

**MEDICAL STUDENTS' PERCEPTION OF FACE-
TO-FACE AND VIRTUAL EDUCATIONAL
ENVIRONMENT DURING COVID-19 PANDEMIC
IN UNIVERSITI MALAYSIA SABAH (UMS)**

by

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LIST OF ABBREVIATIONS

CoI	Community of Inquiry
DREEM	Dundee Ready Educational Environment Measure
FMHS	Faculty of Medicine & Health Sciences
OSCS	Online Student Connectedness Survey
SASP	Students' academic self-perception
SPoA	Students' perception of atmosphere
SPoL	Students' perception of learning
SPoT	Students' perception of teaching
SSSP	Students' social self-perception
UMS	Universiti Malaysia Sabah

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ABSTRAK (BAHASA MALAYSIA)

PERSEPSI PELAJAR PERUBATAN KE ATAS PERSEKITARAN PEMBELAJARAN SECARA BERSEMUKA DAN SECARA DALAM TALIAN SEMASA PANDEMIK COVID-19 DI UNIVERSITI MALAYSIA SABAH (UMS)

Pengenalan: Persekitaran pembelajaran yang positif boleh membentuk keadaan yang baik untuk meningkatkan kepuasan, kesejahteraan hidup, kejayaan dalam pembelajaran serta pengukuhan interaksi sesama pelajar, pensyarah dan juga organisasi. Keadaan ini seterusnya akan menghasilkan graduan yang berkualiti. Oleh itu, tidak dinafikan lagi kepentingan untuk sesebuah organisasi untuk menilai keadaan persekitaran pembelajaran yang disediakan. Walau bagaimanapun, dengan kemajuan teknologi pada masa kini, bukan sahaja persekitaran pembelajaran secara bersemuka yang perlu dititikberatkan. Penilaian persekitaran pembelajaran secara dalam talian juga diperlukan memandangkan lebih banyak sesi pembelajaran termasuk pembelajaran perubatan dijalankan secara dalam talian terutamanya di musim pandemik ini. Tujuan utama kajian ini adalah untuk mendalami keadaan persekitaran pembelajaran secara bersemuka dan juga secara dalam talian di Fakulti Perubatan dan Sains Kesihatan (FPSK), Universiti Malaysia Sabah (UMS) melalui persepsi para pelajar perubatan semasa pandemik COVID-19. **Metodologi:** Satu kajian keratan rentas telah dijalankan yang mensasarkan kesemua pelajar perubatan dari tahun pertama ke tahun kelima di FPSK, UMS (n=456). Persepsi para pelajar terhadap persekitaran pembelajaran mereka dikaji menggunakan borang soal selidik ‘Dundee Ready Education Environment Measure (DREEM-17)’ versi diubah suai dan borang soal selidik ‘Online Student Connectedness Survey (OSCS-25)’. Data yang dikumpul kemudiannya dianalisis menggunakan SPSS versi 28. Kelulusan etika telah diperolehi

melalui jawatankuasa etika di kedua-dua buah universiti, Universiti Sains Malaysia (USM) dan juga UMS di mana kajian ini dijalankan. **Keputusan:** Sebanyak 329 pelajar daripada jumlah keseluruhan 456 pelajar perubatan UMS telah mengambil bahagian dalam kajian ini (72.1%). Persepsi pelajar terhadap persekitaraan pembelajaran adalah positif atau di atas purata dengan skor min 2.93 (SD = 0.76). Manakala, persepsi pelajar terhadap keterlibatan semasa pembelajaran dalam talian juga adalah di atas purata atau sederhana dengan skor min 2.60 (SD = 0.79). Tidak ada perbezaan ketara bagi persepsi terhadap kedua-dua persekitaran pembelajaran secara bersemuka dan atas talian di kalangan jantina pelajar yang berbeza. Namun begitu, terdapat perbezaan ketara di kalangan pelajar mengikut fasa pembelajaran di mana para pelajar klinikal memberikan persepsi yang kurang terhadap pembelajaran dalam talian berbanding dengan para pelajar pra-klinikal. **Kesimpulan:** Melalui kajian ini, dapat disimpulkan bahawa para pelajar perubatan di FPSK, UMS lebih selesa dengan persekitaran pembelajaran secara bersemuka atau pembelajaran teradun berbanding dengan pembelajaran secara dalam talian sepenuhnya, terutamanya di kalangan para pelajar perubatan di fasa klinikal. Selain itu, kurangnya persepsi terhadap sistem sokongan bagi kesejahteraan hidup membuka lagi ruang kepada pengurusan FPSK, UMS untuk menjalankan kajian yang lebih menyeluruh dalam pelaksanaan dan keberkesanan sistem sokongan pelajar sedia ada.

ABSTRACT

MEDICAL STUDENTS' PERCEPTION OF FACE-TO-FACE AND VIRTUAL EDUCATIONAL ENVIRONMENT DURING COVID-19 PANDEMIC IN UNIVERSITI MALAYSIA SABAH (UMS)

Introduction: A positive educational environment creates a welcoming environment that boosts satisfaction, well-being, academic success and collaboration among students, teachers and organizations which in return produces quality graduates. Knowing these effects, it is no doubt about the need for an organization to evaluate its educational environment. However, with the advancement of technology, it is now not only face-to-face teaching and learning activities that need a good educational environment. There is also a need to look into the virtual educational environment as more teaching and learning activities, including medical education, are being undertaken online especially during pandemic. The aim of this study is to explore the physical and virtual educational environment condition in Faculty of Medicine and Health Sciences (FMHS), Universiti Malaysia Sabah (UMS) from medical students' perspectives during COVID-19 pandemic. **Methodology:** A cross-sectional study was carried out with the target population of all medical students from year one to year five in FMHS, UMS (n=456). The perception of students toward their educational environment was measured using the shortened version of Dundee Ready Education Environment Measure (DREEM-17) and Online Student Connectedness Survey (OSCS-25) questionnaires. The quantitative data was analysed using SPSS version 28. Ethical approvals were obtained from the Human Research Ethics Committee of both universities, Universiti Sains Malaysia (USM) and UMS, where the study was conducted. **Results:** A total of 329 out of 456 medical students

responded (72.1%). The students' perception of physical educational environment was above average or more positive than negative with a mean score of 2.93 (SD = 0.76). While students' perception of online connectedness in virtual learning was also above average or moderate with a mean score of 2.60 (SD = 0.79). There is no significant difference in perception of both physical and virtual educational environment between sex of respondents but there is a significant difference between pre-clinical and clinical year students where the latter perceived lesser in the virtual educational environment.

Conclusion: The study findings conclude that medical students in FMHS, UMS perceived a better physical educational environment compared to a virtual one indicates their preferability for physical or blended learning instead of fully online learning in medical education, especially among clinical year medical students. Lower perception of support system in students' well-being suggests the need for further evaluation on the implementation and effectiveness of the current students' support system in FMHS, UMS.

CHAPTER 1 INTRODUCTION

1.1 Title of study

Medical students' perception of face-to-face and virtual educational environment during COVID-19 pandemic in Universiti Malaysia Sabah (UMS).

1.2 Background of study

An educational environment as defined by Hiemstra in 1991 is “all of the physical surroundings, psychological or emotional conditions and social or cultural influences affecting the growth and development of an adult engaged in an educational enterprise”. There are several more terms used as virtual synonyms for educational environment like learning climate or learning environment. The educational environment impacts both students and faculty members at various levels of systems. As a first step towards developing measures in order to improve the educational environment of any institutions, we need to have a comprehensive understanding of the educational environment in general (Gruppen et al., 2017).

Research into educational environment began in the 1930s and accelerated with the work of Pace and Sten in 1958 and Moos in 1974. It began as qualitative observation and interview approaches to determine the educational environment, but the strategies were eventually transformed into more quantitative research. Understanding the educational environment is vital for effective management of learning, development and change within the health professions (Genn, 2001a; Harden, 2001).

It is well known that a positive educational environment creates a welcoming learning environment that boosts satisfaction, well-being, academic success and collaboration among students, teachers and organization (Gruppen et al., 2018). Knowing these effects, it is no doubt about the need for an organization to evaluate its educational environment.

However, with the advancement of technology, it is now not only face-to-face teaching and learning activities that need a good educational environment. There is also a need to look into the virtual educational environment as more teaching and learning activities, including medical education, are being undertaken online.

1.3 Educational environment in Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah (UMS)

As mentioned before, the educational environment includes individual development, social interaction between learners, educators and administrators, and also the physical spaces as well as virtual spaces in an institution.

Universiti Malaysia Sabah (UMS), where this research was conducted, is the 9th university in Malaysia established in 1994, which is relatively a ‘young’ university in this country. In 2003, Faculty of Medicine and Health Sciences (FMHS, UMS), previously known as School of Medicine UMS, set out to design a programme based on the requirements defined at that time in Sabah, Northern Borneo of Malaysia.

The medical programme offered in FMHS, UMS spans over a period of five years and divided into pre-clinical modules for year 1 & 2 and clinical postings for year 3, 4 and 5. It adapted the curriculum model by Harden known as ‘SPICES’ which

are S-student-oriented, P-problem-based, I-integrated, C-community-based, E-electives and S-systematic model (Harden et al., 1984).

The FMHS, UMS has adequate physical facilities for students and also staff to support academic activities and curriculum delivery. This includes lecture halls, auditorium, seminar rooms, problem-based learning rooms, clinical skill laboratory and multi-purpose laboratory. This is further supported by Ibnu Sina Resource Centre (one of the platforms for students to study throughout the display of anatomy specimen models as a material education resources), computer laboratory and student recreation room. Internet access is available in all student's facilities. A large central library with a satellite library in the faculty enables the student access to information any time throughout their five years of medical training.

Other facilities include a student centre complete with counselling services, student study area and recreation room. Grocery stores, automatic teller machine and cafeteria are also available in the student hostels. The university has a mosque, a modern sports complex, and libraries, which are located in the main campus. Health services for students are provided by 'Pusat Rawatan Warga', UMS Polyclinic King Fisher, panel clinics and hospitals throughout Sabah.

Other than these physical facilities, it is also essential to provide a supportive environment especially to cater for mental health of the students. It is well known that higher education has always been regarded as a highly stressful environment for students, especially those in medical training including UMS (Musiu et al., 2019; Saiful et al., 2011). Thus, FMHS, UMS provide counselling services for those in need. Central counselling committee and mentor-mentee system were established for this. Committee members include members of medical education department, module

coordinators, counsellor and year coordinators. Students with suspected mental health issues are referred to university's counselling services; Psychology One Stop Centre provided by Faculty of Psychology and Education. Whenever necessary, the students are referred to psychiatrists for further management.

One important aspect of providing good educational environment is a two-way communication between students and educators. Therefore, FMHS UMS also created a complaint mechanism for its students. Students are able to give feedback and complaints electronically or through the feedback boxes available in FMHS. Complaints can also be channelled through the university's student affairs department or through the faculty's administrative office. Students in need of support are also identified by the mentors for pre-clinical year students and module coordinators for clinical year students based on student's poor performance (e.g. attendance issue, below average continuous assessments performance, behavioural issues with lectures, staff or peers).

To our knowledge, up till today studies on educational environment have never been conducted in FMHS, UMS. Therefore, this study was designed to assess the educational environment in our institute that will locate areas of concern that may be unintentionally overlooked by educators and the organization. This is important because findings from this study can guide the top management to focus on what is lacking in order to improve the educational environment for all FMHS, UMS students as their main stakeholders and other stakeholders as well.

1.4 Justification of study

The medical school is a learning institution that grows and adjusts its environment and curriculum via the analysis of its educational environment. Educational environment considerations in medical schools will certainly promote medical schools as a learning organization, together with continuous quality development and innovation. If medical schools are not established as such, health quality and sustainability might be jeopardized (Genn, 2001a; Harden, 2001).

Faculty of Medical and Health Sciences, Universiti Malaysia Sabah offers medical degrees since 2003. One of the faculty's goals is to produce high-quality graduates who are highly skilled, responsible, and have a holistic approach to medicine and health sciences knowledge. FMHS, UMS also strive to achieve sustainable quality education. Hence, a solid understanding of the educational environment via students' perception as the main stakeholder in medical education is vital to ensure continuous improvement of the educational quality and sustainability in FMHS, UMS.

From the literatures, studies on students' perception of their physical educational environment using DREEM questionnaire as a measurement tool has been widely used across places by medical and allied health educators (al Moaleem et al., 2020; Arokiamary et al., 2021; Atwa et al., 2020; Yee et al., 2019; Zalts et al., 2021). A systematic review of 106 studies conducted by Chan and team in 2018, concluded that most studies were conducted in Asia and Europe within medical, dental, and nursing programs. 80.6% of studies reported DREEM scores within the range of "more positive than negative". This systematic review also found out that higher DREEM scores were associated with better past academic achievement, quality of life, resilience, positive attitudes towards course, mindfulness, preparedness for practice,

less psychological distress, and greater peer support. Therefore, we felt that it is a timely decision for this study to be conducted in FMHS, UMS.

1.5 Educational activities during COVID-19 pandemic

Nowadays, one of the challenges in education is conducting face-to-face teaching and learning sessions or providing a physical educational environment during a pandemic outbreak. According to the United Nation's Educational, Scientific, and Cultural Organization (UNESCO), the COVID-19 pandemic has interrupted the teaching and learning activities of more than one billion students worldwide (UNESCO, 2021). Many universities worldwide have moved to emergency remote teaching (ERT) via online platforms, including UMS.

Fortunately, FMHS, UMS students are allowed to come back to campus in January 2021 for hybrid teaching and learning activities. Medical students in clinical phase also are allowed to do rotation in the nearby three teaching hospitals for their clinical studies. However, in June 2021, Malaysia was again forced into Movement Control Order (MCO) after being hit with the fourth wave of Covid-19 infection. Hence, a quick survey conducted in July 2021 revealed that year 1 and year 3 medical students had 50% online classes and 50% face-to-face classes. Year 2 experienced more than 70% online classes, while year 4 and 5 experienced more than 70% face-to-face classes. This is an opportunity for us to conduct a study, to know whether is there any relationship between the students' perception of the physical educational environment and virtual educational environment as all medical students had the opportunity to experience both face-to-face and virtual learning.

A study conducted by Bowers and Kumar in 2015 highlighted that online courses have higher dropout rates than face-to-face courses, which indicates that there are possibilities of high student attrition rates in online courses. Another research argues that feelings of isolation or disconnectedness in online courses are the major reason for high student attrition rates (Bolliger & Inan, 2012). With this current COVID-19 pandemic situation, the physical and psychological distance between lecturers and students can create this feeling of disconnectedness and can have an impact on the perception of virtual educational environment. Thus, it is important for us to determine the online student connectedness during this COVID-19 pandemic in order to identify the factors that influenced on it, for future improvement.

1.6 Benefit of the study

The aim of this study is to identify the educational environment condition in FMHS, UMS from medical students' perspectives. Students' perceptions are important as one of the major stakeholders in education that can give insights into the current educational environment in the faculty. Hence, it will provide evidence of the current condition of both physical and virtual educational environments in FMHS, UMS. It is hoped that the outcomes of this research will be beneficial to the students and future FMHS, UMS medical students. This study can also inform the relevant authority to improve the educational environment based on priorities. In addition, further research on a more specified educational environment and its association or impact can be made later based on the obtained results.

1.7 Objectives of study

1.7.1 General objectives

To evaluate the perception of medical students on the educational environment during COVID-19 pandemic in Universiti Malaysia Sabah

1.7.2 Specific objectives

1. To determine medical students' perception towards face-to-face educational environment during COVID-19 pandemic in terms of:-

- a) Learning
- b) Teaching
- c) Academic Self-Perception
- d) Social Self-Perception
- e) Atmosphere

2. To determine medical students' perception towards connectedness in online learning during COVID-19 pandemic in terms of:-

- a) Interaction and collaboration
- b) Facilitation
- c) Community
- d) Comfort

3. To determine the correlation between face-to-face and virtual educational environment during COVID-19 pandemic in Faculty of Medicine and Health Sciences, UMS.

4. To determine factors (e.g. phase of study, sex, academic performance) that associate with the students' perception towards face-to-face and virtual educational environment.

1.8 Research hypothesis

1. The overall DREEM score is 'more positive than negative' in Faculty of Medicine and Health Sciences, UMS.
2. The OSCS score shows that UMS students are moderately connected during virtual teaching and learning session
3. There is a positively, poor correlation between perception of student in face-to-face and virtual learning environment
4. There is a significant association between sex, phase of study and academic performance with perceived educational environment score.

1.9 Operational definition

(a) Students' perception: The preferential of students toward information they get from an object or situation. In this study it is the educational environment of medical school in Universiti Malaysia Sabah (UMS). Through observations and experiences with their senses, student can interpret the observed conditions.

(b) Educational environment: All of the physical or virtual surroundings, psychological conditions and social or cultural influences affecting the growth and development of an adult engaged in an educational enterprise.

(c) Academic achievement: Performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments. In this study, we use Grade Point Average (GPA) as a measurement of the academic achievement of medical students in FMHS, UMS. We also divided the students into 2 groups, higher achiever with $GPA \geq 3$ and lower achiever with $GPA < 3$.

(d) COVID-19 pandemic: Coronavirus disease (COVID-19) as defined by World Health Organization (WHO) is an infectious disease caused by a newly discovered coronavirus in 2019. It was initially reported to the WHO on 31st December 2019 in Wuhan, China. On 11th March 2020, the WHO declared covid-19 a global pandemic which is disease outbreak that spreads across countries or continents.

(e) Student Connectedness: The term ‘connectedness’ is generally is “when a person is actively involved with another person, object, group, or environment, and that involvement promotes a sense of comfort, well-being, and anxiety-reduction” (Hagerty et al. 1993)

CHAPTER 2 LITERATURE REVIEW

2.1 Definition

The educational environment sometimes addressed as an educational climate or learning environment, is a complex structure that encompasses individual development, social interaction between learners, educators and administrators, and the physical environment as well as the virtual environment. It also includes both the formally structured curriculum and the 'hidden' curriculum in an institution. This complex psycho-social-physical construct will act as a determinant of the behaviour of learners and educators in an institution (Gruppen et al., 2017; Harden, 2001).

2.2 Key elements in the educational environment

To evaluate learners' or educators' perceptions of the educational environment in one institution, it is vital for us to understand the key elements or parts of the educational environment as a whole. Research into the educational environment began in the 1930s and accelerated with the work of Pace and Sten in 1958 and Moos in 1974. It started as qualitative observation and interview approaches to determine the educational environment, but the strategies were eventually transformed into more quantitative research.

In the year 2001, Genn provided a comprehensive analysis of the educational environment and the curriculum, emphasizing that practically anything can be described and included as an element of the educational environment as long as it has an effect on the educational process (Genn, 2001b). There are so many components

and variables that could be examined that it becomes impossible to enumerate them all. Genn adopts a more specific strategy to sort these vast educational environment components into “faculty, students, administration and physical features” as key elements of the educational environment. These key elements interact with each other in various ways and represent both the social and physical dimensions of the educational environment (Genn, 2001b).

A study done by Schonrock-Adema and team in 2012, highlighted a theoretical framework that outlined the key concepts for assessing the quality of the educational environment, specifically in the medical field. It is also tailored with previous Moos’ framework in 1974 that defines three domains as the key elements of human environments as general and not only for the medical educational environment. These three domains are:

- 1) Personal development or goal direction, which relates to the achievement of the educational goals that are characterized by a clear understanding of the learning outcomes, relevant learning content and constructive criticism in one educational environment. It also includes the opportunity for personal growth and the building of self-esteem among learners.
- 2) Relationship, which is the communication or interaction between learners and other faculty members. Good communication, kindness, support from others in the community, and a sense of belonging are all hallmarks of a positive relationship domain. These positive relationships will reflect in the form of student involvement, affiliation or connection, and good emotional support among members. It demonstrates the extent to which various individuals are involved in the environment and to which degree they support and help each other.

- 3) System maintenance and system change, which focus on the degree of structure, clarity and openness to change. It is characterized by an orderly and organized environment that reflects innovation and allows student influence on any change.

Schonrock and her team managed to map 94% of items from 9 established medical educational measurement tools including the Dundee Ready Education Environment Measure, DREEM into these 3 domains of theoretical framework. Even though it is not supported by quantitative data like factor analysis to check if the items of medical educational environment instruments fit the proposed framework, it still signifies that the majority of the medical educational environment measuring tools are on track in measuring the educational environment (Schonrock-Adema et al., 2012).

While many researchers generally accept the previous framework as their conceptual background in educational environment research, Gruppen and his colleagues in 2019 suggested a conceptual framework for educational environment that adapted the Miller's levels of living systems (Figure 2.1) (Miller, 1978).

Society
Community
Organization
Group
Person

Figure 2.1 The hierarchy of levels of living systems by Miller, 1978

Other than focusing on social interactions as highlighted in the previous framework, it also emphasizes on the need to look into intraindividual psychological

characteristics as well as physical spaces and virtual environments. This framework consists of two primary dimensions: a psychosocial dimension and a sociomaterial dimension (Gruppen et al., 2019).

2.2.1 Psychosocial dimension

The psychosocial dimension encompasses the key elements in social interactions that have been discussed in the previous framework by Moos in 1974 and Schonrock in 2012 as mentioned earlier. There are at least three levels of the living systems hierarchy in this dimension:

- 1) The personal or individual characteristics that give impact or are impacted by the educational environment. It includes the personal and professional growth of learners as well as the quality of life in the institution that embraces their well-being or resilience during the learning period.
- 2) The social level that encompasses interpersonal interactions within the educational environment. These include the interactions between learners, learner-to-educator, learner-to-staff, as well as learner-to-patient interactions. Learners' attitudes toward and experiences in school are shaped in part by their social interactions, which in turn affect what and how they learn.
- 3) The organizational level that focuses on how individuals engage with regulations, comprehend organizational performance measurements and respond to organizational culture or specific leadership actions. It is the organization's responsibility to give structure, guidance, and support for the learning experience.

2.2.2 Sociomaterial dimension

Another dimension suggested by Gruppen and his team is sociomaterial dimension. In this dimension, it describes how learners engage with the physical and virtual platforms that form their educational environment. It divides into two spaces under this dimension:

- 1) Physical spaces in which learning activities occur, like buildings and classrooms, where learners look for a conducive physical environment for learning, including the surrounding factors like light, noise, temperature as well as furniture arrangements.
- 2) Virtual spaces encompass a variety of systems and networks to distribute educational materials to students and facilitate interaction and learning between students and their peers.

2.3 Changes in the educational environment during COVID-19 pandemic

When the COVID-19 pandemic hit the world in the early year 2020, it was not only the health care system or economic growth that experienced a significant crisis. The education system was also impacted by it. This pandemic has interrupted the teaching and learning activities of more than a billion students worldwide (UNESCO, 2021). Students around the world were forced to learn via emergency remote teaching (ERT), including medical students. Most medical schools have had to stop teaching face-to-face and instead use online classes, converting from a real clinical experience to a virtual one, especially in the early phase of the pandemic.

Even though a meta-analysis conducted by Pei and Wu in 2019 indicated that online learning worked as well as offline learning, we still need to consider other

factors that influenced on online learning environment to find the room for opportunities for improvement. In order to do so, we must first grasp the theoretical foundations underlying successful online learning in the educational setting.

2.3.1 Online learning theoretical framework

Online learning or commonly stated as ‘electronic learning’ (e-learning), is a technology-mediated learning approach and should be distinguished from the concept of blended learning, which is described as the effective integration of face-to-face and online learning depending on the educational objectives (Valverde-Berrocso et al., 2020).

A systematic literature review conducted by Valverde-Berrocso and his team in 2020 highlighted the most relevant theoretical framework in the studies of e-learning, which is the Community of Inquiry (CoI) framework by Garrison and colleagues in the year of 1999. The CoI is a theoretical framework that emphasizes the development of a community as a key component in constructing knowledge in the virtual educational environment. Its focus on facilitating meaningful learning experiences through three presences:

- 1) Cognitive presence which is the degree to which learners may construct and reinforce meanings of knowledge through continual discussion among their online community.
- 2) Social presence which is the ability of learners to come to terms with themselves as a group, interact openly in a safe environment, and gradually develop affective and personal relationships as a means of expressing their own personality.

- 3) Teaching presence which is defined as the planning, promotion, and orientation of the cognitive and social processes in order to come out with relevant learning outcomes. To achieve these goals, educators play an important role in delivering online learning (Garrison et al., 1999).

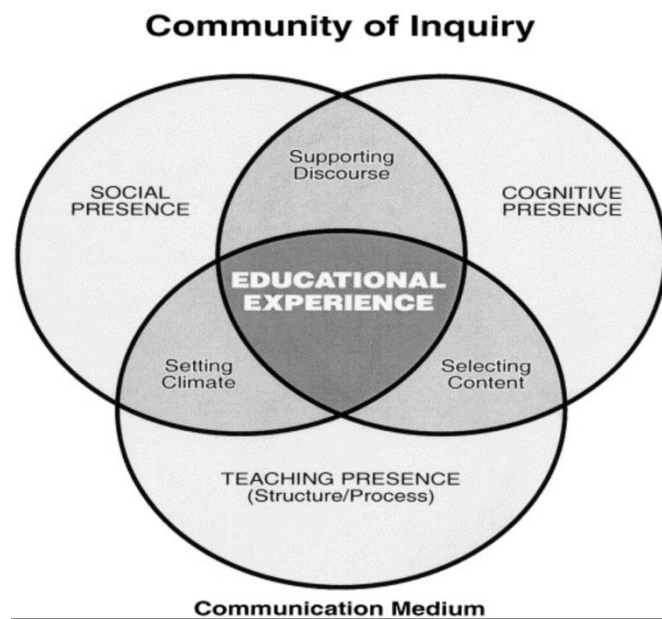


Figure 2.2 Community of Inquiry framework by Garrison et al., 1999

2.3.2 Factors influencing sustainability of online learning

A systematic review of research on online teaching and learning from 2009 to 2018 by Florence Martin and team in the year 2020 highlighted 12 themes from 3 major domains of research that influenced online learning. These 3 major domains are organization, course and instructor, and learner domain (Figure 2.3).

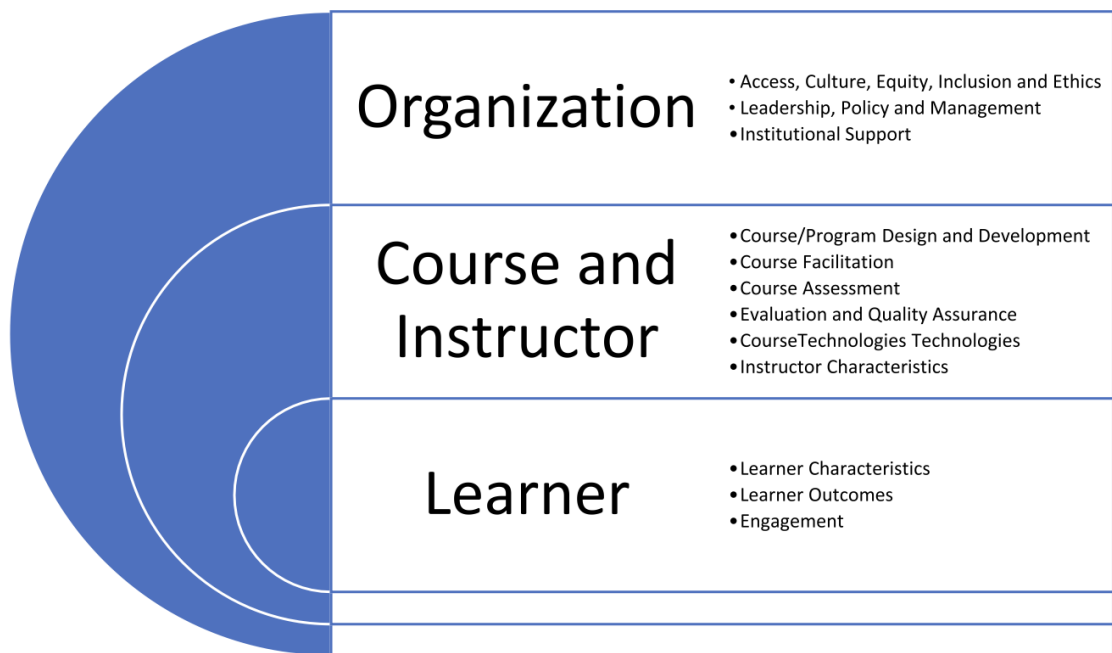


Figure 2.3 Domains that affect online learning by Martin et al., 2020

Some countries might be readily equipped with the sudden changes during pandemic COVID-19 as learners and educators move towards technology-enhanced learning. Unfortunately, in other underdeveloped or even developing countries like Malaysia, many are still struggling with basic necessities like internet connection, operation software, or even devices for technology-enhanced learning that limit the feasibility (Andersson & Grönlund, 2009; Cha et al., 2020). However, for this feasibility factor, it is mainly the responsibility of the policymaker from the respective government or higher up organization in an institution (Martin et al., 2020). We are more interested in looking into learners' perspectives, which we can measure and take note of for any room for improvement.

Engagement or connectedness is one of the factors that we can measure from learners' perceptions (Martin et al., 2020). Connectedness or engagement in online courses includes interaction among students, teachers and faculty plays an important

role to complete online learning objectives successfully. It is also one of the most mentioned predictors in the literature for students' satisfaction in online learning, along with internet self-efficacy and self-regulated learning, among other things (Rodrigues et al., 2019).

Feelings of isolation or disconnectedness in online courses are major reasons for high student attrition rates in online courses (Bolliger & Inan, 2012). Other than this, the absence of connectedness has also been linked to some negative effects such as low self-esteem, loneliness and depression (Baumeister et al., 1995). Thus, for an effective online educational environment, it is important for educators to establish the engagement or connectedness of an online community where social presence is addressed for good communication between learners and teachers.

2.4 Measuring perceptions of the educational environment

To measure the educational environment quantitatively, many instruments have been developed, and each of them is adapted to a particular interest setting (Schonrock-Adema et al., 2012). Study on students' perception of their physical educational environment using the Dundee Ready Education Environment Measure, DREEM questionnaire as a measurement tool has been widely used across places by medical and allied health educators (al Moaleem et al., 2020; Arokiamary et al., 2021; Atwa et al., 2020; Yee et al., 2019; Zalts et al., 2021). A systematic review of 106 studies conducted by Chan and team in 2018 concluded that 80.6% of studies reported DREEM scores within the range of "more positive than negative" and most studies were conducted in Asia and Europe within medical, dental, and nursing programs. This systematic review also found that higher DREEM scores were associated with better

past academic achievement, quality of life, resilience, positive attitudes towards the course, mindfulness, preparedness for practice, less psychological distress, and greater peer support.

Other than DREEM, there is another recent validated medical educational environment measurement tool, the Johns Hopkins Learning Environment Scale (JHLES). It was developed in the US to capture the complexity and diversity of each student's relationship, intellectual and institutional commitment to medical school (Shochet et al., 2015). However, a study conducted by Zalts and team in 2021 shows a positive, high and significant correlation between the JHLES and DREEM, indicating a partial association between them. As this current study was conducted at Universiti Malaysia Sabah (UMS), it is crucial to have the underlying picture of the educational environment of institutions with a relatively similar setting to UMS as one of the public universities in Malaysia that provide undergraduate medical training. Few universities in Malaysia studied the medical undergraduate student's perceptions of the educational environment using DREEM as a research tool like Universiti Sains Malaysia (USM) (Arzuman et al., 2010), Universiti Kebangsaan Malaysia (UKM) (Ugusman et al., 2015), Universiti Sultan Zainal Abidin (UniSZA) (Rahman et al., 2015), and Universiti Malaysia Sarawak (UNIMAS) (Yee et al., 2019).

As the DREEM questionnaire mainly measures the physical medical educational environment, there is a need to look into how do we measure the virtual learning environment quantitatively. There are quite a number of validated instruments to measure online learning environment available in the literature (Taylor & Maor, 2000; Chang & Fisher, 2001; Aldridge et al., 2004; Clayton, 2007; Mousavi et al., 2020; Walker & Fraser, 2005). One recent instrument is the 'e-learning educational

atmosphere measure' (EEAM), which mainly assesses the educational atmosphere in e-learning environments. It consisted of 40 items covering six factors: programme effectiveness, teaching quality, ethics and professionalism, learner support, safety and convenience, and awareness of the rules (Mousavi et al., 2020). This current study involved medical students in UMS that have the chance to experience hybrid learning, which is the combination of both face-to-face and online learning depending on learning objectives. Therefore, it will be biased if we measure the program effectiveness using EEAM as the teaching and learning activities are conducted in a hybrid setting. Thus, we are more interested in measuring the students' perception of online connectedness or engagement, which is one of the major factors that influence online learning to be successful, as mentioned earlier.

To measure students' perception of online connectedness or engagement, there is a reliable, validated instrument in the literature for this purpose which is the Online Student Connectedness Survey, OSCI (Bolliger & Inan, 2012). It consists of 25 items covering four domains; comfort, interaction & collaboration, community and facilitation. When looking into the main framework of online learning as explained before (Figure 2.2), it highlighted three main presences; cognitive presence, social presence and teaching presence. We can indirectly relate the need for a cognitive presence in the comfort domain as it mainly discussed the personal learners' perception to feel safe and encouraged to be involved in the learning process. There is also the involvement of social presence that is relevant to both domains of interaction & collaboration and community, but the depth of interaction between students, peers, and instructors is greater in the latter. We also can relate the importance of teaching presence that is being discussed in the domain of facilitation which mainly involves

organization and instructors in making sure the process of online learning is conducted smoothly.

2.5 Conceptual framework of educational environment

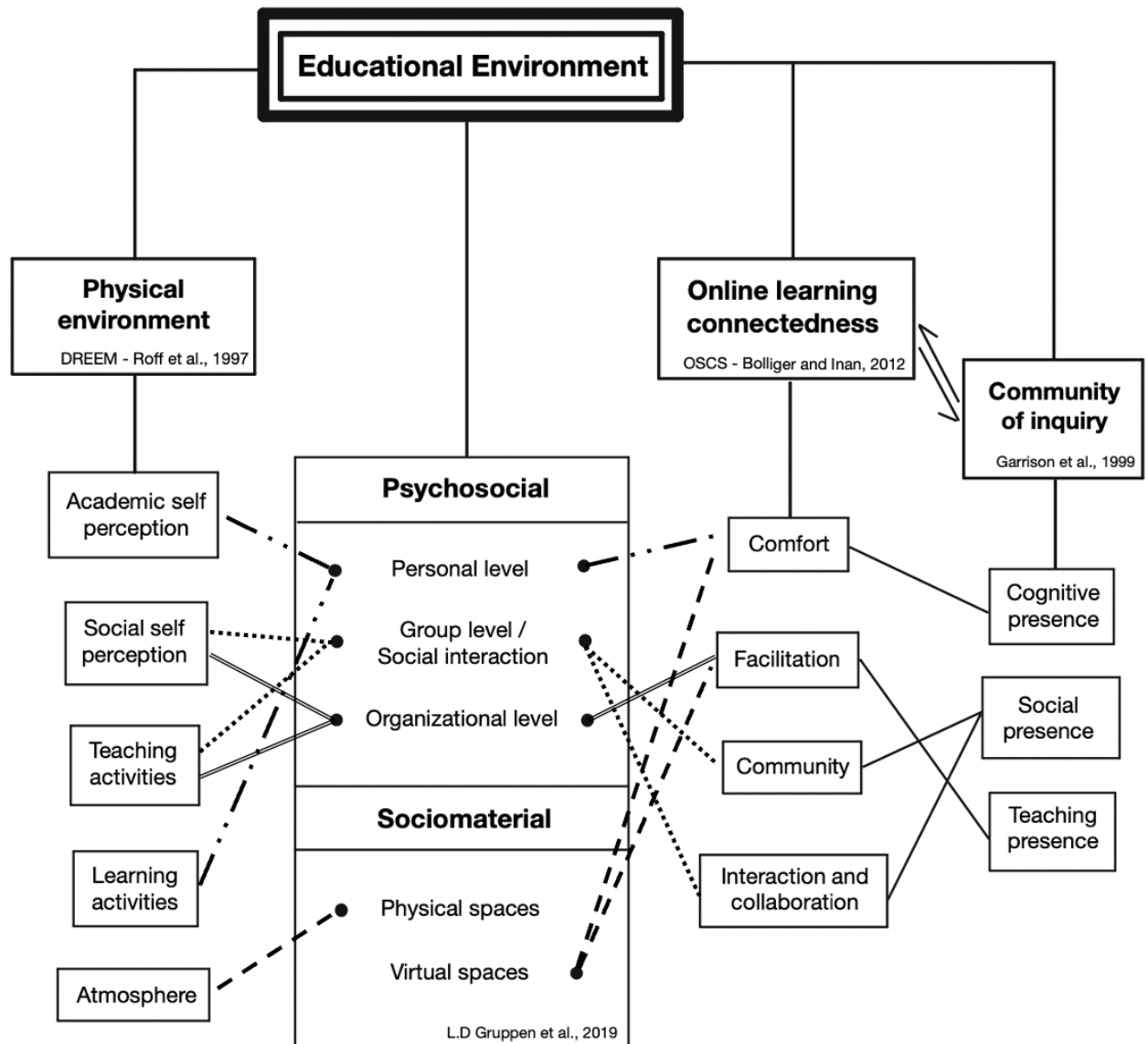


Figure 2.4 Conceptual framework of educational environment

- · · Personal level interrelation
- Group level / social interaction interrelation
- Organizational level interrelation
- Sociomaterial interrelation

Figure 2.4 highlighted the possible interrelation between domains of both instruments measuring physical educational environment and online students connectedness with the theoretical framework of psychosocial and sociomaterial components of the educational environment by Gruppen and team in 2019 as explained before.

We can relate the domains of academic self-perception and learning activities from the DREEM instrument and comfort domain from the OSCS instrument with the personal level dimension as it generally involves the personal perception or professional growth of learners in an institution.

For the group level or social interaction dimension, we can relate the domain of social self-perception and teaching activities from the DREEM instrument, while the domain of community and interaction & collaboration are from the OSCS instrument. All of these domains involve in measuring the social interaction among students, peers and also educators or instructors.

Another dimension is the organizational level wherein this dimension, it relates to the facilitation domain from the OSCS instrument and social self-perception and teaching activities from DREEM instrument similar to the group level dimension. We believe that the interaction between students and educators is also guided by the organization via a proper policy.

The last dimension which is the sociomaterial dimension which discussed the spaces for both physical and virtual educational environments. As these both instruments of DREEM and OSCS are measuring different spaces, hence there will be no interrelation between them and they are unique on their own for interpretation.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Study design

This study is a cross-sectional study that applies a quantitative method using the shortened version of Dundee Ready Education Environment Measure (DREEM-17) and Online Student Connectedness Survey (OSCS-25) questionnaires.

3.2 Study population

The study population are medical students from year 1 until year 5 for semester 2020/2021 session in Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah that stayed in the campus since January 2021.

3.3 Sample size calculation

The sample size was estimated based on research objectives and calculated using an online statistical calculator (Arifin, W. N., 2021).

Table 3.1 Sample size estimation

Research objectives	Parameters for calculation (Power of study = 90% ; level of significance = 0.05)	Estimated sample size
To determine medical students' perception towards face-to-face educational environment during COVID 19 pandemic	Using single mean formula:- DREEM score Mean: 127.9 SD: 16.58 Precision (+-mean) : $5\% * 127.9 = 6.4$ <i>Rahman et al., 2015</i>	26