

Description of Medical Students' Behavioral, Cognitive, and Psychological Engagement with Faculty Online Teaching Styles

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Purpose: The teacher-student dyad is the heart of an institute. A teacher's instructional role significantly influences the student engagement that indirectly measures the institutional outcome. The online transition of medical education changed the milieu of medical education where a virtual link between teacher and student is the only hope for the learner to continue the learning. There were no studies on the relationship between student engagement and teaching styles during online medical education.

Patients and Methods: The present study was an online survey-based descriptive study on medical undergraduates from two universities in the United Arab Emirates. Google forms containing consent statements, teaching styles inventory in higher education (TSIHE), and online student engagement questionnaires were emailed to all medical students requesting to participate in the study. Completed survey questionnaires were analyzed descriptively for the degree of student online engagement, and a chi-square test was used to correlate the relation between faculty online instructional methods and students' engagement.

Results: A total of 423 of 927 students from two universities participated in the survey. There was no significant perception difference among the students from the two universities regarding their faculty online teaching styles. Thirty-three percent of students at first university and 41% of second university students showed engagement during online classes, which is statistically significant. However, the degree of students' disengagement from both universities was high compared to their engagement for online classes. Both university students' cognitive and behavioral engagement was moderate to strongly correlated with four domains of teaching style. Interestingly, there was no correlation between online faculty instructional methods and students' psychological engagement from both the universities.

Conclusion: The present study establishes the relationship between students' cognitive and behavioral engagement and teaching instructional practices. However, there is a need to develop robust evidence on students' psychological engagement and the influencing factors during online and blended contexts.

Keywords: student engagement, teaching styles, perceptions, online medical education, relationships between teaching style and student engagement

Introduction

Most medical students are capable learners, and they can quickly achieve the learning outcomes with little guidance from an excellent medical teacher. It is not the transfer of knowledge, but the interaction between a good teacher and the student makes a significant transformative change in the efficiency and quality of the learner into a desirable doctor a community would expect.¹

According to pedagogical social learning theory,² learning and thinking are social activities, and the learning environment influences thinking. Learning also depends on the personal capabilities, the motivation that drives the learning, goals, place of learning, and the learning style. Students accept less teaching and learning activities when they do not match their needs. Hence, teachers need to change the strategies suitable to the changing learners' learning and engagement behaviors.¹ Medical student engagement is an enigmatic multifaceted meta-construct represented by a bio-ecological model.³

Hence, medical teaching is one of the crucial influences on student engagement during on-campus medical teaching-learning activities. The global lockdown due to recent COVID-19 pandemic forced to change undergraduate medical teaching environment from traditional classroom to virtual classroom, giving a short time in reorganizing the teaching methods to tele teaching technologies as a substitute for in-person lectures. The modifications in the teaching-learning environment are not only a necessity but will also lay the foundation for innovations in medical education.⁴ However, significant challenges for effective online teaching and learning in medical education are a lack of sense of belongingness and connectedness, lack of student engagement, distractions, and technical issues.⁵

Students' effective and efficient learning depends on the quality of teaching in blended learning that harms learners' engagement. Hence, it emphasizes the outcome-based learning is more important than the learning process.³ The teaching style includes instructional behaviors such as how teachers provide information, and how they communicate with students during the teaching-learning process.⁶ The teaching style is an implicit attribute of a teacher who has different styles based on their perception of class, pedagogical teaching principles, and learners' learning capabilities.⁷ Student engagement is a complex term whose definition was not consistent, and different methods were used to measure student engagement in the literature. There is no broad conceptual framework to understand how the students engage in the classroom and how the teacher plays a role in student engagement.⁸ Attention span, interest, curiosity, and passion determine student engagement in learning.⁹ A sudden shift in medical teaching to virtual platforms led to research on learner engagement and teaching effectiveness during online continuous medical education.¹⁰ Furthermore, there is plenty of research on how student engagement can be improved by using different methods during online didactic lectures.^{11,12} The complexity of student engagement during online learning and the importance of teacher instructional role in student engagement are considered in planning the present study. The study was taken up to understand how the teachers' instructional attributes correlate with the learner's cognitive, psychological, and behavioral engagement. This study hypothesizes that the expansion of teacher role towards developing connectedness with students during virtual teaching-learning activities will motivate the learners towards psychological, behavioral, and cognitive engagement.

Materials and Methods

The present study is a quantitative cross-sectional opinion survey that uses prevalidated student engagement scale (Figure 1) and teaching style inventory in higher education (TSIHE) (Figure 2).

The study population was all medical undergraduate students who attended large-group online lectures at Gulf Medical University (GMU) and Ras Al Khaimah Medical and Health Sciences University (RAKMHSU) during 2020–21 academic year. The study population included was 447 and 450 of undergraduate students from basic sciences and clinical sciences of GMU and RAKMHSU, respectively.

After obtaining the ethical approval (RAKMHSU-REC-143-2020-21-F-M & IRB/MHPE/STD/10/April-2021) from the RAKMHSU ethics committee and GMU Institutional Review Board (IRB) and permission from the Dean of Medical College, the email addresses of all the MBBS undergraduates were collected. The undergraduate students were individually emailed a Google form that contained both a student engagement questionnaire, TSIHE, and consent. The students were requested to voluntarily participate in the survey by answering all the teaching style and student engagement questionnaire items. The statements in the TSIHE questionnaire were modified as perceptions of the students on faculty teaching styles without changing any meaning of the statements.

Total 45.63% (423 of 927) of undergraduate students participated in the survey, which was considered a good sample size. Demographic data of the samples from both universities were comparable (Table 1).

ITEM NO	QUESTION	LIKERT SCALE					ITEM NO	QUESTION	LIKERT SCALE				
		Strongly agree	Mostly agree	Not Sure	Mostly disagree	Strongly disagree			Strongly agree	Mostly agree	Not Sure	Mostly disagree	Strongly disagree
Psychological Engagement						Cognitive Engagement							
Psychological Motivation						Cognitive Problem Solving							
1	Online classes enhance my interest in learning						16	I can drive new interpretations and ideas from the knowledge I have learned in my online classes					
2	I am motivated to study when I take an online class						17	I can deeply analyze thoughts, experiences, and theories about the knowledge I have learned in my online classes					
3	Online classes are very useful to me						18	I can judge the value of the information related to the knowledge learned in my online classes					
4	It is very interesting to take online classes						19	I tend to apply the knowledge I have learned in online classes to real problems or new situations					
5	After taking an online lesson, I look forward to the next one						20	I try to approach the subject of my online class with a new perspective					
6	I am satisfied with the online class I am taking						Peer collaboration						
Community Support						21	I study the lesson contents with other students						
7	I feel a connection with the students who are in my online classes						22	I try to solve difficult problems with other students when I encounter them					
8	I feel a sense of belonging to the online class community						23	I work with other students on online projects or assignments					
9	I frequently interact with other students in my online classes						24	I ask other students for help to understand a concept taught in my online class					
Behavioral Engagement						25	I try to answer the questions that other students ask						
Interaction with Instructors						Student engagement dimension		Sub domain	No. of items	Cronbach's alpha			
10	I communicate with the instructor privately for extra help						Cognitive Engagement	CPE	5	0.926	0.901		
11	I often ask the instructor about the contents of the lesson							PC	5	0.828			
Learning Management						Psychological Engagement		PM	6	0.960	0.951		
12	I study related learning content by myself after the online lesson							CS	3	0.894			
13	I remove all distracting environmental factors when taking online classes						Behavioral Engagement		II	2	0.834	0.860	
14	I manage my own learning using the online system							LM	4	0.853			
15	When I take an online course, I plan a learning schedule						Total		25	0.957			

Figure 1 Online Student engagement scale.

Note: Adapted from Lee J, Song HD, Hong AJ. Exploring factors, and indicators for measuring students' sustainable engagement in e-learning. *Sustainability*. 2019;11. Creative Commons.¹⁵

Abbreviations: CPE, Cognitive Problem Solving; PC, Peer Collaboration; PM, Psychological Motivation; CS, Community Support; II, interaction with instructor; LM, Learning Management.

Instruments Used in the Study

Teaching Styles Instrument

Teaching Style Inventory in Higher Education (TISHE) was a prevalidated instrument by collecting data from 3312 university students to measure the teachers' teaching styles.¹⁴ This instrument consists of twenty-eight items that measure four constructs, namely teacher–student interaction (TSI) with ten items, decision-making negotiation (DMN), teaching structuring (TS), and behavioral control (BC) with six items each. The reliability of items within the construct and between the constructs was excellent, with Cronbach's alpha value 0.974.

Answers from the participants were collected using a four-point Likert scale with one completely agreeing, two as agree, three as disagree, and four completely disagreed for each item of TSIHE. The teaching style constructs were classified into two categories based on Likert scale scores. Teacher Student Interaction was grouped into emotionally attached and emotionally detached, whereas decision-making negotiation was grouped into compromised with decision-making and authoritarian. Similarly, the teaching structuring domain was grouped as flexible and rigid. Strict and Lenient were the two groups for the behavioral control domain.

Student Engagement Instrument

The instrument used for student engagement was a prevalidated student engagement scale for e-learning on 737 Korean university students.¹⁵ The instrument contains twenty-five (25) items and three cognitive, psychological, and behavioral engagement constructs. Each main domain of student engagement is a combination of two sub-constructs. Cognitive engagement is due to cognitive problem solving tested by five items, and peer collaboration contains five items. At the

ITEM NO	QUESTION	LIKERT SCALE				ITEM NO	QUESTION	LIKERT SCALE			
		Completely agree	Mostly agree	Mostly disagree	Completely disagree			Completely agree	Mostly agree	Mostly disagree	Completely disagree
Teacher Student Interaction					Teaching Structuring						
1	Acts as mediator when a conflict exists between students					17	Begins the class session by presenting the activities that will be developed				
2	Students can approach to share their personal problems					18	Carries out clearly established routines during the class session				
3	Identifies the group's emotional environment, considering it in the development of the course					19	Provides feedback on students' performance throughout the semester				
4	Manifests interest in students' wellbeing beyond the academic context					20	Develops the course following a clear structure				
5	Shows interest in getting to know and bonding with students					21	Makes the assessments described in the syllabus				
6	Has a close relationship with students					22	Is strict with work delivery times				
7	Recognizes individualities within the group					Behavioral Control					
8	Generates a socialization space before beginning the class					23	Pays constant attention to all bad behavior				
9	Greets the students outside the classroom					24	Confronts students when they exhibit an inappropriate behavior				
10	Is concerned for individual students' progress					25	Constantly controls and monitors that the student fulfills the designated role for the class				
Decision Making Negotiation					26	Generates corrective actions when they see that one or several students are not paying attention					
11	Is flexible with the activities proposed in the syllabus					27	Ensures there is silence when they or a student is talking				
12	Prefers to reach agreements rather than impose decisions					28	Demands, from the students, appropriate behavior during the course				
13	In consensus with the students, the classroom rules are set (schedule, recess, use of mobile phones)					Teaching style classification based on Likert scale scores: TSI = Emotionally Attached/ Emotionally detached DMN = Compromised/ Authoritarian TS = Flexible/Rigid B.C = Lenient/Strict					
14	Faced with unforeseen situations, the teacher agrees with students the actions to be followed										
15	Adjusts course subject matters to the group's interests and needs										
16	Listens and considers the student's reasons when they make a mistake										

Figure 2 Teaching style inventory in Higher Education.

Note: Adapted from Abello, Alonso-Tapia, Panadero. Development and validation of the teaching styles inventory for higher education (TSIHE). *Anales de Psicología*. 2020;36:143–154.¹⁴.

Abbreviations: TSI, Teacher Student Interaction; DMN, Decision-Making Negotiation; TS, Teaching Structuring; B.C, Behavioral Control.

same time, psychological engagement is a combination of psychological motivation tested by five items and community support tested by three items. Similarly, behavioral engagement contains interaction with the instructor tested by two items and learner management by four items. The reliability of items within the construct and between the constructs was excellent, with Cronbach's alpha value 0.901.

A five-point Likert scale measured each item of the student engagement scale with one completely agreeing, two agree, three not sure, four disagree, and five as completely disagree. The three domains of student engagement were grouped based on Likert score into engaged and disengaged.

Data Analysis

The data collected was analyzed by using Statistical Package for Social Sciences (SPSS) software 22. Both descriptive and inferential statistics were used for data analysis. Descriptive statistics were used for analyzing the students' responses to the questionnaires. The difference in the student engagement and the perceptions of their faculty teaching styles among both university students was analyzed by using by unpaired Student's *t*-test. Lambda coefficient was used for correlation between the four domains of teaching styles as perceived by the students and their psychological, behavioral, and cognitive engagement during online teaching. The results from both the universities were compared to exclude biases and identify contextual differences in the student engagement. To keep the results anonymous the universities were named as university 1 and university 2. Conclusions were made based on the results.

Results

The majority of students from both the universities perceived that their faculty were emotionally attached during teacher-student interaction, compromised in decision-making negotiations, flexible in teaching structure, and were lenient in behavioral control of the class (Table 2). Though university 2 students perceived more positively than the university 1

Table 1 Demographic Data of Study Population

Study group	UNIVERSITY 1		UNIVERSITY 2	
MBBS year batch	Number of students	Percentage Responded (n)	Number of students	Percentage Responded (n)
Year 1	108	51.8 (56)	102	40.2 (41)
Year 2	100	47 (47)	99	38.3 (38)
Year 3	95	36.84 (35)	81	49.38 (40)
Year 4	90	46.6 (42)	86	52.32 (45)
Year 5	84	47.6 (40)	82	47.6 (39)
Total	477	46.12 (220)	450	45.11 (203)
Gender				
Female		72.7 (160)		70 (142)
Male		27.3 (60)		30 (61)
Nationality				
MENAR		31.36 (69)		28.07 (57)
ASIAN		46.82 (103)		53.69 (109)
WESTREN		11.36 (25)		6.4 (13)
Not mentioned		10.45 (23)		11.82 (24)

Notes: Demographic and response rates of study population from both the universities.

Abbreviation: MENAR, Middle East and North African Region.

Table 2 Online Teaching Styles of Faculty as Perceived by Students

TEACHING STYLES PERCEPTION			
Faculty online Instruction styles	UNIVERSITY 1 % (n)	UNIVERSITY 2 % (n)	p-value
Teacher Student Interaction			
Emotionally Attached	63.7 (140)	67.5 (137)	0.12
Emotionally Detached	36.3 (80)	32.5 (66)	
Decision Making Negotiation			
Compromised	66.8 (147)	73.4 (149)	0.06
Authoritarian	33.2 (73)	26.6 (54)	
Teaching Structure			
Flexible	69.6 (153)	77.3 (157)	0.15
Rigid	30.5 (67)	22.7 (46)	
Behavior Control			
Lenient	70.5 (155)	76.8 (156)	0.12
Strict	29.5 (65)	23.2 (47)	

Notes: Comparison of faculty online teaching styles as perceived by the students from both the universities is comparable with no statistical significance.

students about their faculty online teaching style, there was no statistical difference among the students from both the universities on perception of their faculty's online instructional style.

Student Engagement During Online Teaching

During the online classes, 64% of students from university 1 and 52% of students from university 2 were disengaged; maximum disengagement was seen in the psychological domain with 70.5% from university 1 and 68.5% from university 2. Around 36% of the students from university 1 were engaged, of which the maximum (46%) engagement was in the cognitive domain, followed by the behavioral domain (40%) and a minor engagement was in the psychological domain (22%), whereas 61%, 52%, and 31.5% of university 2 students showed a good amount of cognitive, behavioral, and psychological engagement compared to university I students. Though the difference in the degree of student engagement as a whole was statistically significant among students from both the universities, when compared the three domains of student engagement across the level of study, both university students showed no statistically significant difference in their engagement in all 3 domains (Tables 3 and 4). The overall difference is due to more cognitive engagement of first two years of students from university 1 where a dedicated faculty in basic sciences was involved in teaching. Similarly, better psychological engagement was seen among two final clinical year students from the university 2 where a dedicated clinical faculty was involved in teaching. In both universities, there was a significantly lower overall engagement among 3rd year students in university 1 and 2nd year students in university 2 who were in transition from basic sciences to clinical sciences.

Lambda co-efficient was calculated by non-parametric analysis using crosstabs for nominal data to determine the strength of association between the four domains of teaching styles and the three domains of student engagement. The zero value of Lambda co-efficient was considered no association, whereas weak association when Lambda coefficient was 0.01–0.9. Similarly, moderate association and evidence of strong associations were considered if the lambda coefficients were 0.1 to 0.29 and 0.30–0.99, respectively. Finally, a perfect association was considered when the lambda coefficient was 1.

Students' cognitive engagement moderately to strongly correlated with faculty decision-making negotiations style during online teaching. At the same time, there was a moderate correlation between students' cognitive engagement and faculty teacher–student interactions style, behavioral control, and faculty teaching structure style (Table 5).

Table 3 Students' Engagement During Online Teaching

STUDENT ENGAGEMENT			
Engagement domain	UNIVERSITY 1 % (n)	UNIVERSITY 2 % (n)	P value
Cognitive engagement			
Engaged	45.5 (100)	61 (124)	0.001
Disengaged	54.5 (120)	39 (79)	
Behavioral engagement			
Engaged	40.5 (89)	51.7 (105)	0.014
Disengaged	59.5 (131)	48.3 (98)	
Psychological engagement			
Engaged	21.8 (48)	31.5 (64)	0.002
Disengaged	78.2 (172)	68.5 (139)	
Overall engagement	35.8% (79)	48% (97)	0.09

Notes: Both university students had a statistically significant difference in cognitive, behavioral, and psychological engagement, though overall engagement difference among both university students was insignificant.

Table 4 Difference in Students' Engagement for Online Teaching Across the Educational Level

	UNI 1	UNI 2		UNI 1	UNI 2		UNI 1	UNI 2	
Year of study	Cognitive engagement %		p-value	Behavioral engagement %		p-value	Psychological engagement %		P-value
Year 1	59	58.5	0.15	44.6	39	0.22	21.4	17	0.06
Year 2	46.8	42		44.7	34		25.5	29	
Year 3	40	62.5		31.4	57.5		11.4	57.5	
Year 4	54.8	57.8		59.5	60		38.1	57.8	
Year 5	20	61.5		15	74.4		10	66.6	

Notes: No statistically significant difference was observed in the three domains of student engagement across the level of study. Both universities showed an observable low engagement among the transition year students (3rd year in University 1 and 2nd year in university 2).

Table 5 Relationship Between Four Teaching Styles and Online Student Cognitive Engagement

Student Engagement vs Teaching Styles	Cognitively Engaged F (n)		Cognitively Disengaged F (n)		Lambda Coefficient λ	
	University 1	University 2	University 1	University 2	University 1	University 2
Teacher student interaction						
Emotionally attached	77	110	63	27	0.235(M)	0.165(M)
Emotionally detached	23	27	57	39		
Decision Making Negotiation						
Compromised	79	107	68	42	0.363(S)	0.241 (M)
Authoritarian	21	17	52	37		
Teaching Structure						
Flexible	88	92	65	63	0.061 (W)	0.266(M)
Rigid	12	13	55	33		
Behavioral Control						
Lenient	86	115	69	41	0.171 (M)	0.278(M)
Strict	14	13	51	34		

Notes: Moderate to strong correlation between both university students' cognitive engagement and all the domains of their faculty online teaching styles.
Abbreviations: S, strong; M, moderate; W, weak.

The students' behavioral engagement had a strong correlation with teaching student interaction, decision-making negotiations, and teaching structuring styles, whereas there was no correlation between behavioral engagement and behavioral control teaching style among the university 1 students. However, the university 2 students' behavioral engagement was moderately correlated with all four domains of teaching styles (Table 6) during online classes.

Overall, the psychological engagement during online classes was very low among the students. Interestingly, there was no correlations between the four domains of teaching styles and students' psychological engagement (Lambda coefficient zero) (Table 7).

Table 6 Relationship Between Four Teaching Styles and Online Student Behavioral Engagement

Student Engagement vs Teaching Styles	Behaviorally Engaged F (n)		Behaviorally Disengaged F (n)		Lambda Coefficient λ	
	University 1	University 2	University 1	University 2	University 1	University 2
Teacher student interaction						
Emotionally attached	77	87	63	50	0.310(S)	0.193 (M)
Emotionally detached	12	18	68	48		
Decision Making Negotiation						
Compromised	76	92	71	57	0.934 (S)	0.193(M)
Authoritarian	13	13	60	41		
Teaching Structure						
Flexible	79	93	61	64	0.808 (S)	0.216 (M)
Rigid	10	12	70	34		
Behavioral Control						
Lenient	76	96	79	60	0.00 (N)	0.295 (M)
Strict	13	60	52	96		

Notes: There was a strong correlation between both university 1 students' behavioral engagement and first three domains of their faculty online teaching styles, whereas in university 2 students, there was a moderate correlation between behavioral engagement and all four domains of their faculty online teaching styles.
Abbreviations: S, strong, M, moderate N, No correlation.

Table 7 Relationship Between Four Teaching Styles and Online Student Psychological Engagement

Student Engagement vs Teaching Styles	Psychologically Engaged F (n)		Psychologically Disengaged F (n)		Lambda Coefficient λ	
	University 1	University 2	University 1	University 2	University 1	University 2
Teacher student interaction						
Emotionally attached	41	57	99	80	0.000(N)	0.000(N)
Emotionally detached	7	7	73	59		
Decision Making Negotiation						
Compromised	44	59	103	90	0.000(N)	0.000(N)
Authoritarian	4	5	69	49		
Teaching Structure						
Flexible	44	60	96	97	0.000(N)	0.000(N)
Rigid	4	4	76	42		
Behavioral Control						
Lenient	41	4	114	43	0.000(N)	0.000(N)
Strict	7	9	58	38		

Notes: There was no correlation between psychological engagement of both university students and all the domains of their faculty online teaching styles.
Abbreviation: N, No correlation.

Discussion

There is an increasing emphasis on student engagement as a strong predictor of student and institutional outcomes.¹³ However, it is not an individual but a complex, multifaceted construct influenced by content, interactions, and context. Multiple teachers' instructional behaviors are one of the influencing factors at the micro-level, as revealed in the present study and other supporting studies.^{4,16–21} Due to the uncertainty of environmental influences and contexts, students were considered "differently engaged"²² rather than disengaged.

The present study showed a uniformity in student engagement among gender, region, and basic sciences and clinical sciences students. Similar findings were seen in some of the studies,¹⁹ and some found that there were gender, regional, and educational level differences in the engagement of males being more familiar with new technologies.^{23–25}

Interestingly, there was a significant decline in all domains of student engagement in third-year medical students of university 1 and in second-year students of university 2. These years were in transition from modular teaching to clinical exposure which was crucial for students' experiential learning. These middle years medical graduates' disengagement can be explained by the critical transition, unpreparedness for online education, and clinical attachment loss might have created psychological insecurity, demotivation, and disinterest. This point was supported by a mixed-method study using virtual simulations with increased engagement and other studies.^{26–30}

The present study found a strong correlation between cognitive engagement and decision-making negotiation teaching style in university 1 students and moderate correlation in university 2 students. Students' ability to solve knowledge-related problems and peer collaboration are essential factors for cognitive engagement. During online classes, student-teacher partnership in the decision-making of learning activities encourages the student's autonomy and peer collaboration. It was similarly shown in a multi-center study on the effect of teaching style on online student engagement and learning experiences,^{31,32} supporting the present study's findings.

We found a moderate correlation between cognitive engagement and teacher-student interaction, behavioral control teaching styles in both university students. Student knowledge acquisition and problem-solving behaviors were encouraging with an emotional attachment during teacher-student interaction and a strict behavioral control teaching style. The finding was similar to in-class engagement of the students in active learning where the cognitive process, verbal and non-verbal learner behaviors co-occur through good interaction with instructors.³³ There was a weak correlation between student cognitive engagement and teaching structuring in university 1 students and a moderate correlation in university 2 students. Flexibility in teaching structuring engaged the students cognitively than rigid teaching structure. Online flexible teaching structure is an immediate micro-environment management that influences the student interest in cognitive learning.³⁴ While using technology like mobiles and other communication devices, optimized challenges and clear goals in structuring teaching create a better cognitive engagement.³⁵

The present study found a strong correlation between student behavioral engagement and decision-making negotiation teaching style, teaching structure style, and teacher-student interaction in university 1 students, whereas moderate correlation was seen among university 2 students. Behavioral student engagement was a continuous learning, effort, and sustained concentration in learning¹⁵ were possible with a combination of interaction with instructors and self-managing and self-determination in online learning activities.^{36–39} The enhanced behavioral engagement was an effect of bidirectional factors like teacher involvement and student motivation, as supported by some studies,^{40,41} that were similar to our findings.

Behavioral and cognitive behaviors overlap in student engagement and learning activities. Our study found that interactive instructions, instructional environment, and peer collaboration influence student cognitive and behavioral engagement. Other studies supported these findings.^{38,42–44}

The present study established no correlation ($\lambda = 00$) between psychological student engagement and teaching styles in both the university students. Motivation and community support are important influences on student psychological engagement. Some studies showed that online teaching-learning enhanced motivation.^{4,38} In their review, Nick Zepke et al concluded that self-determination theory and self-belief are important motivators of student engagement, similar to our study that identifies the student psychological engagement does not have any association with the teaching styles. However, there is a need for the institutes and faculty to create opportunities to enhance the students' self-belief. A self-determined pedagogical learning style characterizes autonomy, competence, and feeling of relatedness. Self-

determination plays a vital role in online courses.^{2,37,45} However, the andragogic teaching and learning approaches are still needed for successful student engagement⁴⁶ as the early undergraduate medical students were adolescent (<21 years) according to the World Health Organization definition. The transition from andragogic learning to pedagogical learning in learning activities is desirable in the process of information transformation to student transformation.

Strengths of the Study

The present study used TSIHE, a multidimensional instrument for measuring the faculty's psychological and pedagogical traditions of teaching styles¹⁴ for the first time in the medical education literature.

Similarly, the student engagement scale for online engagement after the validation by the author¹⁵ was found reliable for further studies.

The sample size was good enough to measure the student engagement and its relation with faculty instructional behaviors.

This study established a relationship between faculty instructional behaviors and student engagement in online courses for the first time in literature and the Middle East medical education context, providing guidance for future research.

Weaknesses of the Study

The study adopted a quantitative opinion survey methodology and cannot be generalized. However, it can guide further research. The survey collected the student experiences retrospectively rather than during online courses. Hence, there may be a recall bias.

Conclusion

To summarise, the perceptions among the students from two universities on their faculty online teaching styles were similar. The degree of students "disengagement from both universities was high compared to their engagement for online classes. Both university students" cognitive and behavioral engagement was moderate to strongly correlated with four domains of teaching style. Interestingly, there was no correlation between online faculty instructional methods and students' psychological engagement from both the universities. The present study establishes the relationship between student engagement and teaching instructional practices. However, there is a need to develop robust evidence on the influencing factors on student engagement during online and blended contexts.

The literature review of this study found that there are not enough studies developing the faculty development programs to meet the student-centred learning in blended and online medical education. There is a need to develop appropriate multidimensional instruments to measure student engagement and teaching styles during online and blended teaching-learning activities.

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Disclosure

The authors report no conflicts of interest in this work.

References

1. Harden RM, Laidlaw JM. Essential Skills for a Medical Teacher; An introduction to teaching and learning in medicine; 2017.
2. Taylor DCM, Hamdy H Adult learning theories: implications for learning and teaching in medical education: AMEE guide no. 83. med teach; 2013.
3. Bond M, Bedenlier S. Facilitating student engagement through educational technology: towards a conceptual framework. *J Interactive Media Educ.* 2019;2019:1.
4. Mian A, Khan S. Medical education during pandemics: a UK perspective. *BMC Med.* 2020;18(1):18. doi:10.1186/s12916-019-1484-5
5. Xie X, Siau K, Nah FFH COVID-19. pandemic—online education in the new normal and the next normal. *J Inf Technol Case Appl Res.* 2020;22:175–187.
6. Eskici M, Çetinkaya S. Analysis of teaching styles of teachers regarding various variables. *Bartın Üniversitesi Eğitim Fakültesi Dergisi.* 2019;8(1):138–160. doi:10.14686/buefad.426636

7. Brown G, Manogue M, Association for Medical Education in Europe. Refreshing lecturing: a guide for lecturers. *AMEE*; 2001.
8. Deschaine ME, Whale DE. Increasing Student Engagement in Online Educational Leadership Courses. *J Educators Online*. 2017;14(1).
9. Kahu ER. Framing student engagement in higher education. *Stud High Educ*. 2013;38:758–773. doi:10.1080/03075079.2011.598505
10. Stephenson CR, Andrade JP, Barbosa J, et al. The relationship between learner engagement and teaching effectiveness: a novel assessment of student engagement in continuing medical education. *BMC Med Educ*. 2020;20(1):20. doi:10.1186/s12909-019-1907-1
11. Klases JM, Meienberg A, Bogie BJM. Medical student engagement during COVID-19: lessons learned and areas for improvement. *Med Educ*. 2021;55(1):115–118. doi:10.1111/medu.14405
12. Zayapragassarazan Z, COVID-19: strategies for online engagement of remote learners; 2020. doi:10.7490/f1000research.1117835.1.
13. Fredricks JA, Reschly AL, Christenson SL. Handbook of student engagement interventions: Working with disengaged students. Elsevier Academic Press; 2019.
14. Abello A-T, Alonso Tapia J, Panadero Calderón E; Panadero. Development and validation of the teaching styles inventory for higher education (TSIHE). *Anales de Psicología*. 2020;36(1):143–154. doi:10.6018/analesps.370661
15. Lee J, Song HD, Hong AJ. Exploring factors, and indicators for measuring students' sustainable engagement in e-learning. *Sustainability*. 2019;24:11.
16. Chakraborty M. Learner engagement strategies in online class environment: a dissertation; 2017.
17. Ostapenko A, McPeck S, Liechty S, Has KD. COVID-19 hurt resident education? A network-wide resident survey on education and experience during the pandemic. *J Med Educ Curric Dev*. 2020;7:238212052095969. doi:10.1177/2382120520959695
18. Xu B, Chen NS, Chen G. Effects of teacher role on student engagement in WeChat-Based online discussion learning. *Comput Educ*. 2020;57:157.
19. Choi B, Andrade JP, Barbosa J, et al. The impact of the COVID-19 pandemic on final year medical students in the United Kingdom: a national survey. *BMC Med Educ*. 2020;20(1):20.
20. 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;12:154–159. doi:10.5116/ijme.610c.1580
21. Wilcha RJ. Effectiveness of virtual medical teaching during the COVID-19 crisis: systematic review. *JMIR Med Educ*. 2020;567:6.
22. Payne L. Student engagement: three models for its investigation. *J Further High Edu*. 2019;43(5):641–657. doi:10.1080/0309877X.2017.1391186
23. Zepke N, Leach L, Butler P. Student engagement: students and teachers perceptions. *High Educ Res Dev*. 2014;33(2):386–398. doi:10.1080/07294360.2013.832160
24. Kuh GD, Cruce TM, Shoup R, Kinzie J, Gonyea RM. Unmasking the effects of student engagement on first-year college grades and persistence. *J Higher Educ*. 2008;79:540–563. doi:10.1080/00221546.2008.11772116
25. Pike GR, Kuh GD. A typology of student engagement for American colleges and universities. *Res High Educ*. 2005;185–209. doi:10.1007/s11162-004-1599-0
26. Haley C, Song E, Lance S. Recommendations for medical students completing virtual rotations: lessons learned from our experience during the COVID-19 Pandemic. *MedEdPublish*. 2021;2021:10.
27. Hamdy H, Sreedharan J, Rotgans JI, et al. Virtual Clinical Encounter Examination (VICEE): a novel approach for assessing medical students' non-psychomotor clinical competency. *Med Teach*. 2021;43(10):1203–1209. doi:10.1080/0142159X.2021.1935828
28. McCoy L, Roberts C, Hawthorne K, et al. Evaluating medical student engagement during virtual patient simulations: a sequential, mixed methods study. *BMC Med Educ*. 2016;16:16. doi:10.1186/s12909-016-0535-2
29. Dedeilia A, Sotiropoulos MG, Hanrahan JG, et al. Medical and surgical education challenges and innovations in the COVID-19 era: a systematic review. *In Vivo*. 2020;34(3 suppl):1603–1611. doi:10.21873/invivo.11950
30. Hilburg R, Patel N, Ambruso S, et al. Medical education during the coronavirus disease-2019 pandemic: learning from a distance. *Adv Chronic Kidney Dis*. 2020;27(5):412–417. doi:10.1053/j.ackd.2020.05.017
31. Dash NR, Andrade JP, Barbosa J, et al. Preferred teaching styles of medical faculty: an international multi-center study. *BMC Med Educ*. 2020;20(1):20.
32. Mehta N, End C, Kwan JC, Bernstein S, Law M. Adapting medical education during crisis: student–Faculty partnerships as an enabler of success. *Med Teach*. 2020;44(6):688–689. doi:10.1080/0142159X.2020.1811215
33. Kelly PA, Haidet P, Schneider V, et al. A comparison of in-class learner engagement across lecture, problem-based learning, and team learning using the STROBE classroom observation tool. *Teach Learn Med*. 2005;17(2):112–118. doi:10.1207/s15328015tlm1702_4
34. Sinatra GM, Heddy BC, Lombardi D. The challenges of defining and measuring student engagement in science. *Educ Psychol*. 2015;50(1):1–13. doi:10.1080/00461520.2014.1002924
35. Carroll M, Lindsey S, Chaparro M, Winslow B. An applied model of learner engagement and strategies for increasing learner engagement in the modern educational environment. *Interactive Learning Environ*. 2021;29(5):757–771. doi:10.1080/10494820.2019.1636083
36. Loyens SMM, Magda J, Rikers RMJP. Self-directed learning in problem-based learning and its relationships with self-regulated learning. *Educ Psychol Rev*. 2008;20(4):411–427. doi:10.1007/s10648-008-9082-7
37. Commission MA. Student Engagement, Self-Regulation, Satisfaction, and Success in Online Learning Environments [dissertation]. Walden University; 2020. Available from: ScholarWorks, Walden Dissertations and Doctoral Studies Collection. <https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=9794&context=dissertations>. Accessed 16 February, 2024.
38. Wu H, Li S, Zheng J, Guo J. Medical students' motivation and academic performance: the mediating roles of self-efficacy and learning engagement. *Med Educ Online*. 2020;25:1.
39. Chiu TKF. Applying the self-determination theory (SDT) to explain student engagement in online learning during the COVID-19 pandemic. *J Res Technol Educ*. 2021.2021:1.
40. Motivation in the classroom: reciprocal effects of teacher behavior and student engagement across the school year; 1993.
41. Li F, Qi J, Wang G, Wang X. Traditional classroom VS e-learning in higher education: difference between students' behavioral engagement. *Int J Emerging Technol Learn*. 2014;9(2):48–51. doi:10.3991/ijet.v9i2.3268
42. Kennedy G. What is student engagement in online learning and how do I know when it is there?; 2020. https://melbourne-cshe.unimelb.edu.au/data/assets/pdf_file/0004/3362125/student-engagement-online-learning_final.pdf. Accessed 16 February, 2024.

43. Alpert JB, Young MG, Lala S, McGuinness G. Medical student engagement and educational value of a remote clinical radiology learning environment: creation of virtual read-out sessions in response to the COVID-19 pandemic. *Acad Radiol.* 2021;28(1):112–118. doi:10.1016/j.acra.2020.09.011
44. Nedaa Waleed Izzat Zohud Supervisors Abdul Kareem Igbaria Fayeze Aqel B. Teaching strategies and their role on students' engagement in learning English; 2015.
45. Ryan RM, Deci EL Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being self-determination theory; 1985.
46. Shahrivini BB, Coffey C, MacDonald BB, Lander SL. Pre-clinical remote undergraduate medical education during the covid-19 pandemic: a survey study. *Res Square.* 2020. doi:10.21203/rs.3.rs-33870/v1

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