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LEARNING STYLES AND ONLINE LEARNING SATISFACTION OF UNIVERSITY STUDENTS POST-COVID-19 PANDEMIC

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Abstract

***Background**: Learning styles can be defined as factors, behaviours, and attitudes that aid the learning process. It benefits students as it allows a better understanding of the lesson. **Purpose**: This study aims to identify the learning styles and satisfaction of online learning of health sciences-based students at the International Islamic University Malaysia post-COVID-19 pandemic. **Methods**: A quantitative cross-sectional study with convenience sampling was conducted among 260 students from April to June 2022. Data were gathered using Google Forms and a self-administered questionnaire, available in English and distributed to the Kulliyyah of Nursing, Kulliyyah of Allied Health Science, Kulliyyah of Pharmacy, Kulliyyah of Medicine, and Kulliyyah of Dentistry students. The questionnaire was adopted and adapted from two sets of questionnaires, i.e., two sets from the Felder and Soloman Index Learning Styles and one set of satisfaction questionnaires from Aritino (2008). Data analysis was done using SPSS version 26.0. **Results**: Most respondents chose the visual, sensing, and sequential learning styles, while an almost balanced proportion chose activist-reflective. Most of them have high levels of satisfaction with online learning. **Conclusion**: Students prefer the Visual, Sensing, and Sequential learning styles and have high levels of online learning satisfaction.*

***Keywords:** learning styles, online learning, university, students, post covid*

INTRODUCTION

Since Malaysia was hit by the COVID-19 pandemic in 2020, all teaching and learning processes have changed. COVID-19 has forced all educational institutions, such as schools, colleges, and universities across the world, to shut down. The government imposed the Movement Controlled Order (MCO) starting in March 2020. Since then, the educational system, university administration, and teaching and learning processes have been affected. The dissemination of education has changed

dramatically with the phenomenal rise of online learning, whereby teaching is conducted remotely via digital platforms. With the imposed MCO by the government, all face-to-face activities were halted, and educators were forced to shift to an online teaching mode overnight. All lectures, meetings, or clinical sessions that involved any face-to-face encounters were converted to a virtual environment to ensure the safety of the students and lecturers. All lessons were changed swiftly into synchronous and asynchronous learning. The Ministry of Higher Education Malaysia has allocated RM 24 million for internet data plan assistance to benefit approximately 320,000 students from the B40 category to facilitate an online learning environment following the COVID-19 pandemic. Moreover, the Malaysian government has spent approximately a quarter million ringgit to assist stranded students as one-off cash assistance involving a data plan that will benefit B40 students and others. Students in need received free laptops and cash assistance.

The teaching and learning of the students were greatly affected during the COVID-19 outbreak due to the sudden need to shift to virtual learning (Meccawy et al, 2021). Nursing students, along with other health science programme students like medical and dentistry, are required to undergo clinical posting to fulfil the course requirement, simultaneously preparing them to become competent healthcare providers (Romli et al. 2022. Online learning can be defined as an education that takes place through the internet and is also referred to as "e-learning." Some benefits include flexibility and the ability to learn at their own pace. However, to what extent are online learning as effective as face-to-face learning? Does it allow the dissemination of all beneficial information through online learning? To what extent does it assist health science-related students in simulating real-life situations? On the other hand, according to Nuankaew et al. (2019), learning styles represent an important issue in the learning process of the 21st century, with students expected to participate actively in developing self-understanding and environment engagement.

Learning styles can be defined as factors, behaviours, and attitudes that aid the learning process. It is beneficial in assisting a better comprehension of the student. Coyne et al. (2018) recognised that educators could address different learning styles and needs when developing the online learning teaching strategy. They can ensure that different learning activities, which address different learning styles, can be incorporated into the different elements of online learning. Elshami et al. (2021) believed that using multimodal examples of the concepts and skills required of the students allows them to understand, reflect on, and develop knowledge. Hence, the developer of online learning activities needs to ensure that the approach can engage and allow immediate feedback to the students on their learning. This is important for modern-day students who are required to be actively engaged in the learning process (Ebner & Gegenfurtner, 2019).

However, in the current conventional e-learning environment, the instructions were devised according to the conventional "one-style-fits-all" approach, i.e., all students are exposed to the same learning procedures. This type of learning considers students' different learning styles and preferences (El-Sabagh, 2021). Although several technologies are available for online education, sometimes they create many difficulties. These difficulties and problems associated with modern technology ranged from downloading errors, issues with installation, login problems, and audio and video problems (Roslan & Halim, 2021). On the contrary, articulating educational content to students requires strong technological skills. It will somehow affect the quality of the teaching. Dalmolin et al. (2018) also stated that the varied learning styles are related to students' different

abilities and individual preferences. The problem arises when one learning style does not fit the online learning process. The inability to adapt to the change in the learning style of an online context might interfere with learning satisfaction and comprehension. Thus, this study aims to explore the dominant learning styles and how satisfied students are with online learning based on their learning styles.

METHODS

Research design

A quantitative cross-sectional study was conducted among 260 students from April to June 2022, utilising the convenience sampling method. The inclusion criteria were active undergraduate students, health science-based students (Kulliyyah of Nursing, Kulliyyah of Medicine, Kulliyyah of Dentistry, Kulliyyah of Pharmacy, and Kulliyyah of Allied Health Science) and those who have experienced online learning. The exclusion criteria are Kulliyyah of Science students and those on study leave.

Setting and samples

The target population of this study was health science-based students in IIUM Kuantan, Pahang, with a total population size of approximately 2,683 students. A sample size calculation was done to determine the sample size needed in this study to reflect the target population using Raosoft Inc. software. The recommended sample size for this study was 337 participants with a 5% margin of error, 95% confidence level, and 50% response distribution.

Measurement and data collection

The study utilised an online survey comprising three parts. Part A comprises four items to identify the sociodemographic characteristics of the participants, such as gender, kulliyyah (faculty), year of study, and experience in online learning. Part B comprises 44-item questionnaires with the choice of answer A or B of the Index Learning Style Questionnaire, which results in Activist/Reflective, Intuitive/Sensing, Visual/Verbal, and Global/Sequential learning styles. It is made up of 11-item questionnaires for each dimension of learning styles. The score was calculated according to the number of A or B selected to determine each dimension of learning styles possessed. The index learning style questionnaire was originally developed by Felder and Soloman (1997). Part C questionnaire is about three-item satisfaction subscale questionnaires adapted from Artino (2008). It comprises seven scales: Completely Disagree, Mostly Disagree, Tend to Disagree, Neutral, Tend to Agree, Mostly Agree, and Completely Agree. The midpoint was used as a cut-off to the categorised level of satisfaction. Scores above 3.5 were categorised as high satisfaction, while scores lower than 3.5 will be categorised as low satisfaction.

Data analysis

The data were analysed using IBM SPSS 26.0. A descriptive analysis (frequency, percentage, and mean) was utilised to explore the sociodemographic data, learning styles, and satisfaction. The normality test showed that the data are normally distributed. A p-value of less than 0.05 is considered statistically significant.

Ethical considerations.

The researcher obtained approval from the Kulliyyah of Nursing Post Graduate Research Committee (KNPGRC) and IIUM Research Committee (IREC) before data collection. The researchers informed eligible participants about their rights of voluntary participation, withdrawal at any time, confidentiality, and privacy on the front page. The study participants were asked not to write their names, academic numbers or any other identifying information on the questionnaire link to maintain anonymity.

RESULTS

This quantitative cross-sectional study was conducted over a three-month period from April to June 2022. The study had 260 student respondents, representing a 70% response rate from the total population. The majority of participants were female (n = 218), enrolled in the Kulliyyah of Nursing (n = 120), and in their fourth year of study (n = 116). Additionally, most respondents had prior experience with online learning.

Table 1: Frequency distribution of Sociodemographic characteristics of the respondents (N=260)

Variables		**Frequency (n)**	**Percentage (%)**
Gender	Male	42	16.2
	Female	218	83.8
Kulliyyah	Kulliyyah of Nursing	120	46.2
	Kulliyyah of Allied Health Science	55	21.2
	Kulliyyah of Medicine	31	11.9
	Kulliyyah of Dentistry	30	11.5
	Kulliyyah of Pharmacy	24	9.2
Year	Year 1	31	11.9
	Year 2	45	17.3
	Year 3	54	20.8
	Year 4	116	44.6
	Year 5	14	5.4
Experience of Online Learning	Yes	260	100
	No	0	0

Table 2 displays the prevalent learning style preferences across various Kulliyyahs. Generally, there is a tendency towards visual learning over auditory, sensing over intuitive, and sequential over global learning styles. In the Kulliyyah of Nursing, the breakdown of preferences is as follows: visual style (n = 109), sensing style (n = 102), sequential style (n = 82), activist style (n = 68), and reflective style (n = 52). Meanwhile, participants in the Kulliyyah of Medicine predominantly favored visual style (n = 23), sensing style (n = 23), and sequential style (n = 21). The preference between activist (n = 15) and reflective (n = 16) styles was almost equal. Within the Kulliyyah of Allied Health Sciences, respondents leaned towards reflective style (n = 38), followed by visual style (n = 49), sensing style (n = 47), and sequential style (n = 41). In the Kulliyyah of Dentistry, the majority of participants preferred the visual style (n = 27), while the other styles showed a more balanced distribution. In the Kulliyyah of Pharmacy, a significant number of participants opted for both visual (n = 22) and sensing (n = 22) styles. Notably, reflective style was favored over activist style by around 15 participants, and 17 chose sequential style over global style. These findings offer valuable insights into the learning style preferences within each Kulliyyah.

Table 2: Kulliyyah and Learning Styles of Health Based IIUM Kuantan Students (N=260)

		Frequency (n, %)				
		Kulliyyah of Nursing	**Kulliyyah of Allied Health Sciences**	**Kulliyyah of Medicine**	**Kulliyyah of Dentistry**	**Kulliyyah of Pharmacy**
Learning styles	Activist	68 (56.7)	17 (30.9)	15 (48.4)	14 (46.7)	9 (37.5)
	Reflective	52 (43.3)	38 (69.1)	16 (51.6)	16 (53.3)	15 (62.5)
	Visual	109 (90.8)	49 (89.1)	23 (74.2)	27 (90.0)	22 (91.7)
	Auditory	11 (9.2)	6 (10.9)	8 (25.8)	3 (10.0)	2 (8.3)
	Sensing	102 (85.0)	47 (85.5)	23 (74.2)	18 (60.0)	22 (91.7)
	Intuitive	18 (15.0)	8 (14.5)	8 (25.8)	12 (40.0)	2 (8.3)
	Sequential	82 (68.3)	41 (74.5)	21 (67.7)	17 (56.7)	17 (70.8)
	Global	38 (31.7)	14 (25.5)	10 (32.3)	13 (43.3)	7 (29.2)

Table 3 shows that most participants from the Kulliyyah of Nursing (n = 92), Kulliyyah of Allied Health Sciences (n = 44) and Kulliyyah of Dentistry (n = 23) have high levels of satisfaction. Likewise, more than half of the participants from the Kulliyyah of Medicine and Kulliyyah of Pharmacy have high satisfaction levels.

Table 3: Kulliyyah and Satisfaction of Online Learning of Health Based IIUM Kuantan Students (N=260)

		Frequency (n, %)				
		Kulliyyah of Nursing	**Kulliyyah of Allied Health Sciences**	**Kulliyyah of Medicine**	**Kulliyyah of Dentistry**	**Kulliyyah of Pharmacy**
Satisfaction	Low (<3.5)	28 (23.3)	11 (20.0)	13 (41.9)	7 (23.3)	11 (45.8)
	High (>3.6)	92 (76.7)	44 (80.0)	18 (58.1)	23 (76.7)	13 (54.2)

Table 4 shows that most participants with visual style (n = 167), sensing style (n = 158), and sequential style (n = 132) have high levels of online learning satisfaction. However, an almost equal number of participants who preferred the activist (n = 92) and reflective (n = 98) styles have high satisfaction levels.

Table 4: Learning Styles and satisfaction of online learning of Health Based IIUM Kuantan Students (N=260)

		Frequency (n, %)	
		Low (<3.5)	High (>3.6)
Learning styles	Activist	31 (25.2)	92 (74.8)
	Reflective	39 (28.5)	98 (71.5)
	Visual	63 (24.7)	167 (72.6)
	Auditory	7(23.3)	23 (76.7)
	Sensing	54 (25.5)	158 (74.5)
	Intuitive	16 (33.3)	32 (66.7)
	Sequential	46 (25.8)	132 (74.2)
	Global	24 (29.3)	58 (70.7)

DISCUSSION

In this study, the study highlights notable patterns in learning style preferences among students across different Kulliyyahs. It is evident that, as a general trend, students tend to favor specific learning styles over others. Specifically, the majority of participants within these Kulliyyahs display a preference for visual learning styles as opposed to auditory styles. Most of the participants have reflective learning (n = 137), visual learning (n = 230), sensing learning (n = 212), and sequential learning (n=178) styles. In comparison, for the activist or reflective dimension, all kulliyyah preferred the latter, except for participants from the Kulliyyah of Nursing, who preferred the activist

style. This could be due to the nature of the course that requires active participation in activities, with hands-on procedures to achieve a greater understanding. People have varying learning styles influenced by their cognitive preferences and how they process information. These preferences are often shaped by past learning experiences and personal characteristics.

Similar to the study by Vizeshfar and Torabizadeh (2018), the results of a study in Turkey that aimed to identify the preferred learning style of nursing and medical students showed that the most nursing students could make deductions as a result of the direct experience and experimental approach. This could be due to the nature of the programs within each Kulliyyah may influence learning style preferences and varied active teaching methods in the nursing field, such as role-playing, practice, repetition, brainstorming, simulation, and drama, to teach students the principle of nursing care (Kohan et al., 2021). The learning method incorporates active participation, such as discussions and explaining it to others. Healthcare-related fields like Nursing and Allied Health Sciences might emphasize visual and sequential learning due to the need for accuracy and attention to detail especially for precise observation and procedural knowledge. This can be related to nursing, which involves clinical posting, hands-on procedures, and others. Subsequently, most participants (n = 190) have high satisfaction levels with online learning, while some (n = 70) exhibit low satisfaction levels. Roughly, participants from all Kulliyyah and the year of study were satisfied with online learning. However, the satisfaction of respondents could be affected by several reasons. The design and structure of online courses can affect students' satisfaction. Courses that incorporate visuals, provide clear instructions, and offer opportunities for sequential learning may align well with the preferences of some students and the new generation who are comfortable with technology.

Dalmolin et al. (2018) revealed that undergraduate dental students were very comfortable utilising technology and generally had a positive attitude towards e-learning. Some students may adapt their learning style preferences to fit the available resources and learning environment. They might choose a learning style that seems most effective for a particular course or situation. The findings suggested that a significant number of participants with visual, sensing and sequential learning styles have higher satisfaction in online learning. This is consistent with the study by Baherimoghadam et al. (2021), where most students were well-balanced between active-reflective learning styles. Similar studies by Vaishnav and Chirayu (2013) have shown that a large proportion of orthodontic residents preferred sensing, active, and visual learning styles. In addition, there is evidence of improved learning using the mixed-method approach. The level of interaction with instructors and peers, as well as the feedback received, can affect satisfaction. Some learning styles may thrive in more interactive online environments. According to Pask (1988), the best learning "style" for benefitting from instruction is to avoid depending upon any single style or any style-like consistency in approach.

IMPLICATION AND LIMITATIONS

This study is important to assess the learning styles of students. Different approaches and teaching methods can be constructed in accordance with it. The learning styles can change depending on time and environment; hence, they need to be updated and assessed accordingly. Nonetheless, the findings of this study do not represent the general scenario as it is limited to the IIUM Kuantan settings. Furthermore, the proportion of kulliyyah, year of study, and gender were not fairly distributed,

possibly affecting the outcomes. Moreover, the availability of many instruments to measure the types of learning styles and various factors could affect the learning styles. These factors can also change depending on time and environment.

CONCLUSION

Out of the participants, 83.8 percent were females, while 16.2 percent were males. The majority of the participants (46.2 percent) belonged to the Kulliyyah of Nursing, with a significant portion (44.6 percent) in their fourth year of study. Interestingly, participants exhibited predominantly visual, sensing, and sequential learning styles, with a nearly balanced number favoring activist-reflective styles. Notably, 56.7 percent of participants from the Kulliyyah of Nursing favored the activist learning style over the reflective style. In contrast, fourth-year students displayed a preference for the reflective style, with 65.5 percent choosing it. When it came to satisfaction with online learning, a significant 73.1 percent reported high satisfaction levels, while the remaining 6.9 percent expressed lower satisfaction. Participants with visual, sensing, and sequential learning styles overwhelmingly reported high satisfaction levels with online learning. However, the activist and reflective styles yielded similar high satisfaction levels. It's worth noting that despite these findings, no significant association was observed between the various learning styles and satisfaction with online learning. Nonetheless, this study carries importance in acknowledging the diverse learning styles of students. This knowledge can inform the development of tailored approaches and teaching methods to better cater to the needs of these students."

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CONFLICT OF INTEREST

The author has no conflict of interest to declare in this study.

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