration of Helsinki, as revised in 2013.

CONSENT FOR PUBLICATION

Informed consent was received from all the participants.

STANDARDS OF REPORTING

STROBE guidelines were followed in this study.

AVAILABILITY OF DATA AND MATERIAL

The data support the findings of this study are available from the corresponding author [G. Al-D], on special request.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ACKNOWLEDGEMENTS

The authors thank Applied Science Private University for its support.

REFERENCES

[1] Tanveer M, Bhaumik A, Hassan S, Haq IU. Covid-19 pandemic, outbreak educational sector and students online learning in Saudi Arabia. J Entrep Educ 2020; 23(3): 1-14.

[2] Melnick ER, Ioannidis JPA. Should governments continue lockdown to slow the spread of covid-19? BMJ 2020; 369: m1924. [http://dx.doi.org/10.1136/bmj.m1924] [PMID: 32493767]

[3] Al-Yateem N, Dias JM, Subu MA, *et al.* Reflections on the transition to online teaching for health science education during the COVID-19 pandemic. Int J Med Educ 2021; 12: 154-9. [http://dx.doi.org/10.5116/ijme.610c.1580] [PMID: 34449437]

[4] Back DA, Behringer F, Harms T, Plener J, Sostmann K, Peters H. Survey of e-learning implementation and faculty support strategies in a cluster of mid-European medical schools. BMC Med Educ 2015; 15(1): 145. [http://dx.doi.org/10.1186/s12909-015-0420-4] [PMID: 26337447]

[5] Stanford University. Ten Best Practices for Teaching Online. 2021. Available from: https://tomprof.stanford.edu/posting/1091

[6] What Makes an Excellent Online Teacher?. 2020. Available from: https://www.gse.harvard.edu/news/uk/20/07/what-makes-excellent-online-teacher

[7] Pacansky-Brock M, Smedshammer M, Vincent-Layton K. Shaping the futures of learning in the digital age humanizing online teaching to equitize higher education. Curr Issues Educ 2020; 21(2)

[8] Fontaine G, Cossette S, Maheu-Cadotte MA, *et al.* Efficacy of adaptive e-learning for health professionals and students: A systematic review and meta-analysis. BMJ Open 2019; 9(8): e025252. [http://dx.doi.org/10.1136/bmjopen-2018-025252] [PMID: 31467045]

[9] McCutcheon K, Lohan M, Traynor M, Martin D. A systematic review evaluating the impact of online or blended learning *vs.* face-to-face learning of clinical skills in undergraduate nurse education. J Adv Nurs 2015; 71(2): 255-70. [http://dx.doi.org/10.1111/jan.12509] [PMID: 25134985]

[10] George PP, Papachristou N, Belisario JM, *et al.* Online eLearning for undergraduates in health professions: A systematic review of the impact on knowledge, skills, attitudes and satisfaction. J Glob Health 2014; 4(1): 010406. [http://dx.doi.org/10.7189/jogh.04.010406] [PMID: 24976965]

[11] Cavanaugh J, Jacquemin SJ. A large sample comparison of grade based student learning outcomes in online *vs.* face-to-face courses. Online Learning 2015; 19(2): n2. [http://dx.doi.org/10.24059/olj.v19i2.454]

[12] Xu D, Jaggars SS. The impact of online learning on students' course outcomes: Evidence from a large community and technical college system. Econ Educ Rev 2013; 37: 46-57. [http://dx.doi.org/10.1016/j.econedurev.2013.08.001]

[13] Jafari M, Naser A. Why, when and how to adjust your P values? Cell J 2018; 20(4): 604-7. [http://dx.doi.org/10.22074/cellj.2019.5992]

[14] Faidley JK. Comparison of learning outcomes from online and face-to-face accounting courses. Electronic Theses and Dissertations 2021.

[15] Paechter M, Maier B. Online or face-to-face? Students' experiences and preferences in e-learning. Internet High Educ 2010; 13(4): 292-7. [http://dx.doi.org/10.1016/j.iheduc.2010.09.004]

[16] Erdem C, Senturk I, Arslan CK. Factors affecting grade point average of university students. Empirical Economics Letters 2007; 6(5): 360-8.

[17] Aliakbari M, Mahjub E. Analytical/intuitive EFL learners and gender effect. Int J Pedagog Learn 2010; 6(1): 41-8. [http://dx.doi.org/10.5172/ijpl.6.1.41]

[18] Arbaugh JB. Virtual classroom versus physical classroom: An exploratory study of class discussion patterns and student learning in an asynchronous Internet-based MBA course. J Manage Educ 2000; 24(2): 213-33. [http://dx.doi.org/10.1177/105256290002400206]

[19] Harrington R, Loffredo DA. MBTI personality type and other factors that relate to preference for online *versus* face-to-face instruction. Internet High Educ 2010; 13(1-2): 89-95. [http://dx.doi.org/10.1016/j.iheduc.2009.11.006]

[20] Johnson RD, Hornik S, Salas E. An empirical examination of factors contributing to the creation of successful e-learning environments. Int J Hum Comput Stud 2008; 66(5): 356-69. [http://dx.doi.org/10.1016/j.ijhcs.2007.11.003]

[21] Westbrook V. The virtual learning future. Teach High Educ 2006; 11(4): 471-82. [http://dx.doi.org/10.1080/13562510600874276]

[22] Paul J, Jefferson F. A comparative analysis of student performance in an online *vs.* face-to-face environmental science course from 2009 to 2016. Front Comput Sci 2019; 1: 7. [http://dx.doi.org/10.3389/fcomp.2019.00007]

[23] Mann JT, Henneberry SR. Online *versus* face-to-face: Students' preferences for college course attributes. J Agric Appl Econ 2014; 46(1): 1-19. [http://dx.doi.org/10.1017/S1074070800000602]