Could Perception of Digital Learning Environment Potentially Affect First-Year Undergraduate Medical Students Learning Motivation? A Study during Distance Learning Transition due to the COVID-19 Pandemic in Indonesia

¿Podría la percepción del entorno de aprendizaje digital afectar potencialmente la motivación de aprendizaje de los estudiantes de primer año de medicina? Un estudio durante la transición del aprendizaje a distancia debido a la pandemia COVID-19 en Indonesia

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SUMMARY

Introduction: *Digital learning environments have been proven could affect students' learning motivation before the COVID-19 pandemic era. This study investigates the correlation between perceptions of the learning environment with learning motivation among first-year undergraduate medical students after joining their first-time-ever full-distance learning activities.*

Methods: *A cross-sectional study was done at the end of the first module block. Students' learning motivation and perspectives on the online learning environment were assessed by the Motivated Strategies Learning Questionnaire (MSLQ) and modified Dundee Ready Educational Environment Measurement (DREEM), respectively.*

Results: *Among 65 respondents, most were females (47, 72.3 %) and aged 18 years (32, 49.2 %). The majority of first-year undergraduate medical students were very satisfied (49 students, 75.4 %), and 16 students (24.6 %) were quite satisfied with the distance learning environment. The mean score of all DREEM dimensions was 162.1/200. In addition, most students*

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had the high motivation (60, 92.3 %), and the score for learning motivation obtained a mean result of 123.3/147. All learning environment dimensions were correlated with three dimensions of learning motivation, including task value, self-efficacy, and extrinsic goal orientation. The strongest correlation was found between students' academic self-perceptions with the task value.

Conclusion: *The dimensions of the learning environment factors were significantly related to the motivation factors in first-year undergraduate medical students during total distance learning due to the COVID-19 pandemic.*

Keywords: *Learning environment, learning motivation, undergraduate medical student, distance learning, COVID-19, Indonesia.*

RESUMEN

Introducción: *Se ha demostrado que los entornos de aprendizaje digital podrían afectar la motivación de aprendizaje de los estudiantes antes de la era de la pandemia de COVID-19. Este estudio investiga la correlación entre las percepciones del entorno de aprendizaje y la motivación de aprendizaje entre los estudiantes de medicina de primer año de licenciatura después de unirse a sus actividades de aprendizaje a distancia por primera vez.*

Métodos: *Se realizó un estudio transversal al final del primer bloque del módulo. La motivación de aprendizaje de los estudiantes y las perspectivas sobre el entorno de aprendizaje en línea se evaluaron mediante el Cuestionario de aprendizaje de estrategias motivadas (MSLQ) y la Medición del entorno educativo Dundee Ready modificada (DREEM), respectivamente.*

Resultados: *Entre los 65 encuestados, la mayoría eran mujeres (47, 72,3 %) y de 18 años (32, 49,2 %). La mayoría de los estudiantes de medicina de primer año estaban muy satisfechos (49 estudiantes, 75,4 %) y 16 estudiantes (24,6 %) estaban bastante satisfechos con el entorno de aprendizaje a distancia. La puntuación media de todas las dimensiones DREEM fue 162,1 / 200. Además, la mayoría de los estudiantes tuvo una alta motivación (60, 92,3 %), y la puntuación de motivación de aprendizaje obtuvo un resultado medio de 123,3/147. Todas las dimensiones del entorno de aprendizaje se correlacionaron con tres dimensiones de la motivación del aprendizaje, incluido el valor de la tarea, la autoeficacia y la orientación a objetivos extrínsecos. La correlación más fuerte se encontró entre las autopercepciones académicas de los estudiantes con el valor de la tarea.*

Conclusión: *Las dimensiones de los factores del ambiente de aprendizaje se relacionaron significativamente con los factores de motivación en estudiantes de primer año de medicina durante el aprendizaje a distancia total debido a la pandemia de COVID-19.*

Palabras clave: *Ambiente de aprendizaje, motivación de aprendizaje, estudiante de pregrado de medicina, educación a distancia, COVID-19, Indonesia.*

INTRODUCTION

The World Health Organization early 2020 declared COVID-19 as a global pandemic. Numerous countries, including Indonesia, were taking emergency social distancing measures as a preventive action to control the broader infection scope and impact of COVID-19. As one of the countries with a high infected population, Indonesia has also implemented several policy reforms in various sectors, especially in the education sector. The Indonesian Ministry of Education, Culture, Research, and Technology suggested distant learning facilitation as a solution for knowledge-based education in higher education. However, the quality of educational processes and outcomes due to the rapid policies transition during the COVID-19 pandemic situation still became a debatable issue in the medical education context (1).

The demand for online learning in higher education has increased significantly (2). This pandemic condition increasingly requires medical schools to respond as rapidly as possible by starting to consider the distance learning innovations that are relevant and well structured (3). In developing countries, barriers and challenges not only come from students who were struggling to engage and accustomed to distant learning activities but several lecturers also unfamiliar to facilitate learning by using internet technology or any other synchronous-asynchronous learning media at that time (1,3,4). Although the online learning approach to medical education has been known for its potential to drastically change the pattern of interaction between students to students and student lecturers even before the pandemic era (5-8), the confirmation on whether the entire distance learning approach could increase or decrease higher-education students' cognitive, emotional, and behavioral engagement towards learning activities in the current pandemic situation is still needed further exploration (9-13).

Online learning during and after the pandemic in some form is undoubtedly here to stay, especially for knowledge-domain education. Most studies on undergraduate medical students during the COVID-19 pandemic focused on students' satisfaction with the online infrastructure usability or online culture realm (1). Another study perspective focused on the stress distribution and burnout level of medical students and then explored personal predictors that potentially affect wellness and mental health during the pandemic era (1,14-17). However, educators must sort through the array of developments to identify what works, for whom, under what circumstances, paying particular attention to the differential impacts of synchronous, asynchronous, and distance learning approaches on students learning engagements, especially in developing countries and rural areas (10-12,18,19). Moreover, educators are required to be able to respond to the situation because engagement is an important thing that can also affect job satisfaction (20).

The online learning environment is believed to influence the development of learning motivation and individual professional identities in the health professions education context (8,21-24). The application of online learning is a new experience that provides convenience and flexibility in studying without going to campus (25). Meanwhile, both learning environment and learning motivation have also been known as beneficial factors that potentially affect academic successes (8,26,27). In addition, the quality of online learning delivery also must be closely monitored because it affects the quality of students' understanding of related courses (28). However, there is still a lack of study that explained the correlation between medical students' perceptions of their online learning environment and their learning motivation during total distance learning due to the COVID-19 pandemic, especially among first-year undergraduate students as one of the population clusters that struggle the most. Therefore, this study investigates the correlation between perceptions of the learning environment with learning motivation among first-year undergraduate medical students after joining their first time-ever full-distance learning activities.

METHODS

The health research ethics committee approved this study at the Muhammadiyah University of Surabaya, Indonesia (027/KET/II.3/AU/F/2020). This study used a cross-sectional method. A survey was delivered within a week after the end of the first module of the undergraduate medical curriculum at the Faculty of Medicine, Muhammadiyah Surabaya University, Surabaya, Indonesia

The first module's objective was to enable students to adapt to medical school learning processes and develop a professional identity. A series of interactive lectures, problem-based learning tutorials, panel discussions, academic writing practices, and portfolio workshops were delivered synchronously using Zoom meetings within four weeks. A week of examination was held to evaluate students' outcomes. The Flipped-Classroom model was used as a practical learning approach in first-year courses. The Flipped-Classroom learning media includes Moodle-based e-learning used as asynchronous learning media and repository, Synchronous Zoom meetings used as a substitute for direct face-to-face interaction and facilitation, and Private Facebook Group used as supporting information media for facilitating feedback. WhatsApp Social Media was also used as a communication medium between lecturers and students outside the formal schedule. A significant learning process that differs from the pre-COVID-19 pandemic era was Zoom meetings as a facilitation media. The learning topics, learning methods, and assessment methods used in the current study remained the same as in pre-pandemic years.

Purposive sampling strategies using inclusion and exclusion criteria had been done on the first-year undergraduate medical student population. The inclusion criteria in this study were active students in the 2020 entry year, who were willing to take part in this study, and had passed the first block of the 2020/2021 academic year. The exclusion criteria for this student have undergone blocks/modules with similar curriculum content in the previous education stage. The drop-out criteria in this study were prospective respondents

who did not complete the informed consent or had fulfilled the informed consent but did not join or complete the questionnaire distributed during this study. An electronic survey was delivered to a total of seventy-eight of first-year undergraduate medical students. Sixty-five respondents completed the electronic survey.

Quantitative data of students' learning motivation were assessed by using the Motivated Strategies Learning Questionnaire (MSLQ) instrument that has been validated in the previous study and revalidated for the context of technology-assisted learning with a Cronbach alpha score of 0.873 (29). Students' perspectives on the online learning environment were assessed by using the modified Dundee Ready Educational Environment Measurement (DREEM) instrument and revalidated for the context of technology-assisted learning with a Cronbach alpha score of 0.952 (30).

Descriptive analysis was applied to determine the characteristics of the respondents' age, gender, location of access, level of motivation, and level of perception of the learning environment. A Spearman correlations analysis was implemented to identify the correlation between learning motivation and learning environment dimensions. Meanwhile, multivariate linear regression was utilized to confirm how much the learning environment variable could affect the learning motivation variable. All statistical analyzes were performed with SPSS 25 software.

RESULTS

Characteristics of Respondents

Sixty-five first-year students were responded to the digital survey (Table 1). Most of the respondents were females (72.3 %), and the most age range was 18-19 years. In addition, access locations, media used to organize learning activities, and media used to communicate learning activities during the distance learning process were also explored. Most of the students' learning locations were in cities in Java, Indonesia (46.2 %). Video conference application was the most often media used to discuss learning organization/learning strategies

(81.5 %) and communicate about course contents (63.1 %) among students. Meanwhile, laptops and smartphones were the most often hardware used in daily activities and learning discussions (56.9 %).

Table 1

Description of respondent's characteristics (n=65)

No	Characteristics	n	%
1	**Age (years)**		
	17	3	4.6
	18	32	49.2
	19	20	30.8
	20	6	9.2
	21	3	4.6
	24	1	1.5
2	**Gender**		
	Male	18	27.7
	Female	47	72.3
3	**Access location**		
	City/district in Java Island	30	46.2
	City/district outside Java Island	2	3.0
	Province capital in Java Island	13	20.0
	Village in Java Island	19	29.2
	Village outside Java Island	1	1.5

The adapted DREEM questionnaire measured students' perception scores about the learning environment. The score was divided into four categories: very dissatisfied, a minor problem, quite satisfied, and very satisfied. The majority of first-year undergraduate medical students were very satisfied (49 students, 75.4 %), and 16 students (24.6 %) were quite satisfied with the distance learning environment. Furthermore, the mean score of all DREEM dimensions was 162.1/200. The mean score of each DREEM dimension is presented in Table 2.

The students' highest satisfaction with the learning environment was on students' perceptions of lecturers, while the lowest satisfaction was on students' social self-perceptions. It can be discovered that students had the highest score on the perceptions of lecturers with a mean value of 3.4 on the 5 Likert scale (Table 2). It shows that the learning process had positive points,

Table 2

The mean dimension score of DREEM

Dimensions (maximum score)	Mean Score of the Dimension (Mean score/item)
Students' perceptions of learning (48)	38.8 (3.2)
Students' perceptions of lecturers (44)	37.6 (3.4)
Students' academic self-perceptions (32)	25.9 (3.2)
Students' learning environment perceptions (48)	38.7 (3.2)
Students' social self-perceptions (28)	21.1 (3)
200	162.1

DREEM: Dundee Ready Educational Environment Measurement

namely the item "Our lecturers have sufficient knowledge" (3.7), the item "Our lecturers ridicule the students." (3.6), the item "Our lecturers have good communication skills" (3.5), and the item "Our lecturers give constructive criticism" (3.5). Of all the items in this domain, the lowest score was in the statement "Our lecturers prepare the learning materials well before the lecture" (3). Then, the dimension of students' social self-perceptions had a mean of 3. A few statements had high points in this domain, namely "I rarely feel lonely" with a mean score of 3.4 and the question item "my social life is fine" with a mean score of 3.2. One item with the lowest score was found for the statement "I rarely feel bored in participating in learning activities," with a mean score of 2.6.

Students' motivations were categorized as high, moderate, and low motivation. Most students had the high motivation (60, 92.3 %), and only five (7.7 %) had moderate motivation. Moreover, the score of learning motivation as measured by adapted MSLQ obtained a mean result of 123.3/147, with the lowest average score of 4.4 per item and the highest score of 6.4 from the maximum score of 7 (Table 3). However, although students' overall learning motivation domains at that time were high, the level of student anxiety was also relatively high, with a mean of 4.4.

Table 3

The average value of the MSLQ dimension (n = 65)

Dimension (maximum score)	Mean Score of the Dimension (Mean score /item)
Task Value (56)	49.9 (6.2)
Self-Efficacy (35)	29.4 (5.9)
Extrinsic goal orientation (21)	17.9 (6)
Test Anxiety (21)	13.3 (4.4)
Control of learning beliefs (14)	12.8 (6.4)
147	123.3

Correlation between Learning Environment with Learning Motivation

There was a correlation between the learning motivation domains with learning environment dimensions in this study (Table 4).

The correlations were primarily positive, and the effect ranged between small and large. All learning environment dimensions were correlated with three dimensions of learning motivation, including task value, self-efficacy, and extrinsic

Table 4

The correlation between the dimensions of learning motivation and the dimensions of the learning environment factors

Dimension	1	2	3	4	5	6	7	8	9	10
1. Task value	1									
2. Self-Efficacy	0.718**	1								
3. Extrinsic Goal Orientation	0.570**	0.675**	1							
4. Test Anxiety	-0.163	-0.121	0.045	1						
5. Control of learning beliefs	0.543**	0.459**	0.436**	-0.116	1					
6. Students' perceptions of lecturers	0.559**	0.447**	0.423**	-0.180	0.232	1				
7. Students' perceptions of learning	0.392**	0.251*	0.354**	-0.233	0.135	0.616**	1			
8. Students' academic self-perceptions	0.580**	0.550**	0.403**	-0.229	0.319**	0.830**	0.641**	1		
9. Students' learning environment perceptions	0.531**	.520**	0.411**	-0.329**	0.168	0.812**	0.666**	0.759**	1	
10. Students' social self-perceptions	0.346**	0.428**	0.359**	-0.283*	0.198	0.586**	0.377**	0.535**	0.716**	1

*p<.05, **p<.01.

goal orientation. The strongest correlation was found between students' academic self-perceptions with the task value. Meanwhile, the weakest correlation was found between students' learning environment perceptions and learning beliefs' control. There was a weak negative correlation between the student's perception of the social self-perceptions and a strong negative correlation between the students' perception of the learning atmosphere with the test-anxiety dimension. It has also been discovered that the students' perceptions of lecturers strongly correlated with the task-value, self-efficacy, and extrinsic goal orientation of the motivation scale.

DISCUSSION

An improved learning environment will provide students, with comfort, confidence, responsibility, knowledge, skills, learning opportunities, and practice models. All dimensions of the learning environment were associated with dimensions of learning motivation, including task value, self-efficacy, and extrinsic goal orientation. The study also demonstrates that the students' highest satisfaction with the learning environment was on students' perceptions of lecturers, while the lowest was on students' social self-perceptions. The dimension of students' perceptions of lecturers shows that the learning process had positive points. Similar to the previous studies, this condition shows that students felt that their lecturers were very knowledgeable, could provide fast and good feedback to students, and they also felt that their lecturers could communicate effectively with patients. However, some thought that some of the lecturers were unprepared, either technically or mentally, for the learning process (9). Thus, to improve the quality of the learning environment, it is necessary to continuously; 1) build lecturers' professional capabilities, 2) re-evaluate the readiness of lecturers learning materials and resources, and 3) evaluate lecturers' attitudes in providing learning. The optimal adaptation can be achieved by increasing students' digital literacy skills in the online learning environment (31). Not only the students as the subject but the current learning environment can also be further improved by conducting advanced faculty training on digital literacy skills (32,33) because technical problems and various other forms of adaptation in a current total distance learning situation will become obstacles that needed to be solved to achieve optimal adaptation (1,3,18).

The study confirmed that students' perceptions of lecturers had a more significant influence on the task value dimension than the self-efficacy dimension and extrinsic goal orientation.

Encouragement and support from lecturers and collaboration between students can increase intrinsic motivation and course satisfaction, i.e., students will have more interest, importance, and usefulness in the assigned tasks. Task value can also be influenced by the social world, self-efficacy motivation, and cognitive processes (34-37). The experience of learning gradually or slowly can lead to mastery of expectations in the field of work (self-efficacy and control of learning beliefs) (38). Therefore, it fostered self-confidence in students. Students with high academic perceptions might have managed to make arrangements in terms of independent learning abilities because they believe they can do a job successfully, which can then be referred into a form of motivation (39-42). High academic perception can also make students more interested in presenting and setting academic goals to achieve specific learning outcomes and consequently become more motivated to learn. In other words, academic achievement can make students believe that their efforts to learn will produce positive results so that they will then use effective learning strategies (39,42,43).

In addition, the students had a proper social environment to support the learning process regarding the dimension of students' social self-perceptions. However, the tendency of students to feel bored in online learning can be overcome by evaluating and exploring' the barriers and challenges on students' engagements towards curriculum, facilitating and assessment methods, and learning systems that had been used currently in the respondents' institution. In addition, further exploration of factors affecting current students' perceptions and engagements is still needed. Peer social support is needed to support academic toughness in individuals (44). There is a high possibility that students also faced a turbulent time during new online learning (45). Those kinds of support can also reduce the student burden in dealing with problems in learning (46,47). Thus, it could be argued that first-year students at the preclinical stage have succeeded in adapting and working together in overcoming curriculum and learning obstacles.

Motivation can change with time, maturity, and experience in the environment. Although the level of learning motivation in this study was high, faculties must be aware that a high level of

learning motivation was also known, followed by a high level of stress in medical students (22,26). Some issues already known as a precursor of stress among undergraduate students are anxiety and maladaptation problems. Learning anxiety in an online learning environment can occur due to the lack of direct communication between students and lecturers and academic demands in mastering learning topics and skills in a short time (48-50). Meanwhile, first-year students are also prone to anxiety due to other factors, such; as lack of peer support, competitive environment, rigid authoritativeness, the imbalance between professional and personal life, and cultural problems (21,51,52).

The perception of academic self-perceptions was associated with control of learning beliefs. If a person has a choice, explanation/rotation, feeling of self-acceptance, or belief in his abilities, an individual will be intrinsically motivated. When students feel they are well prepared to become a doctor, have learned a lot about empathy, and most of what they learn is relevant to their career in the health sector, they will be more confident and confident that they can control their academic performance. It leads to students' beliefs about their efforts to learn with positive learning outcomes (53-55).

The authors acknowledge that there are some limitations to this study. The learning environment in a study program that is relatively new established and private university environment is the contextual limitation of this study. Thus, using a mixed methods design, especially at least one in-depth qualitative method, for the following study will further strengthen the potential for research replication in other educational institutions. Another limitation is the use of a moodle-based learning environment itself as a medium for supporting learning information. Observational methods to obtain empirical evidence of behavioral engagement will benefit further study. A third-party observational metrics application usage must be considered carefully. The authors suggest using built-in features as its usage is already protected by law and user regulation. The researcher also recommends replication of research for another level of a medical education program or its use as a companion to other learning methods, including workplace-based education, to test contextual specificity.

CONCLUSION

A constructive digital learning environment could potentially affect students' learning motivation during total distance learning activities. The learning environment factors' dimensions were significantly associated with the motivation factors in first-year undergraduate medical students during total distance learning due to the COVID-19 pandemic. In addition, the student's perception of academic factors can affect the dimensions of the student's self-efficacy factor and the control of learning beliefs factor dimension.

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Conflict of interest

The authors declare no conflict of interest regarding the article.

REFERENCES

1. Daniel M, Gordon M, Patricio M, Hider A, Pawlik C, Bhagdev R, et al. An update on developments in medical education in response to the COVID-19 pandemic: A BEME scoping review: BEME Guide No. 64. Med Teach. 2021;43(3):253-271.

2. Kwary DA, Fauzie S. Students' achievement and opinions on the implementation of e-learning for phonetics and phonology lectures at Airlangga University. Educ e Pesqui. 2017;44:e173240.

3. Gordon M, Patricio M, Horne L, Muston A, Alston SR, Pammi M, et al. Developments in medical education in response to the COVID-19 pandemic: A rapid BEME systematic review: BEME Guide No. 63. Med Teach. 2020;0(0):1-14.

4. Zami QA, Suyanto B. Digital Divide for Teacher During Pandemic Covid-19. Al-Mada J Agama, Sos Dan Budaya. 2021;4(2):213-224.

5. Utama MR, Yuliawan D, Suhoyo Y, Doni W. Facebook® Group Usage To Support Flipped-Classroom Learning on Ocular Trauma. J Pendidik Kedokt Indones Indones J Med Educ. 2020;9(1):32.

6. Tudor Car L, Soong A, Kyaw BM, Chua KL, Low-Beer N, Majeed A. Health professions digital education on clinical practice guidelines: A systematic review by Digital Health Education collaboration. BMC Med. 2019;17(1).

7. Car LT, Myint Kyaw B, Dunleavy G, Smart NA, Semwal M, Rotgans JI, et al. Digital problem-based learning in health professions: Systematic review and meta-analysis by the digital health education collaboration. J Med Internet Res. 2019;21(2):1-12.

8. Regmi K, Jones L. A systematic review of the factors - Enablers and barriers - Affecting e-learning in health sciences education. BMC Med Educ. 2020;20(1).

9. Utama MR, Levani Y, Paramita AL. Medical students' perspectives about distance learning during early COVID-19 pandemic: A qualitative study. Qanun Med - Med J Fac Med Muhammadiyah Surabaya. 2020;4(2):255.

10. McLeod E, Gupta S. The role of psychological safety in enhancing student engagement in online synchronous learning. Med Teach. 2021;0(0):1.

11. Bond M. Schools and emergency remote education during the COVID-19 pandemic: A living rapid systematic review. Asian J Distance Educ. 2021;15(2):191-247.

12. Bedenlier S, Bond M, Buntins K, Zawacki-Richter O, Kerres M. Facilitating student engagement through educational technology in higher education: A systematic review in the field of arts and humanities. Australas J Educ Technol. 2020;36(4):126-150.

13. Bond M, Bedenlier S, Marín VI, Händel M. Emergency remote teaching in higher education: Mapping the first global online semester. Int J Educ Technol High Educ. 2021;18.

14. Orrù G, Marzetti F, Conversano C, Vagheggini G, Miccoli M, Ciacchini R, et al. Secondary traumatic stress and burnout in healthcare workers during COVID-19 outbreak. Int J Environ Res Public Health. 2021;18(1):1-13.

15. Arima M, Takamiya Y, Furuta A, Siriratsivawong K, Tsuchiya S, Izumi M. Factors associated with the mental health status of medical students during the COVID-19 pandemic: A cross-sectional study in Japan. BMJ Open. 2020;10(12):1-7.

16. Fontana MCP, Generoso IP, Sizilio A, Bivanco-Lima D. Burnout syndrome, extracurricular activities and social support among Brazilian internship medical students: A cross-sectional analysis. BMC Med Educ. 2020;20(1):1-9.

17. Wu Y, Yu W, Wu X, Wan H, Wang Y, Lu G. Psychological resilience and positive coping styles

among Chinese undergraduate students: A cross-sectional study. BMC Psychol. 2020;8(1):1-11.

18. Taylor D, Grant J, Hamdy H, Grant L, Marei H, Venkatramana M. Transformation to learning from a distance. MedEdPublish. 2020;9(1):1-12.

19. Seymour-Walsh AE, Bell A, Weber A, Smith T. Adapting to a new reality: COVID-19 coronavirus and online education in the health profession. Rural Remote Health. 2020;20(2).

20. Dara D, Eliyana A, Hamidah. The engagement and working satisfaction of millennial lecturers during the covid-19 pandemic: Differences in gender identity perspectives. Syst Rev Pharm. 2020;11(10):438-445.

21. Fontaine G, Cossette S, Maheu-Cadotte MA, Mailhot T, Deschênes MF, Mathieu-Dupuis G, et al. Efficacy of adaptive e-learning for health professionals and students: A systematic review and meta-analysis. BMJ Open. 2019;9(8):1-17.

22. Neufeld A, Malin G. Exploring the relationship between medical student basic psychological need satisfaction, resilience, and well-being: A quantitative study. BMC Med Educ. 2019;19(1):1-8.

23. Gomes AW, Butera G, Chretien KC, Kind T. The Development and Impact of a Social Media and Professionalism Course for Medical Students. Teach Learn Med. 2017;29(3):296-303.

24. Martin F, Dennen VP, Bonk CJ. A synthesis of systematic review research on emerging learning environments and technologies. Educ Technol Res Dev. 2020;68(4):1613-1633.

25. Alchamdani A, Fatmasari F, Anugrah ER, Sari NP, Putri F, Astina A. The Impact of Covid-19 Pandemic on Online Learning Process in the College at Southeast Sulawesi. J Kesehat Lingkung. 2020;12(1):129-136.

26. Chisholm-Burns MA, Berg-Poppe P, Spivey CA, Karges-Brown J, Pithan A. Systematic review of noncognitive factors influence on health professions students' academic performance. Advances in Health Sciences Education. Springer Netherlands; 2021.

27. Ali W. Online and Remote Learning in Higher Education Institutes: A Necessity in light of COVID-19 Pandemic. High Educ Stud. 2020;10(3):16.

28. Oki AS, Yuliati JS, Irmawati A, Luthfi M. Dental students' perception of online lecture using video conferencing. Syst Rev Pharm. 2020;11(12):245-248.

29. Lisiswanti R, Sanusi R PT. The Construct Validity And Reliability Motivated Strategies Learning Questionnaire (MSLQ). In: World Association of Lesson Studies (WALS) International Conference. 2014.

30. Leman MA. Conctruct Validity Assessment of Dundee Ready Educational Environment Measurement (Dreem) in a School of Dentistry. J Pendidik Kedokt Indones Indones J Med Educ. 2017;6(1):11-29.

31. Meyers EM, Erickson I, Small R V. Digital literacy and informal learning environments: An introduction. Learn Media Technol. 2013;38(4):355-367.

32. O'Doherty D, Dromey M, Lougheed J, Hannigan A, Last J, McGrath D. Barriers and solutions to online learning in medical education - An integrative review. BMC Med Educ. 2018;18(1):1-11.

33. O'Doherty D, Lougheed J, Hannigan A, Last J, Dromey M, O'Tuathaigh C, et al. Internet skills of medical faculty and students: Is there a difference? BMC Med Educ. 2019;19(1):1-9.

34. Lee D, Watson SL, Watson WR. Systematic literature review on self-regulated learning in massive open online courses. Australas J Educ Technol. 2018;35(1):28-41.

35. Partala T, Saari T. Understanding the most influential user experiences in successful and unsuccessful technology adoptions. Comput Human Behav. 2015;53:381-395.

36. Wingo MT, Thomas KG, Thompson WG, Cook DA. Enhancing motivation with the "virtual" supervisory role: A randomized trial Approaches to teaching and learning. BMC Med Educ. 2015;15(1):1-7.

37. Mclean S, Attardi SM, Faden L, Goldszmidt M. Flipped classrooms and student learning: not just surface gains. Adv Physiol Educ. 2016;40(1):47-55.

38. McKenna C. Motivations for Learning. Educ Renaiss. 2019;3(1):21-32.

39. Findyartini A, Greviana N, Putera AM, Sutanto RL, Saki VY, Felaza E. The relationships between resilience and student personal factors in an undergraduate medical program. BMC Med Educ. 2021;21(1):1-10.

40. Findyartini A, Felaza E, Setyorini D, Mustika R. Relationship between empathy and motivation in undergraduate medical students. GMS J Med Educ. 2020;37(4):1-16.

41. Darmayani S, Findyartini A, Widiasih N, Soemantri D. Stereotypes among health professions in Indonesia: An explorative study. Korean J Med Educ. 2020;32(4):329-341.

42. Findyartini A, Anggraeni D, Husin JM, Greviana N. Exploring medical students' professional identity formation through written reflections during the COVID-19 pandemic. J Public health Res. 2020;9(s1):4-10.

43. Felaza E, Findyartini A, Setyorini D, Mustika R. How Motivation Correlates with Academic Burnout: Study Conducted in Undergraduate Medical Students. Educ Med J. 2020;12(1):43-52.

44. Strahl A, Gerlich C, Alpers GW, Ehrmann K, Gehrke J, Müller-Garnn A, et al. Development and evaluation of a standardized peer-training in the context of peer review for quality assurance in work capacity evaluation. BMC Med Educ. 2018;18(1):135.

45. Nisa DF, Putri NK. How is The Coronavirus Outbreak Affecting The Daily Lives of University Students? J Kesehat Lingkung. 2020;12(1si):137-144.

46. Huang CC, Hsu HC, Yang LY, Chen CH, Yang YY, Chang CC, et al. Peer-assisted learning model enhances clinical clerks' procedural skills. J Chinese Med Assoc. 2018;81(8):747-753.

47. Crites GE, Berry A, Hall E, Kay D, Khalil MK, Hurtubise L. Applying multiple frameworks to establish effective virtual collaborative teams in academia: a review and recommendations. Med Educ Online. 2020;25(1):1742968.

48. Hartnup B, Dong L, Eisingerich AB. How an Environment of Stress and Social Risk Shapes Student Engagement With Social Media as Potential Digital Learning Platforms: Qualitative Study. JMIR Med Educ. 2018;4(2):e10069.

49. Neufeld A, Mossière A, Malin G. Basic psychological needs, more than mindfulness and resilience, relate to medical student stress: A case for shifting the focus of wellness curricula. Med Teach. 2020;42(12):1401-1412.

50. Maini A, Saravanan Y, Singh TA, Fyfe M. Coaching skills for medical education in a VUCA world. Med Teach. 2020;0(0):1-2.

51. Burr J, Beck Dallaghan GL. The Relationship of Emotions and Burnout to Medical Students' Academic Performance. Teach Learn Med. 2019;0(0):1-8.

52. Zheng B, Zhang Y. Self-regulated learning: The effect on medical student learning outcomes in a flipped classroom environment. BMC Med Educ. 2020;20(1):1-7.

53. Chandler C. Effective Use of Educational Technology in Medical Education. AAMC Inst Improv Med Educ. 2007:1-18.

54. Bevilacqua R, Casaccia S, Cortellessa G, Astell A, Lattanzio F, Corsonello A, et al. Coaching through technology: A systematic review into efficacy and effectiveness for the aging population. Int J Environ Res Public Health. 2020;17(16):1-14.

55. Findyartini A, Hawthorne L, McColl G, Chiavaroli N, Boulet J, Bede C, et al. How clinical reasoning is taught and learned: Cultural perspectives from the University of Melbourne and Universitas Indonesia. BMC Med Educ. 2016;16:185.