RESEARCH ARTICLE

Extent of self-regulated learning among allied health students in an online environment

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ABSTRACT

Background: The shift to online learning during the COVID-19 pandemic has caused students to experience several challenges in their academic lives. A strategy that may assist in mitigating these challenges and facilitating students' positive adaptation to online learning is the promotion of self-regulated learning (SRL). However, SRL is underexplored in the context of health sciences students.

Objectives: This study aimed to describe the extent and examine the nature of SRL of allied health students in a fully remote learning environment.

Methodology: This is a cross-sectional online survey study. Data were collected online using Qualtrics. Descriptive statistics and confirmatory factor analysis were used to determine the extent and nature of SRL, respectively.

Results: Responses from 241 participants show that students had a mean self-regulated learning score of 82.80 out of 120 (SD=12.68). Of the dimensions of SRL, students had higher scores in environmental structuring, time management, and self-evaluation than the other dimensions. A six-factor second-order model of self-regulation showed adequate model-data fit ($\chi2$=673.88, CFI=0.95, TLI=0.95, SRMR=0.09, RMSEA=0.09 [90% CI=0.08-0.09]).

Conclusion: Health science students showed a high level of SRL; SRL for these students is adequately measured using the six dimensions of goal setting, environmental structuring, tasks strategies, time management, help seeking, and self-evaluation. The results indicate the value of understanding the extent and nature of SRL as a first step in planning strategies to support learning and student success in remote environments.

Keywords: *Self-regulated learning, Online Self-Regulated Learning Questionnaire, emergency remote learning, health sciences*

Introduction

Universities moved learning to the online space as a response to the COVID-19 pandemic [1,2]. The shift to a fully remote learning environment was primarily aimed to protect students, teachers, and staff from health risks due to the COVID-19 virus, while minimizing disruptions in learning. The change from face-to-face instruction to remote learning presented challenges for teachers and students, largely because of the emergency and abrupt nature of the change, and the immediate need to adjust the mode of learning.

For students, the emergency shift to remote learning mode included challenges, such as stress associated with adapting to

and accepting the changed learning environment, completing assignments, missing social interactions and participation in school activities, and decreased self-efficacy in areas such as completing assignments on time, exchanging ideas with peers, and managing time [1]. These challenges were similar to those expressed by allied health students at the University of the Philippines College of Allied Medical Professions (UP CAMP), in a survey evaluating their learning experience in the middle of their first semester of fully remote learning. Students cited struggles in submitting assignments on time, completing modules, adjusting to the home environment as their "new" learning space, and performing competing roles within the

family set-up. One strategy that has been found to be effective in mitigating these challenges and facilitating students' positive adaptation to emergency online learning is the promotion of self-regulated learning (SRL) [3].

Self-Regulation (SR) encompasses the "cognitive, metacognitive, behavioral, motivational and emotional/ affective aspects of learning" [3]. The processes students use for self-regulation are known as SRL [4]. SRL therefore comprises processes students use to be actively involved and take control of their learning, such as setting goals for learning based on past experiences and the contextual features of the current environment, monitoring their thinking, behaviors related to managing the tasks and environment, seeking help to facilitate learning, and motivations about learning itself [4,5]. Among the various models of SRL, the Cyclical Phases Model of Zimmerman is widely used, potentially due to the comprehensiveness of its subprocesses, its ease of application, and its utility in explaining the interaction of the learner's characteristics with the environment [3,6]. The most recent version of the Cyclical Phases Model has three phases: (i) Forethought phase, which includes task analysis and self-motivation beliefs; (ii) Performance phase, which includes self-control and self-observation; and (iii) Self-reflection phase, which includes self-judgment and self-reaction [7]. The forethought phase is concerned with planning and organizing, the performance phase involves implementing and making adjustments to the plan as necessary, and the self-reflection phase relates to realizing and correcting for discrepancies in learning [8]. By its nature, SRL is more essential for students taking courses in an online learning environment, which requires more student independence, willpower, and time management, and where students make their own decisions on when, where, and how long to complete requirements [9-12].

SR and SRL in students have been shown to be predictive of positive outcomes in online learning environments. Students who have efficient SR were found to have higher grade point averages (GPA) than those with inefficient SR. Further, students with inadequate SR struggled with instructional platforms that required active learning strategies and did not optimize strategies for time management and planning [10,13-15]. Students with minimal SR are also found to have low intention and automaticity to study [16]. Age has been shown to influence SRL; for example, SRL, specifically metacognitive strategies, has been shown to be similar or better in older adults compared to younger adults [17-18]. Comparing SRL across age groups remains to be addressed in future studies and is beyond the scope of this study. SRL also contributed to other positive

learning outcomes such as satisfaction with online learning and self-efficacy among undergraduate and graduate students [3,19,20]. The positive outcomes associated with SR and SRL may be attributed to its related skills for planning, controlling, and evaluation, which are deemed necessary to achieve meaningful learning in online contexts [21].

SRL in online environments in health sciences education has been well described in medicine. Zheng and Zhang (2020) reported that SRL skills of peer learning and help-seeking had a positive effect on the performance of first and second-year medical students who were in a flipped-classroom learning environment [22]. Meanwhile, the use of the rehearsal method had the opposite effect. Ngwira *et al.* (2018) found that first year medical and allied health (pharmacy, physiotherapy, and medical laboratory sciences) students of a university in Malawi with strong motivational beliefs and intrinsic goals utilized more deep learning approaches and showed more organized studying [23]. SRL, particularly effort regulation and time spent in a learning management system (*e.g.*, Blackboard), also predicted academic achievement. SR at the metacognitive level is predicted by intrinsic goal motivation and academic self-efficacy of 64 students enrolled in an online Introduction to gerontology course [24].

SRL in online learning among students in health sciences courses other than medicine is underexplored [25,26]. This gap in understanding is important to address, because health science curricula typically employ face-to-face classroom or clinical encounters to teach patient-handling skills. The evaluation of SR in health science students must use measures that take into account the contextual nature of SRL, especially that online learning is different from the traditional in-classroom environment [3,11,27]. Studies describing SRL among undergraduate students who experienced emergency or rapid transition to remote learning are also scarce.

To address these gaps, this study aims to describe the SR of allied health students who have been taking courses on a fully remote learning mode during an emergency shift due to the pandemic. Allied health students include occupational therapy (OT), physical therapy (PT), speech pathology (SP), and clinical audiology (CA) students. Specifically, this study aims to:

1. Determine the extent of self-regulated learning of allied health students who learn in a fully remote learning environment; and
2. Determine the nature of self-regulated learning of allied health students who learn in a fully remote learning environment.

Methodology

Study Design

This study used a cross-sectional design to examine the extent and nature of the SRL of allied health students learning in a fully remote environment. Data were collected from non-final-year undergraduate students and graduate students of UP CAMP from July to September 2021. This study received clearance for implementation from the University of the Philippines Manila Research Ethics Board (UPMREB 2021-278-01).

Participants

Participants were recruited from the undergraduate and graduate health sciences programs of UP CAMP. The undergraduate programs included Bachelor of Science (BS) in Occupational Therapy (4 years), BS Physical Therapy (4 years/5 years), and BS Speech Pathology (4 years). The graduate programs included Master of Clinical Audiology (2 years), Master of Physical Therapy (3 years), and Master of Rehabilitation Science – Speech Pathology (2 years). All students experienced full remote learning for only one year at the time of the survey, which consisted of both synchronous and asynchronous classes.

Instrument

The data collection instrument consisted of a demographic information portion (age, sex, degree program, and year level) and the Online Self-Regulated Learning Questionnaire (OSLQ) [9]. The OSLQ was used to measure self-regulated learning skills and strategies [9]. The OSLQ comprises 24 items spanning six (6) dimensions of SRL using a five-point ordinal scale (1= "Strongly disagree"; 2= "Disagree"; 3 = "Neutral", 4 = "Agree", 5 = "Strongly agree") [9]. The six SRL dimensions measured by the OSLQ include goal setting (GS), environmental structuring (ES), task strategies (TS), time management (TM), help seeking (HS), and self-evaluation (SE) [9]. The phases in the Cyclical Phases Model measured by each SRL dimension of the OSLQ are illustrated in Table 1 [8]. The six SRL dimensions were found to have acceptable internal consistency reliability for blended learning (Cronbach's alpha for GS = 0.90; ES = 0.86; TS = 0.78; TM = 0.69; HS = 0.67; and SE = 0.78) and for online learning (Cronbach's alpha for GS = 0.92; ES = 0.95; TS = 0.87; TM = 0.96; HS = 0.93; and SE = 0.94) [9]. A confirmatory factor analysis fitting a six-factor model with a higher-order factor showed sufficient model-data fit for blended learning (chi-square ($\chi2$) = 758.79, degrees of freedom (df) = 246, p<0.05; $\chi2$/df = 3.08; root mean square error of approximation (RMSEA)= 0.04; Tucker-Lewis index (TLI) = 0.95; comparative fit index (CFI) = 0.96) and for online learning ($\chi2$ = 680.57, df = 246, p<0.05; $\chi2$/df = 2.77; RMSEA = 0.06; TLI = 0.93; CFI = 0.95), which supports structural validity of the OSLQ for these two modes of learning [9]. Scores above the median suggest higher levels of SRL and scores lower than the median suggest lower levels of SRL for dimension scores and for the overall score. This interpretation is based on the original interpretation of scores, where "higher scores on this scale indicate better self-regulation in online learning by students" (p. 3) [9]. Various studies showed that the OSLQ is an acceptable measure of SR in online and blended learning environments, with adaptations developed for different cultures [12,28-32]. Items of the OSLQ are described in Table 2.

Data Collection

A pilot study was first conducted among final year students to evaluate technical aspects of the survey prior to commencing the full-scale survey. Responses were collected from 30 participants, following the recommendation of

Table 1. *Phases in the Cyclical Phases Model of Zimmerman that are measured by the SRL dimensions of the Online Self-Regulated Learning Questionnaire by Barnard et al. (2009) [8].*

SRL dimensions of the OSLQ	Phase		
	Forethought	Performance	Self-reflection
Goal setting	X		
Environmental structuring	X	X	
Task strategies	X	X	
Time management		X	X
Help seeking	X	X	X
Self-evaluation	X	X	X

Table 2. *Items of the Online Self-Regulated Learning Questionnaire (Barnard et al., 2009) [9].*

Dimension	Item
Goal setting	I set standards for my assignments in online courses.
	I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).
	I keep a high standard for my learning in my online courses.
	I set goals to help me manage studying time for my online courses.
	I don't compromise the quality of my work because it is online.
Environmental structuring	I choose the location where I study to avoid too much distraction.
	I find a comfortable place to study.
	I know where I can study most efficiently for online courses.
	I choose a time with few distractions for studying for my online courses.
Task strategies	I try to take more thorough notes for my online courses because notes are even more important for learning online than in a regular classroom.
	I read aloud instructional materials posted online to fight against distractions.
	I prepare my questions before joining in the chat room and discussion.
	I work extra problems in my online courses in addition to the assigned ones to master the course content.
Time management	I allocate extra studying time for my online courses because I know it is time-demanding.
	I try to schedule the same time everyday or every week to study for my online courses, and I observe the schedule.
	Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days.
Help seeking	I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.
	I share my problems with my classmates online so we know what we are struggling with and how to solve our problems.
	If needed, I try to meet myI am persistent in getting help from the instructor through e-mail. classmates face-to-face.
	I am persistent in getting help from the instructor through e-mail.
Self-evaluation	I summarize my learning in online courses to examine my understanding of what I have learned.
	I ask myself a lot of questions about the course material when studying for an online course.
	I communicate with my classmates to find out how I am doing in my online classes.
	I communicate with my classmates to find out what I am learning that is different from what they are learning.

Thomas (2004) on minimum sample size requirement for a pilot study [33]. The pilot study included all items that were also part of the full-scale survey, with the addition of items that assess the following: (i) clarity and ease of following instructions; (ii) ease of understanding of items; (iii) items that were considered difficult to understand; (iv) issues with font, layout, or presentation of the survey instrument, (v) issues with platform of data collection, and (vi) suggestions and comments. No change was applied to the full-scale survey following favorable responses from the pilot test. Informed consent was obtained prior to the administration of online survey forms using Qualtrics [34].

Statistical analysis

Scores on OSLQ were analyzed using descriptive statistics (mean and standard deviation) to describe the extent of SRL of students. Confirmatory factor analysis (CFA) was used to examine the nature of SRL [35]. Hot-deck multiple imputation (m = 200) was used to handle missing data in OSLQ [36]. Internal consistency of the overall scale and subscales of self-regulated learning was assessed using Cronbach's alpha (α) [37]. α values ≥ 0.70 suggests adequate internal consistency [38]. Item-test and item-rest correlations were assessed using Pearson's product-moment correlation coefficient (r).

Correlation values closer to ±1.00 suggested stronger correlation between item and scale, while values closer to 0.00 suggested weaker correlation between item and scale. Model-data fit was assessed using the chi-square test (χ2), comparative fit index (CFI), Tucker-Lewis index (TLI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA) [39]. A nonsignificant χ2 test suggests adequate model-data fit but caution was taken in interpreting a significant χ2 test because of its sensitivity to relatively larger sample sizes [40]. CFI ≥ 0.95, TLI ≥ 0.95, SRMR ≤ 0.06, and RMSEA ≤ 0.08 also suggest adequate model-data fit [39].

Estimates were pooled from analysis performed on multiply imputed data [41]. The SRL models tested included a unidimensional model, a four-factor correlated model, a six-factor uncorrelated model, and a six-factor second-order model [9,14,28,29,42]. The models tested related to (i) a conventional one-factor structure for the unidimensional model; (ii) a model in the context of a massive open online course for the four-factor correlated model, derived from a Russian version of the OSLQ; (iii) a model in the context of online learning, derived from a Romanian version of the OSLQ; and (iv) a model in the context of online and blended learning for the six-factor second-order model, derived from Chinese, Turkish, and the original versions of the OSLQ [9,14,28,29,42].

Analysis was performed using R through the integrated development environment RStudio [43,44]. Additional packages were used to facilitate analysis in addition to the base packages of R [45-55].

Results

Participants

From the 359 allied health students invited to participate in the study, 241 accomplished the survey, giving an 87.32% response rate. Participants had a median age of 21 years (range = 18–43 years). Majority of the participants were female (75.10%), undergraduate (88.38%), from Year 3 undergraduate level (30.71%), and from the BS Physical Therapy program (45.07%). Other information on the participants is detailed in Table 3.

Extent of SRL of allied health students

The participants had a mean SRL score of 82.80 out of 120 (SD = 12.68). The participants obtained relatively higher scores in environmental structuring (77.00%), time management (74.20%), and self-evaluation (72.70%) compared to task strategies (61.05%), help seeking (63.35%), and goal setting (67.40%). The participants responded highest to Item 6 ("*I choose the location where I study to avoid too much distraction*") with a score of 4.14 out of 5 (SD = 1.03) and Item 18 ("*I share my problems with my classmates online so we know what we are struggling with and how to solve our problems*") with a score of 4.01 out of 5 (SD=1.07). The participants responded lowest to Item 19 ("*If needed, I try to meet my classmates face-to-face*") with a score of 1.90 out of 5 (SD = 1.10) and Item 13 ("*I work extra problems in my online courses in addition to the*

Table 3. *Demographic characteristics of the respondents.*

Category	Frequency	Percentage
Sex (n=241)		
• **Male**	60	24.90
• **Female**	181	75.10
Year level (n=241)		
• **Year 1**	38	15.77
• **Year 2**	55	22.82
• **Year 3**	74	30.71
• **Year 4**	48	19.92
• **Year 5**	20	8.30
• **Other**	6	2.49
Degree program		
• **Undergraduate (n=213)**		
• **BS Occupational Therapy**	55	25.82
• **BS Physical Therapy**	96	45.07
• **BS Speech Pathology**	62	29.11
• **Graduate (n=28)**		
• **M Clinical Audiology**	1	3.57
• **M Physical Therapy**	16	57.14
• **M Rehabilitation Science - Speech Pathology**	11	39.29

LEGEND: Other=Response other than the options provided; BS=Bachelor of Science; M=Master

assigned ones to master the course content") with a score of 2.65 out of 5 (SD = 1.00). The mean scores of each item and the mean scores, maximum possible score, and percentage of the dimensions are presented in Table 4.

Nature of SRL of Allied Health Students

Out of the four models tested, the six-factor higher-order model showed the best model-data fit ($\chi2$= 673.88, CFI = 0.95, TLI = 0.95, SRMR = 0.09, RMSEA = 0.09 [90% CI = 0.08-0.09]), closely followed by the four-factor correlated model. The six-factor uncorrelated model showed the worst model-data fit. This suggests that the SRL of allied health students is adequately measured in terms of the dimensions of goal setting, environmental structuring, task strategies, time management, help seeking, and self-evaluation. The results of CFA are presented in Table 5 and the path diagram of the model of best fit is presented in Figure 1. Within the

dimension of task strategies and help seeking, Item 11 ("*I read aloud instructional materials posted online to fight against distractions*"; item test correlation = 0.27, item-rest correlation = 0.17) and item 19 ("*If needed, I try to meet my classmates face-to-face*"; item test correlation = 0.35; item-rest correlation = 0.27), respectively, seem to be less applicable to the students. The item-test correlations, item-rest correlations, and internal consistency values of the items and dimensions of the OSLQ are presented in Table 6.

Discussion

Extent and Nature of SRL of Allied Health Students

The results revealed that undergraduate and graduate allied health students showed high levels of SRL. Particularly, the scores suggest that the students have high levels of environment structuring and time management. These

Table 4. *Mean scores of the respondents on the Online Self-Regulated Learning Questionnaire.*

| Dimension and item	Mean (SD)	Maximum possible score	Percentage
Goal setting	16.85 (3.23)	25	67.40
• Set standards for assignments	4.00 (0.83)		
• Set short-term long-term goals	3.07 (0.82)		
• Keep high standard for learning	2.84 (0.89)		
• Set goals to manage studying time	3.05 (0.81)		
• Do not compromise quality of work	3.88 (0.99)		
Environmental structuring	15.40 (3.27)	20	77.00
• Choose location to study	4.14 (1.03)		
• Find comfortable place to study	3.91 (1.00)		
• Know where to study efficiently	3.53 (1.11)		
• Choose time with few distractions	3.82 (1.09)		
Task strategies	12.21 (2.92)	20	61.05
• Try to take thorough notes	3.50 (1.15)		
• Read along instructional materials	3.12 (1.28)		
• Prepare questions before joining	2.94 (1.03)		
• Work extra problems	2.65 (1.00)		
Time management	11.13 (2.60)	15	74.20
• Allocate extra study time	3.99 (1.04)		
• Try to schedule study time	3.32 (1.17)		
• Try to distribute study time	3.82 (1.08)		
Help seeking	12.67 (2.81)	20	63.35
• Find someone knowledgeable to consult	3.57 (1.08)		
• Share problems with classmates	4.01 (1.07)		
• Try to meet face-to-face	1.90 (1.10)		
• Be persistent in getting help	3.19 (1.01)		
Self-evaluation	14.54 (3.11)	20	72.70
• Summarize learning	3.43 (0.95)		
• Ask questions to self	3.62 (0.98)		
• Communicate to find out status	3.70 (1.18)		
• Communicate to find out difference	3.78 (1.13)		
Self-regulated learning	82.80 (12.68)	120	68.50

LEGEND: SD=standard deviation; scores are based on a five-point ordinal scale (1="Strongly disagree"; 2="Disagree"; 3="Neutral", 4="Agree", 5="Strongly agree")

Table 5. *Confirmatory factor analysis of self-regulated learning using the Online Self-Regulated Learning Questionnaire for health sciences students.*

Model	χ2	CFI	TLI	SRMR	RMSEA (90% CI)
Model 1: One-factor	1378.78*	0.88	0.86	0.12	0.14 (0.13-0.14)
Model 2: Six-factor second-order	673.88*	0.95	0.95	0.09	0.09 (0.08-0.09)
Model 3: Six-factor uncorrelated	5400.54*	0.44	0.38	0.25	0.29 (0.29-0.30)
Model 4: Four-factor correlated	906.35*	0.91	0.90	0.11	0.12 (0.11-0.13)

LEGEND: χ2=chi-square goodness-of-fit test; *=statistically significant result at α=0.05.
Notes: CFI=comparative fit index; TLI=Tucker-Lewis index; SRMR=standardized root mean square residual; RMSEA=root mean square error of approximation; Model 1=Unidimensional model; Model 2=Model proposed by Fung *et al.* (2018), Korkmaz & Kaya (2012), and Barnard *et al.* (2009); Model 3=Model proposed by Cazan (2014); Model 4=Model proposed by Martinez-Lopez *et al.* (2017)
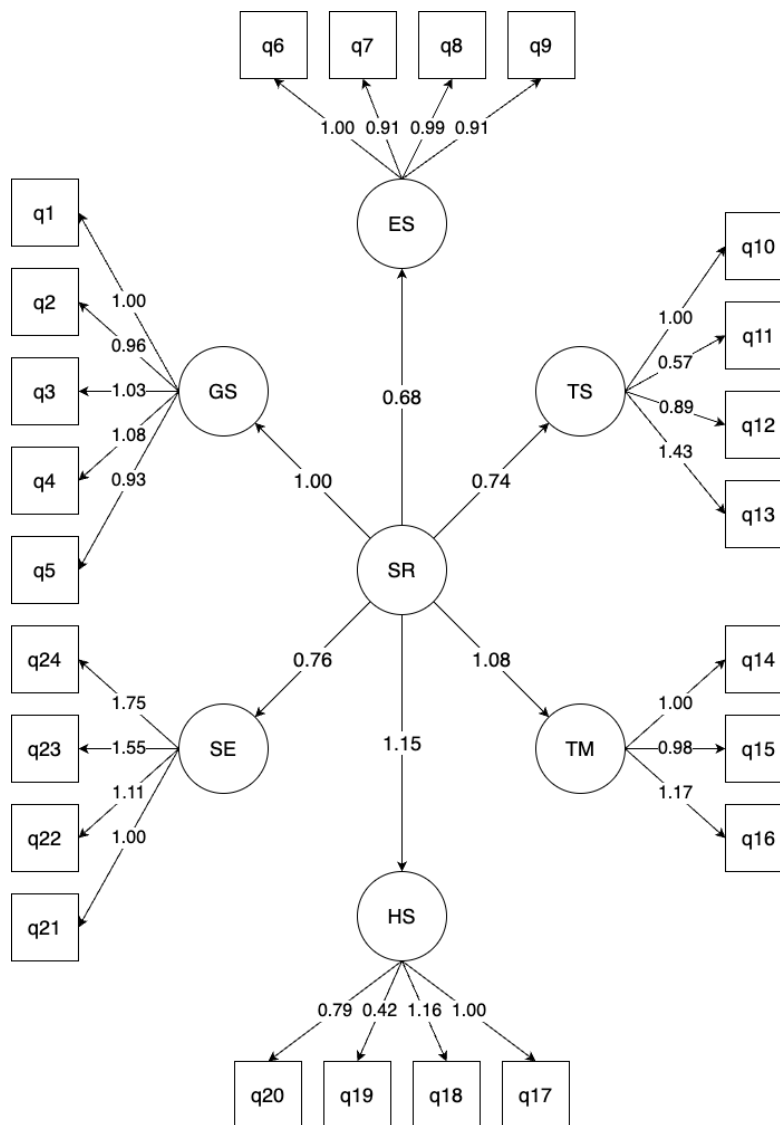
Legend: SR=self-regulation; GS=goal setting; ES=environmental structuring; TS=task strategies; TM=time management; HS=help seeking; SE=self-evaluation;
Note: All coefficients are statistically significant at a 5% level of significance

Figure 1. *Path diagram of the six-factor higher-order model of the Online Self-Regulated Learning Questionnaire.*

Table 6. *Item-total correlations, item-rest correlations, and internal consistency of the items and dimensions of the Online Self-Regulated Learning Questionnaire for health sciences students.*

Dimension and item	Item-test	Item-rest	Internal consistency
Goal setting			
• *Set standards for assignments*	0.5731	0.5267	
• *Set short-term long-term goals*	0.5222	0.4729	
• *Keep high standard for learning*	0.5942	0.5462	0.7978
• *Set goals to manage studying time*	0.5680	0.5222	
• *Do not compromise quality of work*	0.5770	0.5211	
Environmental structuring			
• Choose location to study	0.4834	0.4172	
• Find comfortable place to study	0.4282	0.3606	0.7747
• Know where to study efficiently	0.5062	0.4364	
• Choose time with few distractions	0.5170	0.4500	
Task strategies			
• Try to take thorough notes	0.4591	0.3833	
• Read along instructional materials	0.2716	0.1745	0.5468
• Prepare questions before joining	0.4221	0.3517	
• Work extra problems	0.6027	0.5488	
Time management			
• Allocate extra study time	0.5885	0.5311	0.6998
• Try to schedule study time	0.5619	0.4938	
• Try to distribute study time	0.6416	0.5870	
Help seeking			
• Find someone knowledgeable to consult	0.5895	0.5297	
• Share problems with classmates	0.5143	0.4483	0.5709
• Try to meet face-to-face	0.3484	0.2692	
• Be persistent in getting help	0.4916	0.4275	
Self-evaluation			
• Summarize learning	0.4808	0.4202	
• Ask questions to self	0.4855	0.4232	0.7109
• Communicate to find out status	0.5459	0.4758	
• Communicate to find out difference	0.5768	0.5129	
Self-regulated learning (overall scale)	-	-	0.8750

results are similar to those reported by Barnard-Brak *et al.* (2010) and Schwam *et al*. (2021), which looked into American University students' SRL in online learning and found that these dimensions have higher scores as well [8,13]. Similarly, a sample of Slovenian undergraduate students also identified environment structuring as the dimension with the highest score [56]. The evaluation of SR in students must use measures that take into account the contextual nature of SRL, especially that online learning is different from the traditional in-classroom environment [3,11,27]. Moreover, SRL was also identified as a predictor for a more constructive experience of emergency remote learning [56]. Remote learning has very different demands in terms of study time and environment compared with traditional face-to-face education. With the sudden shift, it became more crucial for students to develop a better ability to manage their time and space in order to lessen distractions and learn effectively.

On the other hand, the participants showed low levels of SRL in the dimensions of task strategies and help seeking, which are skills critically needed in the 'performance' and 'self-reflection' phases of SRL [8]. These two dimensions have also been seen to have lower scores in several studies [8,13,56], with task strategies as consistently the least used even in an emergency remote education context [56]. A notable dissimilarity between this study and other studies involves the dimensions of goal setting and self-evaluation; in other studies, high levels of goal setting and low levels of self-evaluation skills were seen [8,56]. However, the opposite was found for this study. This contrast may possibly be explained by differences in cultural factors relating to learning and education, which are claimed to influence student self-regulation [57,58].

The six-factor second-order model structure suggested by Barnard *et al.* (2009) showed adequate model-data fit,

suggesting that SRL among allied health students can be adequately measured using the OSLQ [9]. This also suggests that SRL in an emergency, remote, online learning environment may be measured using the OSLQ, in addition to the measurement of SRL in online and blended learning environments. The presence of a second-order factor allows for the pooling of dimension scores into one composite score [59]. The four-factor correlated model showed some capability in explaining SRL but the model did not perform as well as the six-factor higher-order model, suggesting that four factors may not be sufficient to explain SRL; additionally, the presence of a higher-order factor reflecting the six dimensions of SRL is shown to be viable. The six-factor uncorrelated model showing the worst fit suggests that the dimensions of SRL can be conceptualized to have correlations with one another, which supports the findings of the existing literature.

The applicability of the items of the OSLQ for this study is comparable to that of the original study [9], as well as for some studies that adapted the instrument to their local context [14]. For all studies, items belonging to the dimensions of goal setting and environmental structuring seemed to be very applicable to their population, while some items belonging to the dimensions of help seeking and task strategies may be less applicable. One difference across the studies was the mode of learning – Barnard et al. (2009) observed a subsample of students enrolled in courses in blended mode; Cazan (2014) observed from students enrolled in online mode, while this present study observed students that experienced an emergency, remote, online mode [9,14]. It would seem that the items of the OSLQ may be more applicable to students taking courses with an online mode compared to students taking courses in a blended mode, as observed by Barnard *et al.* (2009) [9]. Similar to Barnard *et al.* (2009) but unlike Cazan (2014), some items belonging to the dimensions of help seeking and task strategies may be less applicable to students and may warrant further investigation [9,14]. Examples of items that may benefit from a follow-up inquiry include Item 11 and Item 19 - the low correlational values exhibited by these items to their respective dimension total scores suggests that these items may not be part of the dimensions to which they are conceptualized to belong or these items may not be applicable to Filipino health science students learning in a fully remote environment. Interestingly, Item 19 received the most negative response from the participants. This negative response may be due to the restrictions in mobility imposed by the government as a response to the pandemic. Aside from those who live in the same household, many

students may not consider face-to-face interactions with their peers as an option to begin with because of the restrictions. The relatively negative response to Item 13 ("*I work extra problems in my online courses in addition to the assigned ones to master the course content*") may be due to the absence of extra problems in course materials or to the increasing demand for academic ease, in light of the several difficulties brought about by the pandemic.

The future of health science education seems to inevitably include a lot more remote learning from now on. With this, it is vital for students to continually strengthen their SRL skills. Current findings may suggest that allied health education institutions could include in their efforts strategies directed toward developing less utilized SRL skills. Specifically, learning supports and trainings could focus on helping students develop healthier and more effective study methods, help-seeking behaviors, and goal-setting strategies. Additionally, it would be beneficial to continuously enhance and encourage the use of environment structuring, time management, and self-evaluation, as the students continue to engage in online or blended learning. Learning approaches shown to positively influence SRL and all its components in online contexts, such as deep learning approach, can also be incorporated more strongly in curriculum and practice [60].

This study adds valuable information to the scarce literature on SRL among health sciences students. This study is the first to describe the extent and nature of SRL in the local context. Additionally, this study shows that OSLQ is appropriate to use for allied health students in a fully remote learning environment. Even so, the results of this study need to be interpreted with caution, since the participants of this study are from a single site (UP CAMP). Results of similar research may vary when recruiting participants from other universities.

Implications on Research and Educational Practice

The OSLQ offers a simple, quantitative measure of SRL. Future studies can determine if the results in this study can be replicated in students of other health sciences programs and higher education institutions, and examine the relationship of SRL and academic performance, motivation, and satisfaction, as well with as other related factors such as age. Qualitative inquiry on the individual items is recommended to allow for an in-depth exploration of the SRL strategies students use, especially on items with negative responses and items that may not be applicable to their context. By conducting this

further investigation, possible conceptualizations of other dimensions (*e.g.*, motivation) which may be part of SRL but not accounted for by the present model may be explored. Further examination of the model structure of OSLQ is recommended to facilitate this endeavor.

Conclusion

Overall, allied health students have a high level of SRL. While all dimensions of SRL may benefit from further improvement, the dimensions of task strategies, help seeking, and goal setting may be given priority in improvement. These scores may serve as baseline information from which the design of appropriate teaching-learning strategies to improve SRL could be based.

This study also shows that the extent of online SRL among allied health students is adequately measured in terms of goal setting, environmental structuring, task strategies, time management, help seeking, and self-evaluation. Understanding SRL and developing strategies to develop and strengthen SRL may facilitate student success especially in complex learning and social settings where emergency shifts come into play.

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Competing Interests

The authors have no competing interests to declare.

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