

Effect of Absenteeism on Student's Performance in Different Components of Examinations - A Comparison of Online Verses Offline Teaching

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ABSTRACT

Background: The In online learning, more responsibility is shifted towards students in learning according to their needs. However there is a need to assess which component of teaching can be shifted online for future hybrid teachings. **Objective:** This study aims to compare the students' performance in difference components of the exams and compare them in online vs offline. **Methods:** It was a quantitative study comparing onsite and online groups academic performance in individual components of assessment for a duration of 6 months. Estimates were reported per standard deviation (SD) increase or decrease. Taking absenteeism rate as a predictor, models with group and gender on their own was fitted in univariable models, before including all three predictors (absenteeism rate, group and gender) in the final model. **Results:** Students who studied online, had a 0.49SD higher grade than their counterparts who attended physically ($p < 0.001$), each SD increase in the absenteeism rate was associated with a 0.26SD lower overall score, and this was significant, $p < 0.001$. While comparing both groups in MCQ part students who studied online, had a 0.6SD higher grade than their counterparts ($p < 0.001$), also in continuous assessment students who studied online, had a 0.49 SD higher grade than their counterparts who attended physically ($p < 0.001$). **Conclusion:** Positive effect of the online teaching was clear in the (MCQs) and the final result, while no significant gender variation detected in this study.

Keywords: Online learning, obstetrics and gynecology, academic performance.

1. BACKGROUND

Students absent rate is associated with poor performance (Khan et al., and Ansari et al.) (1, 2). Financial constraints and sickness can lead to absenteeism in physical classes. Online students can login in the class while they are away from the screen. Since the online education has started, there is a need to compare its effect with those who attend physically.

Absenteeism denies students chances to engage in class activities. Missing class content, discussion, and explanation of course materials, disadvantage students, when sitting for exams. Class activities allow teachers and students to interact. Due to poor attendance, students may be unable to answer their examinations. Khan et al. (1) reveals that learning institutions and stakeholders prepare children for perfect performance. Attending classes guide

learners to understand class expectations. Course guidance from class reduces the chances of choosing inaccurate virtual materials that can hurt their performance.

Introducing examinations improves medical education. Unfortunately, absentees may fail to complete a series of timed activities which influence their performance levels. Mokhtari et al. (3) and Anderson and Romm (4) state that students are assessed in their classes by observing how they respond to questions and other class activities. Therefore, absent students have limited class performance (Shaaban and Reda) (5).

The published literature concentrates on the overall student performance like Khan et al. (1), Gubbel's et al. (6), while none has looked at the different individual components of the examinations. This study will be unique in comparing the effect of absenteeism on

student grades in different component of examination like multiple choice questions (MCQ's), modified essay questions (MEQ), objective structured clinical exam (OSCE) and continuous assessment.

During the COVID-19 pandemic, learning was interrupted. Student's teachers and learning institutions changed their learning schedules as a strategy for achieving their goals. Many learners had challenges covering course content with minimal assistance from their tutors. This cohort who went online provides an opportunity to research on which components the students were deficient.

Qassim University has a well organised online platform as well as offline teaching facilities. There is a need to see the performance of the students who are having a higher absence rate in a particular examination component whether online or offline and how it affects their performance in all examination components. If a difference is found between the absent rate and performance in different components of examinations between the 2 groups, then this will enable educators to design a hybrid course by selecting best mode of delivery for each component.

2. OBJECTIVE

The prime objective of the study is to see the effect of absent rate on performance of students in different components of examinations individually. Finally, this effect was compared between the groups who had online teaching with those who had offline delivery of the similar course. This will enable to select the best mode of delivery for that component of the course.

3. MATERIAL AND METHODS

This is a quantitative, comparative study realized at Obstetrics and Gynecology course, College of medicine, University. It's an 8-credit hour course covered in 10 weeks and there are 3 batches each year. The evaluation tools are multiple choice questions (MCQ), modified essay questions (MEQ), objective structured clinical exam (OSCE), skill lab exam and oral case discussions (clinical component) and continuous assessment (which includes marks for quizzes, attendance, seminars and mid-term examination). Duration of the study was 6 weeks. Student's results presented and attendance from the Aug 2018- June 2019 (On-site) and cohort of Aug 2020-June 2021(online). Data of all 3 batches of both years was used and collected from the department record. Epi tool online calculator a sample of 90 students had a power of 80% and CI of 95%. (<https://epitools.ausvet.com.au/casecontrolss>)

Sampling technique of the study (with inclusion and exclusion criteria) was the next:

Inclusion criteria: Data of all students of three taught batches including males and females both online and offline were included in the study.

Exclusion criteria: students who dropped out the course were excluded

Data collection and analysis

The marks of MEQ, MCQ, clinical station and continuous assessment of both groups were recorded in SPSS. Group 1 included those who had on-site classes and group 2 included those who had online classes. SPSS (Statistical package

Variable	Frequency (%)
Group	
Online	123 (52%)
Physical	115 (48%)
Gender	
Male	158 (66%)
Female	80 (34%)
Repeater	
No	232 (97.5)
Yes	6 (2.5%)
Overall grade	
A	7 (2.9%)
B+	35 (15%)
B	43 (18%)
C+	44 (18%)
C	49 (21%)
D+	37 (16%)
D	17 (7.1%)
F	6 (2.5%)

Table 1: Tabulation of demographic characteristics

for social science) version 24 was used. Mean, median and Standard deviation from the mean were calculated. Linear regression models were fitted to investigate the relationship between the rate of absenteeism and the exam components that contribute to the final grade as outcomes. Consequently, estimates were reported per standard deviation (SD) increase or decrease. On top of the absenteeism rate as a predictor, we fitted models with group and gender on their own in univariable models, before including all three predictors (absenteeism rate, group and gender) in the final model. The results were presented next for each component in tabulated form.

Ethical considerations

Students names were kept anonymous and just the student numbers were used which were changed after giving a code before entering into SPSS. Ethical approval was sought from the regional committee numbered 23-61-11.

4. RESULTS

Demographic data

A total of 238 participants took part in the study, just over half of whom (52%) studied online, and 66% were males.

Variable	Mean (SD)	Median (IQR)	Minimum/Maximum
Overall mark	75 (8)	75.1 (69.3, 81.4)	51.9/94.1
MCQ marked out of 30	20.6 (3.5)	21 (18.5, 23.5)	9.5/28.0
MEQ marked out of 5	3.68 (0.70)	3.8 (3.3, 4.3)	1.3/4.9
OSCE marked out of 10	7.63 (1.17)	7.8 (6.9, 8.6)	3.8/9.8
Clinical marked out of 15	12.60 (1.13)	12.7 (11.8, 13.3)	9.2/15.0
Continuous assessment out of 40	30.7 (3.3)	31 (28.6, 33.0)	21.4/39.2
Absent rate %	8.0 (5.2)	6.9 (4.2, 11.3)	0/27.5

Table 2: Continuous outcomes. * All continuous variables were not normally distributed

	Unadjusted models			Adjusted model			
	Characteristic	Beta (95% CI)	p-value	R-squared	Beta (95% CI)	p-value	R-squared
MCQ	Absent rate %	-0.23 (-0.35, -0.10)	<0.001	0.048	-0.18 (-0.30, -0.06)	0.004	0.116
	Group						
	Physical	—	—		—	—	
	Online	0.60 (0.35, 0.84)	<0.001	0.086	0.55 (0.30, 0.79)	<0.001	
	Gender						
	Female	—	—		—	—	
MEQ	Absent rate %	-0.14 (-0.26, -0.01)	0.036	0.014	-0.12 (-0.25, 0.01)	0.075	0.024
	Group						
	Physical	-	-		---	--	
	Online	0.16 (-0.09, 0.42)	0.21	0.002	0.14 (-0.12, 0.39)	0.299	
	Gender						
	Female	--	--	--	--	--	
OSCE	Absent rate %	-0.16 (-0.29, -0.03)	0.014	0.021	-0.15 (-0.27, -0.02)	0.025	0.017
	Group						
	Physical	--	--	--	---	---	
	Online	0.17 (-0.09, 0.42)	0.201	0.003	0.12 (-0.14, 0.38)	0.356	
	Gender						
	Female	---	---	---	----	---	
CLINICAL	Absent rate %	-0.18 (-0.30, -0.05)	0.006	0.028	-0.19 (-0.32, -0.06)	0.004	0.023
	Group						
	Physical	---	---	---	----	----	
	Online	-0.06 (-0.32, 0.19)	0.619	0.001	-0.13 (-0.38, 0.13)	0.330	
	Gender						
	Female	----	---	---	----	----	
CONTINUOUS ASSESSMENT	Absent rate %	-0.28 (-0.40, -0.16)	<0.001	0.074	-0.24 (-0.37, -0.12)	<0.001	0.109
	Group						
	Physical	---	---		----	---	
	Online	0.49 (0.25, 0.74)	<0.001	0.057	0.42 (0.17, 0.66)	0.001	
	Gender						
	Female	---	---		----	----	
	Male	-0.05 (-0.32, 0.22)	0.702	0.001	-0.03 (-0.29, 0.22)	0.791	

Table 3: Association of absenteeism and other demographic factors on MCQ MEQ, OSCE , clinical score. MCQ = -0.18*Absent + 0.55*Group - 0.13*Gender CI = Confidence Interval

Only 6 participants in the sample (2.5%) were repeaters. Overall grades ranged from A to F, with around one third scoring a B or B+, 39% scoring a C or C+, while the rest had lower grades (Table 1).

Continuous variables

Overall, students scored an average mark of 75%, range 51.9-94.1%. For the MCQ, the mean score out of 30 was 20.6, the mean MEQ out of 5 was 3.7, the OSCE out of ten was 7.6. The average clinical score was 12.6 out of 15.0.

While on average, students scored 30.7 out of 40 in the continuous assessment. The mean absenteeism rate was 8% (Table 2).

Regression models

Linear regression models were fitted to investigate the relationship between the rate of absenteeism and the exam components that contribute to the final grade as outcomes. Each component was explored to test if the observed data followed the normal distribution as detailed above. Since none of the exam components were normally distributed, we loge-transformed and Z-standardized each of the outcomes as well as the predictor absenteeism rate. Consequently, estimates are reported per standard deviation (SD) increase or decrease. On top of the absenteeism rate as a predictor, we fit models with group and gender on their own in univariable models, before including all three predictors (absenteeism rate, group and gender) in the final model. The results are presented next for each component.

Absenteeism on MCQ

In the univariable models, each SD increase in the absenteeism rate was associated with a 0.23 SD lower MCQ score, and this was significant, $p < 0.001$. Students who studied online, had a 0.6SD higher grade than their counterparts who attended physically ($p < 0.001$), while there were no significant differences in the MCQ30 score by gender. When included determinants together in the multivariable model, higher absenteeism rate was still associated with a significantly lower MCQ score, although the effect was attenuated (Beta: -0.18 vs -0.23). Students who studied online again scored higher than those who attended physically, although the effect was again slightly smaller, (Beta: 0.55 vs 0.60). Finally, gender was again not associated with the MCQ score. The absenteeism rate, group and gender on their own explained 4.8%, 8.6% and 0.4% of the variation in the MCQ grade, while together, they explained 11.6% of the variation in the outcome (Table 3).

Absenteeism on MEQ

In the univariable models, each SD increase the absenteeism rate was associated with a 0.14 SD lower MEQ5 score, and this was significant ($p = 0.036$), Table 3 Both group and gender were not associated with the MEQ score in the univariable models. Upon adjustment for the demographic factors, the effect of the absenteeism rate was smaller (Beta: -0.12 vs 0.14) in the multivariable model, and non-significant. Both group and gender were again not associated with the MEQ score. The absenteeism rate, group and gender on their own

Variable	Unadjusted models			Adjusted model		
	Beta (95% CI)	p-value	R-squared	Beta (95% CI)	p-value	R-squared
Absent rate %	-0.26 (-0.39, -0.14)	<0.001	0.065	-0.23 (-0.35, -0.11)	<0.001	
Group						
Physical	—	—		—	—	
Online	0.49 (0.24, 0.73)	<0.001	0.055	0.41 (0.17, 0.66)	0.001	0.099
Gender						
Female	—	—		—	—	
Male	-0.04 (-0.31, 0.23)	0.767	0.000	-0.02 (-0.28, 0.23)	0.849	

Table 4. Association of absenteeism and other demographic factors on overall score. R2 for models, Percentages for the bar plots (y-axis)

explained 1.4%, 0.2% and 1.2% of the variation in the MEQ grade, while together, they explained 2.4% of the variation in the outcome (Table 3).

Absenteeism on OSCE

In the univariable models, each SD increase the absenteeism rate was associated with a 0.16 SD lower OSCE score, and this was significant ($p = 0.014$), Table 3 Both group and gender were not associated with the OSCE score in the univariable models. Upon adjustment for the demographic factors, the effect of the absenteeism rate was smaller (Beta: -0.16 vs -0.15) in the multivariable model and it was still significant ($p = 0.025$). Both group and gender were again not associated with the OSCE score. The absenteeism rate, group and gender on their own explained 2.1%, 0.3% and 0.1% of the variation in the OSCE grade, while together, they explained 1.7% of the variation in the outcome (Table 3).

Absenteeism on clinical

In the univariable models, each SD increase the absenteeism rate was associated with a 0.18SD lower clinical score, and this was significant ($p = 0.006$), Table 3 Both group and gender were not associated with the clinical score in the univariable models. Upon adjustment for the demographic factors, the effect of the absenteeism rate was slightly bigger (Beta: -0.19 vs -0.18) in the multivariable model and it was still significant ($p = 0.004$). Both group and gender were again not associated with the clinical score. The absenteeism rate, group and gender on their own explained 2.8%, 0.1% and 0% of the variation in the clinical grade, while together, they explained 2.3% of the variation in the outcome (Table 3).

Absenteeism on continuous assessment

In the univariable models, each SD increase in the absenteeism rate was associated with a 0.28 SD lower continuous assessment score, and this was significant, $p < 0.001$. Students who studied online, had a 0.49 SD higher grade than their counterparts who attended physically ($p < 0.001$), while there were no significant differences in the continuous assessment score by gender. When included together in the multivariable model, a higher absenteeism rate was still associated with a significantly lower continuous assessment score, although the effect was attenuated (Beta: -0.28 vs -0.24). Students who studied online again scored higher than those who attended physically, although the effect was again slightly smaller, (Beta: 0.42 vs 0.49). Finally, gender was again not associated with the continuous assessment score. The absenteeism rate,

group and gender on their own explained 7.4%, 5.7% and 0.1% of the variation in the continuous assessment grade, while together, they explained 10.9% of the variation in the outcome (Table 3).

Absenteeism on overall marks

In the univariable models, each SD increase in the absenteeism rate was associated with a 0.26 SD lower overall score, and this was significant, $p < 0.001$. Students who studied online, had a 0.49 SD higher grade than their counterparts who attended physically ($p < 0.001$), while there were no significant differences in the overall score by gender. When included together in the multivariable model, a higher absenteeism rate was still associated with a significantly lower overall score, although the effect was attenuated (Beta: -0.23 vs -0.26). Students who studied online again scored higher than those who attended physically, although the effect was again slightly smaller, (Beta: 0.41 vs 0.49). Finally, gender was again not associated with the overall score. The absenteeism rate, group and gender on their own explained 6.5%, 5.5% and 0% of the variation in the overall grade, while together, they explained 9.9% of the variation in the outcome (Table 4 and Figure 1).

5. DISCUSSION

The effect of absenteeism was very clear in the overall exam result as well as most of the exam components, this makes sense as the effect on the exam components will definitely be reflected on the final result. Also, positive effect of the online teaching was detected in the (MCQs) component of the exam which was also reflected on the final result, while no significant gender variation was detected in this study.

The performance of absent students in multiple-choice questions (MCQ) was clearly lagging behind their counterparts who attended physically, this may be due to deficient information that enables them to choose the correct answer from the pre-determined options. Missing class discussions and important class routines limit absent students from accessing information that enables them to perform well (6) also, It was found that the students that practiced options justification "which usually conducted during class sessions" perform significantly better than those who do not practice options justification (7).

The effect of absenteeism on the objective structured clinical exam (OSCE) was similar to the effect on the MCQs. OSCE is conducted in a simulated clinical environment and it continues to play an important role in clinical assessments due to its perceived fairness and standardization, yet the students may need help accessing the stipulated OSCE environment. It was found that a single OSCE training session leads to an improvement in OSCE scores (8) thus, student absence from those important sessions may result in missing critical knowledge and can affect their exam results.

The scores in the clinical component of the exam were again clearly affected by absenteeism. This reflects the importance of hands-on teaching for acquiring knowledge and bridging it with the practical skills (9), which cannot be achieved except through direct communication.

Modified essay questions (MEQs) scores were the only exam component that is not affected by absenteeism as the results of absent students were almost similar to their counterparts who physically attended the sessions. Recent research

suggested that answering case scenario questions and short answer questions is more dependent on students cognitive skills (10) which can usually be acquired without tutor assistance.

Due to many causes absent students cannot build and sustain smooth relations with their teachers and class mates. Poor class relationships sabotage the overall class performance (11), as absentees may have problems with their group members due to their limited team contribution (12), the need for more work by the other group members to cover the absent ones and due to absentees dependence on the group members to have notes and information of the missed classes (13). As a result, other learners may discriminate against them. Due to that, other students may prefer to have groups with their friends with perfect class attendance. Besides, many absentees rely on their friends for notes and information about missed classes. Absentees can be demoralized when they fail to have critical course materials and notes covered when they are away (14). Missing course materials interfere with examination preparations (15).

Similarly, student-teacher relationship have positive correlations with self-confidence, self-esteem and thus, academic performance along extracurricular achievements (16). Teachers mostly struggle to create and sustain relationships when students fail to attend class but, they usually fail to recognize students' personalities due to poor class attendance. It is recommended that teachers should strive to have perfect relationships with their learners to facilitate learning. Regrettably, chronic absentees may be unavailable to build and sustain such relationships (17).

Surprisingly, in this study the exam scores of the groups who had online teaching were higher than those who had on-site teaching in the MCQs component and in the overall result, which agrees with a previous study that reveals positive impact on student knowledge when e-learning systems were used (18). Also, in our cohort there were no significant score differences in MEQs, OSCE and clinical between the online and onsite students which also agrees with a systemic review of more than 19 studies which suggested that online learning of clinical skills is equivalent to learning by the traditional means (19). This may raise the concept of blended learning as an ideal learning strategy (20).

Although plethora of published research has found a difference of performance between genders. this study failed to show any gender variation in the exam result. Some researchers reported higher scores by female students (21). Others stated that although females perform well in all tests but this is not the case in university entrance examinations (22) and in longer cognitive tests (23), which may justify the results of this study. However, the academic performance of students depends on many factors including gender, familial support, students' e-learning activity (24), teaching institution factors (25) and attendance.

Hence attendance positively influence the academic performance (26), Education stakeholders and learning institutions developed policies that keep students at school and increase attendance related motivation. Awarding grades for best class attendance and setting penalties for absenteeism are examples for such policies. Awarding grades for class attendance is a strategy learning institutions are using to curb increasing

student absenteeism (5). Students usually assessed in their classes by observing how they respond to questions and other class activities (4). Therefore, chronic absentees have limited class performance and poor grades. Due to that, these learners ensure that they attend their classes to avoid losing marks for poor class attendance. Many schools have class registers to identify absent students. School and course registers are critical in determining students' performance. Similarly, teachers fail to achieve their goals due to poor class attendance, online classes and Awarding digital badges are suggested suitable alternatives for some absent learners (27).

In order to determine students' performance, we also award grades for class attendance as a part of the continuous assessment as a strategy adopted by our institutions to curb the increasing student absenteeism. Also, we have registers for all educational activities.

In short the effect of absenteeism was very clear in the overall exam result as well as most of the exam components, this makes sense as the effect on the exam components will definitely be reflected on the final result. Also, positive effect of the online teaching was clear in the (MCQs) and the final result, while no significant gender variation detected in this study.

6. CONCLUSION

In the univariable models, each SD increase in the absenteeism rate was associated with a 0.23SD lower MCQ score, and this was significant, $p < 0.001$. Students who studied online, had a 0.6SD higher grade than their counterparts who attended physically ($p < 0.001$),

In the univariable models, each SD increase the absenteeism rate was associated with a 0.14SD lower MEQ5 score, and this was significant ($p = 0.036$), Table 4. Both group and gender were not associated with the MEQ score in the univariable models.

For OSCE in the univariable models, each SD increase the absenteeism rate was associated with a 0.16SD lower OSCE score, and this was significant ($p = 0.014$), group and gender were not associated with the OSCE score in the univariable models

Clinical In the univariable models, each SD increase the absenteeism rate was associated with a 0.18SD lower clinical score, and this was significant ($p = 0.006$), Table 6. Both group and gender were not associated with the clinical score in the univariable models

In the univariable models, each SD increase in the absenteeism rate was associated with a 0.28SD lower continuous assessment score, and this was significant, $p < 0.001$. Students who studied online, had a 0.49SD higher grade than their counterparts who attended physically ($p < 0.001$), while there were no significant differences in the continuous assessment score by gender.

In the univariable models, each SD increase in the absenteeism rate was associated with a 0.26SD lower overall score, and this was significant, $p < 0.001$. Students who studied online, had a 0.49SD higher grade than their counterparts who attended physically ($p < 0.001$), while there were no significant differences in the overall score by gender.

Limitation of the study

Research covered a major public higher teaching institute in

a few regions and we expect that the situation represents the possible situation in other regional institutes.

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