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Students' Motivation and self-regulated learning in health professions during Compulsory E-learning in COVID-19 pandemic.

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Abstract: Our objective is to assess motivation and self-regulated learning domains among undergraduate health professional students during compulsory E-learning in the COVID-19 pandemic, and explore inter-gender variabilities and the correlation between test anxiety and self-regulated learning. Institutional based descriptive study, Motivated Strategies for Learning Questionnaire (MSLQ) was administered to 291 healthy undergraduate students of health professions programs at Al Marefa University. Two months after shifting to compulsory E-learning, students were invited to return an online standardized self-administered questionnaire via Google form. Data were analyzed using SPSS version 23. Reliability analysis with an average close to or exceeds the recommended value ($\alpha = 0.7$). The extrinsic motivation was higher than the intrinsic one, the use of learning strategies was modest. Female students displayed significantly higher motivation and learning strategies scores (P=0.001). Male had higher extrinsic goal orientation P= 0.001, self-efficacy P= 0.043, Help-seeking P= 0.017, while females had a higher time study environment P=0.027. Also, the youngest and oldest students were the most motivated ones (P= 0.04). A positive correlation exists between test anxiety and extrinsic goal orientation (P=0.000). Statistically significant correlations exist between test anxiety and all of the learning strategies scales. There are adequate levels of motivation with moderate use of learning strategies among health professional students during sudden shifting to compulsory E-learning in the COVID-19 pandemic. Females' students were more self-regulated learners than males. Further investigation of the use of the Motivated Strategies for Learning Questionnaire and its association with academic achievement is recommended to assess the online teaching experience.

Keywords: Students' Motivation, self-regulated learning, E-learning, COVID-19 pandemic

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1. INTRODUCTION

The novel coronavirus (COVID-19) has recently spread globally and now a pandemic [1]. This disaster brought not only the risk of death from the viral infection but also intolerable psychological pressure [2]. The continuous spreading of the epidemic, with the strict isolation measures and delays in starting universities across the world, is expected to impact the mental health of college students [3]. Although the necessary preconscious has been taken for the safety of patients and communities, the appearance of COVID 19 has disrupted medical education, and this demands instant attention from medical educators. The urge to prepare health professions' students has never been as focused as it is now in the setting of the global emergency. The thoughtful effects of COVID-19 may permanently change the future of medical education. Therefore, the Ministry of Education in the kingdom of Saudi Arabia (KSA) issued several unprecedented measures for viral containment, including the implementation of online education in early March, as well as several other decisions to ensure that students' grade point averages (GPA) will not be affected by COVID-19 pandemic. There are many definitions for E-learning, in the context of this research, E-learning describes learning processes and interactions between students and teachers that refer to almost any learning environment in which electronic media, like computers, are utilized as a piece of an educational delivery system. These can extend from using Email to complement print-based materials spread at a distance to courses that are delivered entirely through technology [4]. Compared with a more traditional learning environment, an E-learning environment can offer students an improved learning experience and 'provide a model for students on how to become self-directed independent learners, which may assist them to become lifelong learners' [5]. Self-regulated learning has been hypothesized by Pintrich [6]. It has been defined as learning that occurs when one is 'metacognitively, motivationally, and interactively in the learning process'[7]. Thus, self-regulated learners are expected to monitor their own progress towards self-set goals and are therefore able to reflect on the effectiveness of their learning approaches; and also tend to view the learning task as intrinsically interesting and worthwhile, and have high levels of self-efficacy, and engage in and persist with learning behaviors that maximize the degree to which learning occurs [7,8]. Participation of students in E-learning may facilitate the relationships between motivational beliefs, learning strategies, and Students' performance. Data indicated that students felt positive about Web-based instruction in terms of increased motivation and access to information via the Web as well as meaningful learning experiences through the integration of technology and course content. [9] On contradictory, several other studies documented unfavorable students' perceptions of E-learning. Therefore, the current study aimed to assess self-regulated learning domains among undergraduate health professional students of Almarrefa University. Furthermore, it also aimed to explore whether self-regulated learning differed across the genders and whether there were any differences among students, as well as to identify any correlation between test anxiety and self-regulated learning. Motivated Strategies for Learning Questionnaire (MSLQ) [10] is the most commonly used instrument in self-regulated learning assessment [11] and self-efficacy assessment [12]. Our study has the distinction of being the first study that has utilized MSLQ to assess motivation and learning strategies prevalent during the COVID-19 pandemic.

2. MATERIALS AND METHODS

2.1 Study design and setting

This is an institutional base descriptive study, it was conducted over 4 weeks during the second semester of the 2019–2020 academic year at Al Marrefa University UM (Riyadh, KSA), which is a private establishment of higher education. The UM consists of three colleges: Medicine, Pharmacy, and Applied Sciences. The college of Applied Sciences contains several programs: Nursing, Respiratory Care, Emergency Medical Services, Anaesthesia Technology, Health Information System, Computer Science, Information Systems, and Industrial Engineering.

2.2 Study population

The participants in this study were 291 healthy male and female students from health professions programs which are: College of Medicine, College of Pharmacy, as well as the following programs: Nursing, Respiratory Care, Emergency Medical Services, Anaesthesia Technology, and Health Information System.

2.3 Data Collection

Two months after shifting to compulsory E-learning, students were invited to return an online standardized self-administered questionnaire via Google form, which took 15–20 minutes to complete. The survey was sent to students' emails at mcst@edu.sa, also the link was provided at Almaarefa Learning Management system 'Moodle'. The students were informed about this research, and no harm to participants will arise from the study.

2.4 Instrument

The first part of the questionnaire comprised of students' characteristics. We used parts of a validated questionnaire; the Motivated Strategies for Learning Questionnaire (MSLQ). Some minor changes to the wording of the items were made to make them more appropriate for our students. MSLQ is based upon the social cognitive theory of learning to measure self-regulated learning [10]. The MSLQ consists of 81 items divided into six motivation subscales and nine learning strategies subscales. Items are scored on a 7-point Likert scale (1 = not at all true of me, 7 = very true of me). As the MSLQ subscales are designed to be modular, therefore used to fit the needs of any particular study [13]. The present study used ten subscales of the MSLQ, comprising 41 items. To measure students' motivational beliefs, we used part of the motivation subscales: 1. Value component: Intrinsic Goal Orientation, Extrinsic Goal Orientation, and Task Value. 2. Expectancy Component: Self-Efficacy and 3. Effective component: Test Anxiety. While deep learning strategies were measured using four subscales on cognitive and metacognitive strategies: elaboration, organization, critical thinking, self-regulation. To measure the extent to which students manage their resources, we used three resources management subscales: time and study environment, peer learning, and help-seeking[13].

Table 1 demonstrates a definition of the psychological terminologies used.

2.5 Data Analysis

Before the statistical analyses, the data were checked for accuracy and normality. Data were analyzed using SPSS

version 23 (SPSS Inc. Chicago, IL, USA). Then, the subscales of the MSLQ were subjected to reliability Analysis using Alfa Cronbach, and descriptive statistics, and Pearson correlations. Moreover, an independent-samples T-test was run to compare the mean scores of the two genders.

Table 1: Description of various psychological terminologies used

Terminology	Description
Intrinsic Goal Orientation	Refers to the degree to which the student perceives himself/herself to be participating in a task for reasons such as challenge, curiosity, and mastery.
Extrinsic Goal Orientation	Refers to the degree to which the student perceives himself/herself to be participating in a task for reasons such as grades, rewards, performance, evaluation by others, and competition.
Task Value	It refers to students' perceptions of the course material in terms of interest, importance, and utility.
Self-Efficacy	Includes judgments about one's ability to accomplish a task as well as one's confidence in one's skills to perform that task.
Critical thinking	Refers to the degree to which students apply previous knowledge to new situations to solve problems, reach decisions, or make critical evaluations concerning standards of excellence
Metacognitive self-regulation	Three general processes framework the metacognitive self-regulatory activities: planning, monitoring, and regulation of cognitive activities
Resource management	It includes time and study environment regulation, effort regulation, peer learning, and help-seeking attitudes

3. RESULTS

3.1 Sociodemographic characteristics

The current sample involved 291 students, it consisted of 105 (36.1%) medical students and 186 (63.9 %) other health-related students from Pharmacy, Nurse, and Allied health professionals from three colleges. All cases in this sample were valid to be analyzed. Most of the participants' age (56 %) were between 20 – 23 years old, (11.3%) were between 16 – 19 years old, (13.7%) were between 24-27 years old, (14.8%) were between 28-31 and only (4.1%) were more than 31 years old. The furthermost of the participants were females (69.1 %), and (78.7%) were Saudi students. Single participants accounted for (85.2 %) higher than the proportion of married (13.1%), divorced (1.4%), and widowed (0.35 %). The majority of the participants are not currently working (81.4 %). A total of (86.6 %) of the sample live with their parents. Moreover, (78.0%) of the participants had no previous experience with online learning.

3.2 Reliability and descriptive statistics for the Motivated Strategies for Learning Questionnaire (MSLQ)

Table 2 shows the reliability and descriptive statistics obtained for the MSLQ. The reliability statistics demonstrated fair to good internal validity. Most of the sections have a reliability score that is close to or exceeds the recommended value which is 0.7 [13]. This indicates an overall degree of satisfaction.

3.3 Analyses of the relationship between demographic characteristics, motivation, and Learning strategies

As exemplified in Table 3, statistically significant differences were found between males and females students in the compound score for motivation (*P*=0.001). Female students had much higher scores than males. Also, another statistically significant difference was found, where the youngest students (age between 16-19 years old) and the oldest were the most motivated ones. In Table 6 an independent samples t-test was done to explore intergender variation, where males had higher extrinsic goal orientation *P*= 0.001, self-efficacy *P*= 0.043, Help-seeking *P*= 0.017, while females had higher Time Study Environment *P*=0.027.

Table 4 depicts that females' students were found to have better learning strategies than males be statistically significantly correlated with the learning strategies adopted (*P*= 0.001). No significant associations were found between learning strategies and other demographic variables or student characteristics.

3.4 Correlational analyses between test anxiety, motivation, and learning strategies

As demonstrated in table 5, a Pearson correlation test was performed, it clear that a strong positive correlation exists between test anxiety and extrinsic goal orientation (*P*=0.000). Moreover, another statistically significant correlation exists between test anxiety and all of the learning strategies scales.

Table 2: Reliability and descriptive statistics for the MSLQ

Items and scale	Mean (SD)	Cronbach's α
Motivation scales		
Intrinsic Goal Orientation (2items)	5 (1.8)	0.50
Scale	10.1 (2.9)	
Extrinsic Goal Orientation (3items)	5.2 (1.9)	0.69
Scale	16.3 (4.6)	
Task Value (2items)	5.7 (1.7)	0.81
Scale	11.4 (3.2)	
Self-Efficacy (3items)	5.4 (1.6)	0.86
Scale	16.2 (4.3)	

Test Anxiety (5 items)	4.3(2.2)	0.75
Scale	21.4 (7.5)	
Cognitive/Metacognitive Strategies:		
Elaboration (3 items)	5.5(1.7)	0.74
Scale	16.6 (4.2)	
Organization (1 item)	5.2 (1.9)	-
Critical thinking (2 items)	4.9(1.9)	0.43
Scale	9.8 (3)	
Self-regulation (5items)	5 (1.8)	0.6
Scale	24.9 (5.6)	
Resource Management Strategies:		
Time and Study Environment (8 items)	4.92 (2.12)	0.5
Scale	38.9 (7.3)	
Peer learning (3 items)	4.22(2.2)	0.7
Scale	12.7 (5.2)	
Help seeking (4 items)	5(2.01)	0.5
Scale	18.2 (4.9)	

Table 3 Comparison between the composite score for motivation and demographics characteristics

Student characteristics		N	Mean (SD)	t*/F**	Sig.
Age[1]	16-19	33	81.0 (9.2)	2.543**	0.04
	20-23	161	73.4 (15.0)		
	24-27	40	75.9 (13.6)		
	28-31	43	75.3 (16.5)		
	>31	12	81.0 (8.2)		
Gender[2]	Male	90	75.2 (14.5)	1.44*	0.001
	Female	199	77.0 (10.9)		
Level[2]	Junior	153	74.4 (15.8)	-0.578*	0.418
	Senior	136	74.7 (15.4)		
College[2]	Medicine	105	75.7(13.4)	0.776*	0.343
	Pharmacy, Nurse, and Allied health professionals	184	76.1 (14.3)		

[2]test statistic: independent samples t-test
[1]test statistic: one-way analysis of variance

Table 4: Comparison between the composite score for learning strategies and Demographics characteristics

Student characteristics		N	Mean (SD)	t*/F**	Sig.
Age[1]	16-19	33	130.3 (15.2)	0.371**	0.829
	20-23	161	127.6 (26.5)		
	24-27	40	128.2 (20.9)		
	28-31	40	128.8 (27.7)		
	>31	12	136.0 (23.7)		
Gender[2]	Male	86	127.9 (18.4)	0.266*	0.008
	Female	200	128.8 (27.0)		
Level[2]	Junior	150	129.5 (23.4)	0.721*	0.089
	Senior	136	127.4 (26.0)		
College[2]	Medicine	104	124.8 (20.3)	-1.943*	0.067
	Pharmacy, Nurse, and Allied health professionals	182	130.6 (26.7)		

[2]test statistic: independent samples t-test
[1]test statistic: one-way analysis of variance

Table 5: Correlations Between Test Anxiety, Motivation and Learning strategies

MSLQ scales	Pearson Correlation	*P*-Value
Motivation scales:		
Intrinsic Goal Orientation	0.032	0.591
Extrinsic Goal Orientation	.313**	0.000
Task Value	0.069	0.243

Self-Efficacy	-0.041	0.488
Learning strategies		
Elaboration	.117*	0.046
Critical thinking	.222**	0.000
Self-regulation	.270**	0.000
Time and Study Environment	.331**	0.000
Peer learning	.147*	0.012
Help seeking	.138*	0.019
* Correlation is significant at the 0.05 level (2-tailed).		
** Correlation is significant at the 0.01 level (2-tailed).		

Table 6: Comparison of MSLQ scales' mean scores among genders (Independent samples t-test).

MSLQ scales	Gender	N	M	t	P
Motivation scales:					
Anxiety score	Male	90	21.0 (6.8)	3.08	0.080
	Female	201	21.5 (7.8)		
Intrinsic goal orientation	Male	90	10.7 (2.8)	0.14	0.709
	Female	199	9.8 (2.9)		
Extrinsic goal orientation	Male	90	16.9 (3.7)	10.55	0.001
	Female	201	16.0 (4.9)		
Task value	Male	90	11.8 (2.9)	0.69	0.407
	Female	201	11.2 (3.3)		
Self-efficacy	Male	90	16.6 (3.7)	4.13	0.043
	Female	201	16.0 (4.6)		
Learning strategies					
Elaboration	Male	90	16.7 (3.7)	1.51	0.220
	Female	201	16.6 (4.4)		
Critical thinking	Male	90	9.8 (2.7)	2.04	0.155
	Female	201	9.7 (3.1)		
Self-regulation	Male	86	25.2 (5.1)	3.31	0.070
	Female	200	25.0 (6.5)		
Time Study Environment	Male	90	38.4 (6.2)	4.97	0.027
	Female	201	39.7 (8.2)		
Peer learning	Male	90	12.5 (4.9)	1.04	0.308
	Female	201	12.7 (5.3)		
Help-seeking	Male	90	20.3 (4.1)	5.79	0.017
	Female	201	19.6 (5.5)		

4. DISCUSSION

This study explored students' motivation and learning strategies as well as the possible correlations among a diverse group of students from health professions programs during the compulsory E-learning in the COVID-19 pandemic. Most of our participants had no previous experience in online distant learning. In the current study, the MSLQ tool was found to be reliable, as there was an overall degree of acceptable, consistent scoring of items within the different categories. Statistically significant differences were found between gender and the overall score for motivation and learning strategies scores, where the females' students were more self-regulated learners than males. Similar findings were reported by Hamid *et al* [14], they found that females had higher scores than males. Moreover, other studies revealed that females generally engage more with academic activities than males and they are consequently higher achievers academically [13]. By comparison, men are reported to place less value on engaging with academic activities. On the other hand, the current study revealed that female students were more persuaded to time study environment, while males more likely to be self-efficacious, existing literature supports these findings [15,16]. Additionally, critical thinking skills among males were perceived as higher than those among their female peers according to several studies that assessed the differences in critical thinking across genders [14,17].Based on the MSLQ, extrinsic goal orientation is defined as the degree to which a student perceives the importance of issues that are not directly related to participating in the task itself, this includes grades, rewards, and reputation [18]. We found that our students are more concerned with the acquisition of extrinsic goals rather than aiming for intrinsically motivating outcomes. This finding was contradicted by an Australian study (n = 72) [19] where medical students scored lower on the extrinsic goal orientation scale with only 36.1% of respondents achieving high scores. Similarly, the proportion of their respondents scoring high on the critical thinking scale (16.7%) and rehearsal scale (18.1%). Despite the sudden shift to online learning, we find that our findings are comparable with those of other studies, Cheema *et al* [16] reported that their medical students (n = 550) the extrinsic motivation was higher than intrinsic one (mean score 5.34 ± 1.31, 5.14 ± 1.08 respectively), We have similar results (mean score 5.2 ± 1.9, 5 ± 1.8 respectively). Moreover, our students are likely

to employ cognitive strategies for learning (our mean score 4.9 ±1.9, their mean score 4.51 ± 1.11) and we were better at self-regulating (our mean score 5 ± 1.8, their mean score 4.57 ± 0.92). Also, our students scored better in self-efficacy and task value were mean score (5.4 ±1.6 and 5.7±1.7 respectively) their scores (5.15 ± 1.02, 5.49 ± 0.95 respectively). However, they score higher in peer learning (mean score: 4.36 ± 1.33) than our subjects (mean score 4.22 ±) this finding is expected due to sudden loss of peer support when students experience distant learning. The MSLQ defines metacognition as the awareness and control of cognition that can involve three general processes: planning, monitoring, and regulating. Planning activities include goal setting and reflecting on prior knowledge that makes organizing and comprehending the material easier. Monitoring activities include the tracking of attention and self-testing. Regulating activities include adjusting one's cognitive and behavioral activities [18]. Most of our students were moderate in their practice of cognitive and metacognitive strategies. There is a need to highlight the essentials of these skills as they relate to the health professions and endorse their practical application among students. According to the literature this can be accomplished by embedding learning strategies into the curriculum [27] and establishing learning skills training sessions for students [2]. Moreover, learning resources such as time/study environment, effort, peers, instructors domains also need improvement and similar measures might prove to be effective [20, 21]. In our study, positive colorations were found between test anxiety and extrinsic motivation and metacognitive self-regulation. This finding was expected as we hypothesized that students with no previous experience in online education as well as stress from COVID 19 pandemic would find this experience more stressful and thus need to use more cognitive resources to adapt, spending more of their cognitive resources on metacognition. These hypotheses are consistent with literature suggesting that self-control strength may affect test anxiety, as it predicted increases in state anxiety only in students with depleted self-control strength, suggesting that increased self-control strength may be useful for coping with anxiety [22]. Our study opens up new views for researchers to design future researches to identify the factors responsible for low motivation and low practice of self-regulated learning strategies in the era of COVID 19. On the other hand, the current study has some limitations such as lacking correlation of the finding to students' academic performance and also it conveying to a single institute-based study, therefore the findings cannot be generalized to the whole medical and health professions students population.

5. CONCLUSION

The current study found adequate levels of motivation among health professional students at Al Marrefa University. Though, the balance was sloped more to extrinsic rather than intrinsic motivation. Most of our students believed that they could control their learning and were self-efficacious. However, moderate levels of test anxiety were reported. Significantly positive associations were found between test anxiety and domains of extrinsic motivation and learning strategies. The use of cognitive and metacognitive skills was reasonable while resource management and peer support need to be enhanced. Comparison across genders revealed that female students reported more positively than males on motivation strategies as well as the time study environment. While males perceive more on extrinsic goal orientation with a higher sense of self-efficacy. These findings necessity further study of the use of the MSLQ in health professions education in the era of COVID 19.

6. ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance was obtained from the Institutional Review Board at Al Marrefa University board number (3/201). Verbal consent was obtained from students before handling the questionnaire.

7. AUTHOR CONTRIBUTION STATEMENT

Dr Hiba Awooda and Nisreen Hajedris conceptualized and gathered the data with regard to this work. Dr Hiba Awooda analyzed the data and necessary inputs were given towards the designing of the manuscript. Dr Hiba Awooda wrote the manuscript. All authors discussed the methodology and results and revised to the final manuscript.

8. CONSENT FOR PUBLICATION

Verbal consent was obtained from the participants.

9. COMPETING INTEREST

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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