PERCEIVED SUPPORT FROM INSTRUCTOR & PEERS AND STUDENTS' SELF-REGULATED LEARNING DURING TEMPORARY ONLINE PIVOTED LEARNING

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ABSTRACT

The third wave of the Covid-19 pandemic has made every higher education institution in Taiwan implement online learning. Given the circumstance, supporting students in their online self-regulated learning (SRL) became more critical to enabling students' learning maintenance and learning success. The present study explores the impact of instructor support and peers support on students' SRL during temporary online pivoted learning. 123 undergraduate and graduate students in Taiwan were surveyed on two scales The Instructor Support and Peers Support Questionnaire and The Self-Regulated Online Learning Questionnaire (SOL-Q). The descriptive results indicated that students had relatively good perceptions of instructor support, peers support and the online SRL. Additionally, the correlation analysis revealed that both instructor support and peers support had positive and moderate relationships with dimensions of the online SRL. Furthermore, the regression analysis substantiated the importance of instructor support to dimensions of metacognitive skills, persistence, and environmental structuring. In contrast, peer support was essential to metacognitive skills, persistence, and help-seeking. Lastly, there was a negligible impact of provided support on time management behaviors. The research suggested that educators and institutions should provide adequate support for students and facilitate interactive online learning environments for peer-to-peer support.

Keywords: Instructor support & peers support, self-regulated learning, temporary online pivoted learning, quantitative research.

INTRODUCTION

Lifelong learning is considered the ultimate purpose of education, and self-regulated learning (SRL) is a means to that end (Hoyle & Dent, 2018). Schunk and Greene (2018) view SRL as a process through which students activate and sustain cognitions, behaviors, and effects to attain their goals. In online learning, the SRL become an even more critical factor in explaining the successful online learning experience (Broadbent & Poon, 2015; Wong et al., 2019) due to the lack of the instructor's supervision and social interactions for motivational and emotional factors.

The temporary pivot to online learning as the immediate response to the Covid–19 pandemic has once again postulated the importance of SRL in higher education (Atmojo, Muhtarom, & Lukitoaji, 2020). The term temporary online pivoted learning is used by Nordmann et al. (2020) and other researchers as a reference to the situation of school campus closure and the traditional offline courses being pivoted to online. In such emergent remote teaching, many students and course educators might not have voluntarily chosen the online method. This differs from the fully online distance course with their ordinary choice and motivation (Nordmann et al., 2020). As a result, exclusively online learning may not be well-suited for all students (Sason & Kellerman, 2021). Moreover, the core pedagogies utilized in most in-person courses are based on the interactions of educator-students and student-student (Nordmann et al., 2020). During the

emergent online teaching method, these interactions may be changed in nature and even not deficit for students to construct their knowledge. Given instructors' and students' lack of readiness and interaction limitations, temporary online pivoted learning requires more self-regulatory skills from students to maintain their learning and achieve academic success.

Further, a question is raised about how individuals (instructors, peers and so forth) who have close interactions with students in the course context can support the online SRL process. Recently, Edisherashvili (2022) conducted a systematic review of 38 studies in the areas of SRL in the period of 2010-2020 for an overview of the identified interventions on dimensions of the online SRL as well as the phases in the process in the context of higher education. The review indicated that the "support interventions" (Edisherashvili, 2022, p.1) had proven to have a positive effect on the online SRL. However, the investigations into the impact of support factors on SRL were distributed inadequately among the online SRL dimensions and phases, focusing more on the metacognition skills and performance phase. Furthermore, the research team also found out that the supportive factors affording personalization and flexibility should be further developed in the service of the online SRL. In an attempt to contribute to the existing gap in the study of supporting the online SRL, the present paper sets out to investigate the impact of student support on the whole online SRL process comprehensively. In more specific terms, of three main interactions in the online learning context including student-student, student-instructor, and student-content (Moore, 1989), the present research focuses on the support derived from the interactions between instructor and student and among students given its personalized and flexible features in the context of temporary online pivoted learning. To be more detailed, the present study aims (1) to clarify potential support that instructors and peers might offer to online learners; (2) to clarify the dimensions of the online SRL; (3) to examine the influence of the perceived support from instructors and peers on the online SRL during the temporary online pivoted learning. A good awareness of the online SRL and how instructors and peers could assist the online SRL process is necessary for educators and programs to support students' academic success in an uncertain era.

LITERATURE REVIEW

Self-Regulated Learning (SRL)

There have been many conceptions of SRL, however, the most used is from the social cognitive theory. The social cognitive arena views the human agency as the heart of self-regulation (Usher, 2012). Social cognitive researchers also highlight the self-regulation process's personal, behavioral, and environmental interactions. These factors are subjected to changes and monitored by learners to improve strategies, cognitions, affects, and behaviors accordingly (Schunk et al., 2014).

So far, plenty of SRL models have been proposed (Carneiro, Lefrere, Steffens, & Underwood, 2011). (Zimmerman, 2000) developed a social cognitive model of self-regulated learning titled the Zimmerman 3-phase Self-regulation model (2009). The model consists of 3 phases (forethought phase, performance phase, and self-reflection phase).

The first phase of *forethought* comprises task analysis and self-motivational beliefs. In the form of task analysis, students analyze the tasks, set goals, and select appropriate learning approaches. As for self-motivational beliefs, student generates their perceptions about self-efficacy, outcome expectations, task values, and goal orientation which influences the latter consequences of learning.

The *performance* phase is executed with subtasks of self-control and self-observation. Self-control deploys specific methods selected before in the forethought phase together with other skills to keep themselves engaged and finish the tasks. Self-control contains task strategies, self-instruction, imagery, time management, environmental structuring, help-seeking, interest incentives, and self-consequences. In the self-observation process, the student performs metacognitive monitoring and self-recording.

During the *self-reflection* phase, student assesses how they performed the tasks through self-judgment and self-reaction. A form of self-judgment, self-evaluation occurs when a student observes their progress in skill acquisition and compares it against some standards (Zimmerman, 2002). The state of self-reactions impacts students' self-efficacy, the satisfaction of accomplishing the goal, and belief about the acceptability of the learning process they made (Schunk et al., 2014). At this phase, how students react to their prior efforts affects subsequent forethought processes (Zimmerman & Bandura, 1994).

Dimensions of the Online SRL

Popular questionnaires have been used to measure online SRL, including the Motivated Strategies for Learning Questionnaire - MSLQ (Pintrich et al., 1991), the Online Self-regulated Learning Questionnaire – OSLQ (Barnard et al., 2009), the Metacognitive Awareness Inventory-MAI (Schraw & Dennison, 1994), the Learning Strategies Questionnaire-LS (Warr & Downing, 2000). In general, these models collectively cover key dimensions of online SRL, including Task definition, Goal setting, Strategic Planning, Environmental structuring, Time management, Task strategies, Help-seeking, Comprehension monitoring, Motivation control, Effort regulation, and Strategy regulation.

However, the Self-Regulated Online Learning Questionnaire (SOL-Q) was developed by Jansen, Van Leeuwen, Janssen, Kester, and Kalz (2016) as a combination of the above questionnaires. The SOL-Q model covers five dimensions: metacognitive skills, time management, environmental structuring, persistence, and help-seeking.

Metacognitive Skills: This large scale is the cooperation of five scales from theoretical models, including task definition, goal setting, strategic planning, comprehensive monitoring, and strategy regulation. From the theoretical point of view, these five dimensions are scattered over 3 phases of SRL. However, the research conducted by Jansen et al. (2016) show that students performed consistently in metacognitive activities. For example, if students work on task definition in the forethought phase, they will also engage in comprehension monitoring in the performance phase.

Environmental Structuring: Unlike learning in a traditional classroom with a controlled and structured environment, online learners "must be able to structure their physical learning environment, whether at home or elsewhere" (Lynch & Dembo, 2004, p. 5). Kocdar, Karadeniz, Bozkurt, and Buyuk (2018) also postulate that controlling the physical environment is a distinctive and vital SRL strategy for online distance learners. In recent research, Ng (2021) lists aspects of the physical environment and its impact on online distance learners in higher education. Ng (2021) states that online learners need a functional and comfortable space (with control of temperature, noise, lighting, air quality, and ergonomic furniture). The learning space should also have high-speed Internet and a comfortable learning station.

Persistence: Jansen et al. (2016) propose the persistence scale as the merge of motivation control and effort regulation.

Help-seeking: Newman (2008) contends that help-seeking is a vital strategy in self-regulated learning. In the traditional classroom, help-seeking can be performed through face-to-face interactions that allow students to ask for help. By contrast, in online learning (both synchronous and asynchronous formats), there is a reduced opportunity for immediate interactions for help-seeking. The popular means of seeking help are through online communication applications. As a result, help-seeking in online learning becomes more challenging and requires more effort and motivation from students to operate seeking help.

Time Management: According to Trentepohl and Leutner (2022), the time-management strategy can be seen in three phases forethought, performance, and self-reflection of the SRL process. Before the task, a student sets up an estimated duration and time frame for the task according to relevant deadlines and learning goals. While performing the task, the student follows the planned time and duration and monitors compliance. In the self-reflection phase, the student would review the actual time invested into the task in comparison to the outcomes. In asynchronous online learning, students are more active and autonomous in scheduling and managing learning time. However, given the reduced or no class control and instructor control, students need more effort and accountability to keep to the learning plan and maintain the learning process.

Perceived Supports Students Get from Instructors and Peers in Online Learning

In a broad sense, student support is any additional support offered to assist students in achieving academic aspirations and personal development. In discussing the purpose of the support for student learning, Earwaker (1992) states, "to ensure that they derive maximum benefit from their course" (p. 11). Given its importance to the student learning experience, coming to the online learning environment, student support becomes one of the vital elements affecting student achievement in the course (Rovai & Downey, 2010).

According to Thorpe (2002), there are two contexts of learner support: institutional and course contexts. Institutional context includes admission, registration, scholarship, research, student life issues (Thorpe, 2002), library services, help desk, and digital and technological facilities (Selim, 2007). The course context support encompasses course materials, learning activities, and assignments. In the present paper, student support is narrowed down to the course context, focusing on educators' and peers' support during online learning.

Instructor Support

According to Sang et al. (2011), instructional support refers to instructional guidance to learning (academic support); and "dialogues and course structures to motivate and encourage students to learn and master course materials and achieve learning objectives." (p. 159). Curley and Strage (1996) state that high instructional support in combination with high instructional demands promotes more sophisticated study strategies toward a higher level of performance.

Peers Support

In all learning contexts, students can get support from peers for both academic and non-academic issues through group work, peer tutoring, and peer facilitation, answering questions, encouraging each other, and forming a study group (Sang, Srinivasan, Trail-Constant, Lewis, & Lopez, 2011). Omar, Abdalrahim, Drewish, Saeed and Abdalbagi (2015) contend that effective peer interaction could contribute to a higher motivation to achieve learning outcomes. Therefore, creating a learning environment that is friendly and supportive of interactions is encouraged. However, due to a lack of social engagement in the online environment, students may need more support from instructors and other students (Muilenburg & Berge, 2005). As a result, students would find it more challenging to get peers support in online learning than in traditional offline classes. Therefore, if the online class can improve student interactions, the course will be more effective and enjoyable (Muilenburg & Berge, 2005). In that matter, Mălureanu and Enachi-Vasluianu (2021) emphasize the code of conduct in the online environment that must be based on "the principle of non-aggression, of cooperation for the common good" (p. 206).

With regard to the learning context, it is necessary to mention social comparison - the process of comparing learners themselves with others. Commonly, social comparison is often understood as competitiveness negatively. However, from the developmental perspective in social cognitive theory, adults often consider social comparative information during their self-evaluation in their SRL process (Schunk, Meece, & Pintrich, 2014). To some extent, social comparative information is the input in the SRL process and especially positively correlates to students' motivation to achieve in their learning (Schunk, Meece, & Pintrich, 2014).

The Influence of Instructor's and Peers' Support on Dimensions of Student's Self-Regulated Learning in Online Learning

Metacognitive Skills

Clear Expectations & Objectives and Syllabus Update: Instructors should clearly and concisely communicate course objectives and expectations so students can plan their learning appropriately (Zimmerman, 2008). Moreover, instructors must update students on any minor changes or adjustments to the course syllabus in response to emergency online learning. According to Carneiro et al. (2011), the criteria we apply to the course need means of communication. The instructor and peers are essential in informing students of relevant and key measures.

Goal Orientations: With the definition of goal orientation, which focuses on the situated purposes for action (Carter et al., 2020), instructors can foster the goal orientation process in students. When the learning environment is changed, in the case of pivoted online learning, the students may need to review their goals and adjust their learning approach for subsequent achievement. However, Duffy and Azevedo (2015) contend that goal orientation benefits the performance-oriented student group more than the mastery-oriented group.

Structured Materials: Different learning materials and resources should be uploaded onto one digital space for the student to access. Barth (2020) considers this practice vital to student success because they would better manage learning resources and spend more time reading materials (Edisherashvili, 2022).

Responses To Students' Questions and Clear Assessment Instructions: Sang et al. (2011) propose that instructors provided support, including answering students' questions, correcting their misunderstandings, and providing clear instructions for assignments. The participation of experienced supporters is essential to monitoring the accuracy and relevance of the learning practices. In other words, instructors could support students' comprehension monitoring in the SRL process.

Appropriate Feedback on Students' Assignments and Performance: Instructors can provide feedback on students' work in diverse formats such as written, audio, videos, or discussion posts to stay connected with students (Barth, 2020). Although task accomplishment is not always completed correctly, the teacher needs to ensure constructive feedback from which students are encouraged and motivated to learn (Mălureanu & Enachi-Vasluianu, 2021).

Receiving and providing peer feedback: Realising the importance of feedback, however, the educator cannot provide frequent and thorough feedback to every student (Liu & Carless, 2006). Feedback provided by peers can work as an alternative to help students improve their learning process (Gielen, Tops, Dochy, Onghena, & Smeets, 2010). Peer feedback involves comments on the peer's work, SWOT, and/or improvement tips (Falchikov, 1996). Through peer interactions, feedback receivers gain benefits, and the students who often provide feedback can improve their self-regulation skills (Boekaerts & Cascallar, 2006) and hone their understanding of the specific knowledge (Yu-Hui & Yu-Chang, 2013). Moreover, the recent research conducted by Gikandia and Morrowa (2016) shows that detailed assessment instructions are conducive to peer-to-peer feedback because they could support students in monitoring their peers' progress and provide more appropriate feedback. However, the peer-to-peer feedback would be bettered with tutor supervision.

Reflective Student Survey: Besides the official mid-term survey announced to students by school administrators, instructors can facilitate their reflective student survey to get the necessary information for course improvement. Under the circumstances that teachers must switch to emergent remote teaching, this information becomes more critical to make timely course corrections. This not only supports student success in the course but also creates an excellent chance for students to do reflections on their learning experience (Barth, 2020).

Group Discussion: Group discussion is considered one of the best ways to maintain interaction in the online environment. Within the group scale, students are expected to have debates, seminars, problem-solving sessions, research work, etc. These activities are conducive to mutual learning, cognition exchange, and fostering students' self-evaluation. However, to ensure the group discussion efficiency, it should be organised in alignment with students' levels and needs and principles of creating different experiences and competencies, roles, and models of relationships (Mălureanu & Enachi-Vasluianu, 2021).

Environmental Structuring

Despite the importance of the physical environment to the online SRL process (Kocdar et al., 2018), there needs to be more focus on this dimension; instead, online learning research studies have paid more attention to the virtual social environment. Each student may set up their learning environment during online learning in diverse physical conditions, living arrangements, and accessibility to digital devices and internet connectivity (Ng, 2021). Considering these factors is necessary for instructors to design appropriate learning activities. For example, since students already need to allocate their attention to both the physical and virtual environments, the instructor should consider **reducing the multiple tasks**. Otherwise, students may get more distracted and hence achieve worse task performance.

In addition, the instructor and online students can build **the code of conduct in the online course** by mentioning appropriate manners, for example, camera opening. From the student's side, they set up and control their own learning spaces accordingly. If students face problems, for instance, technical issues with slide sharing or noisy background, the online class should respect their choice, have sympathy, and offer ad-hoc technical assistance to the student.

Persistence

Regular Dialogue: The typical dialogue provided by instructors would increase students' engagement in learning tasks and interactions during the lesson and motivate them to achieve their learning goals (Edisherashvili, 2022).

Assessment Instructions: Moreover, Panadero, Alonso-Tapia, and Reche (2013) state that assessment instructions benefit students' cognitive development and persistence for more complex learning tasks. Having been clear about the assessment, the students would process better goals setting and have a deeper connection to their prior knowledge to perform the task. As a result, the students gain higher motivation to achieve the tasks and reduce their avoidance of difficult tasks or stress related to complex tasks.

Collaborative and Interactive Learning Environment: Through the collaborative and interactive learning environment, for example, asynchronous group discussion, and discussion forums, peers interactions allow students to learn about peers' cognition and other social and behavioral patterns (Edisherashvili, 2022). This can be understood that social comparison boosts students' self-esteem and encourage them to maintain their learning. In addition, according to Ma, Liu, Liang, and Fan (2020), involvement with peers during learning activities would help reduce their loneliness, especially in online learning and foster a sense of belonging to a community. Lee and Choi (2011) consider social support a significant predictor of student persistence.

Help-seeking

Students can only regulate help-seeking in the SRL process when there are potential and accessible helpers in their learning network. According to Lim, Tai, Peter, and Morrison (2020), not only help-seekers but help-givers can also foster their acquisition of self-regulated learning. By contrast, Huang and Law (2018) contend that students who asked for help the least were the ones who performed the worst in online courses. Given the challenges of help-seeking in online learning, facilitating a friendly and collaborative learning environment is vital for students to regulate help-seeking.

Time Management

There is very little existing evidence proving the relationship between instructor-provided support and students' time management in the online learning environment. Instead, the existing research findings have shown that technology-based tools, such as Learning Management Systems, could help students track their time invested in the tasks and avoid procrastination (Edisherashvili, 2022).

Advice on Planning Strategy and Time Management Skills: The instructor could provide advice on planning strategies during the preparatory phase. Particularly, with information about task strategies or recommended time that students should spend on course materials, the student can accordingly make an appropriately planned schedule and duration for their learning. Besides, the instructor and peers can also instruct time management skills to inexperienced students to help them monitor learning schedules and control themselves from distracting factors in online learning.

Providing Pacing Support: "Support for appropriate pacing might be particularly important during emergency remote schooling" (Carter et al., 2020, p. 324). Rice and Carter (2016) also maintain the benefits of pacing flexibility as additional time in emergency remote schooling because students may encounter many difficulties with the internet connection, online fatigue, and content overwhelming that constrain students from completing assignments on time. Therefore, teachers could consider the situation and adjust the due dates for assignment submission.

Set up the Online Social Norm in Communication: Ng (2021) proposes the alignment of means of communication and the appropriate time. This makes sense in the diverse living conditions of students and instructors and ensures the work-life balance.

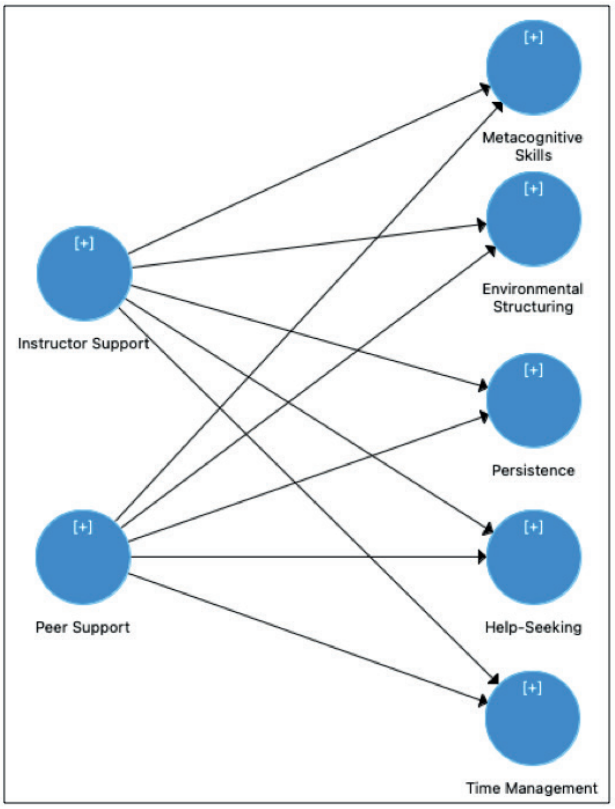

Figure 1. Research Framework

Hypotheses

H_1: There is a significant impact of instructor support and peers support on the Metacognitive skills dimension.

H_2: There is a significant impact of instructor support and peers support on the Environmental Structuring dimension.

H_3: There is a significant impact of instructor support and peers support on the Persistence dimension.

H_4: There is a significant impact of instructor support and peers support on the Help-seeking dimension.

H_5: There is a significant impact of instructor support and peers support on the Time management dimension.

METHOD

Participants

We conducted convenient surveys on 123 undergraduate and graduate students at universities in Taiwan. Students were asked to choose a course from the current online courses they have been studying during the spring semester of the school year 2021-2022 and answered the self-report questionnaire based on their experience in that course. The survey was conducted on Google Forms from 22-29 May 2022, with anonymous responses.

The questionnaires were bilingual in English and Mandarin. The finalized version in English was translated into Mandarin following the steps of forwarding translation and back translation. The translation process was performed in order by two translators proficient in English and Chinese and with education knowledge. The pilot survey was pretested on five participants to get feedback on content understanding, translation, survey structure, and other aspects.

Table 1 provides demographic information of the participants: 115, representing (93%) of the participants, were students from National Dong Hwa University (NDHU) and eight, representing (7%) were from other universities in Taiwan. Among NDHU participants, 42 (34%) were from the College of Management. Regarding the study year, 62 (50%) were first-year students. Of the pursuing degrees, 86 representing (70%) were undergraduate students.

Table 1. Demographic Information

School	Frequency	Percent (%)
NDHU - Hua-shih College of Education	21	17%
NDHU - College of Management	42	34%
NDHU - College of Science and Engineering	17	14%
NDHU- College of Humanities and Social Science & College Of Indigenous Studies	17	14%
NDHU- Center for Teacher Education	7	6%
NDHU- Others	11	9%
Other Universities	8	7%
Study Year	Frequency	Percent (%)
First year	62	50%
Second year	18	15%
Third year	12	10%
Fourth year	28	23%
Other (year)	3	2%
Pursuing Degree	Frequency	Percent (%)
Undergraduate	86	70%
Master	23	19%
PhD	13	11%
Other (Degree)	1	1%

Data Collection and Analysis

The Scales

The Instructor Support and Peers Support Scale: This scale aimed to assess the instructor and peers' support perceived by the students in online learning. The scale was adopted from Sang et al. (2011) and modified according to specific literature and the research scope. The scale has a five-point Likert format (1 = strongly disagree to 5 = strongly agree).

The sub-scale about instructor support has 15 items, covering aspects of 1) Clear expectations and objectives; 2) Syllabus update; 3) Goal orientations; 4) Regular dialogue; 5) Structured Materials; 6) Questions asking; 7) Correct misunderstandings; 8) Provide clear instructions; 9) Constructive feedback; 10) Reflective Student Survey; 11) Providing pacing support. The sub-scale had good internal consistency, $\alpha = 0.938$.

The sub-scale used to assess peers support consists of seven items covering 1) Peer interaction; 2) Group discussion; 3) Peer interaction; 4) Help-seeking and help-giving, and 5) Receiving and providing peer feedback. The alpha coefficient was 0.884.

The Self-Regulated Online Learning Questionnaire (SOL-Q): The purpose of this scale was to assess self-regulated learning in online learning. Respondents respond to questions in a five-point Likert format with values ranging from strongly agree (5) to strongly disagree (1). The scale covers five sub-dimensions, comprising metacognitive skills with 18 items, time management with three items, environmental structuring with five items, persistence with five items, and help-seeking with five items. Even though SOL-Q is developed in the context of Massive Open Online Courses (MOOC), this questionnaire is "developed for fully online courses with a focus on individual learning activities, and thus transferable to similar settings" (Jansen et al., 2016, p. 20). So far, SOL-Q has been employed popularly by researchers to measure self-regulated learning in the online environment.

In the present study, the alpha coefficient values for dimensions of the Self-Regulated Online Learning were in Table 2. (*) Time management dimension has three items, of those two items are negatively worded. These are also the only negatively worded items in the whole 58-item questionnaire. The data of these two items were recorded before the step of factor analysis. The results show high homogeneity among the variances (coefficient alpha is at 0.428); however, given the importance of the time management dimension in the SRL process, it is kept for later analysis.

Table 2. The Alpha coefficient values

Dimensions of the online SRL	Cronbach's Alpha
Metacognitive skills	0.95
Time management	0.428 (*)
Environmental structuring	0.905
Persistence	0.82
Help seeking	0.858

Measurement

Factor analysis was conducted using SPSS 22.0 to discover underlying factors besides two predefined scales.

Instructor Support and Peers Support Scale: The KMO measure of sampling adequacy value was positive (0.902), and Bartlett's test of sphericity had a significance level of 0.000. The principal component analysis (PCA) results show that all variables under instructor and peers support scales had significant factor loadings on the model. However, three variances of instructor support (IS_1, IS_2, IS_3) grouped into an underlying component were eventually removed from the model because they carried out the aspects of course instructions rather than the ad-hoc support from the instructor. As a result, the instructor support scale was reduced to 12 items, and the peers support scale was kept to seven items.

The Self-Regulated Online Learning Questionnaire (SOL-Q): Despite the previous validity process by the authors and its popularity in the research market, the present study still conducted the factor analysis to examine if the underlying factors established from the gathered data are aligned with the proposed model. The KMO measure of sampling adequacy value was positive, at 0.887, and Bartlett's test of sphericity had a significance level of 0.000. After checking factor loadings, the study excluded eight variables (MS_1, MS_6, MS_9, MS-12, MS_14, MS_17, TM_2, HS_5) to the low factor loading and cross loading. All remained variables were verified to have meaningful contributions to the research.

PCA proposed seven underlying factors, while the ordinary model of SOL-Q only has five dimensions. The variables in two new proposed components (MS_7, MS_8, MS_18, PE _4, HS_4, PE_5) did not reflect a specific and distinctive dimension based on the theoretical review and thus were removed from the model.

To sum up, after the reliability and validity examination process, 14 variables were removed from the model. In the end, the final scale used to analyze self-regulated learning in online learning had 25 items: metacognitive skills with nine items, time management with two items, environmental structuring with five items, persistence with three items, and help-seeking with three items. After removing the variable TM_2, the alpha coefficient for the dimension of time management had a better result, at 0.603, and the corrected item-total correlation was higher than 0.4 for each TM_1 and TM_3. All in all, all remained variables satisfied the requirements for the later correlation and regression analysis.

Data Analysis

The study used SPSS 22.0 for the data analysis. Firstly, descriptive analysis was conducted to examine students' perception of 1) instructor support and peers' support and 2) their SRL during the temporary pivoted online learning. Secondly, correlation analysis was performed to assess the relationship between instructor support and peer support individually with dimensions of SRL. Lastly, regression analysis was employed to examine the stated hypothesis, particularly the ability of instructor support and peer support levels to predict self-regulated online learning.

FINDINGS

Descriptive Analysis

In the present research, questions were designed as an interval scale. Each combination of questions was to measure 1) instructor support and peers' support and 2) their SRL during the temporary pivoted online learning. Therefore, Means were used to evaluate the central tendency and standard deviation (SD) for the data set's variability.

In general, the overall score of instructor support, peers support, and SRL rated by students are relatively good, at 3.78, 3.41, and 3.30, respectively. Additionally, SD varied from 0.81 to 1.07, depicting that students' perceptions of surveyed aspects mostly varied among Likert responses 2 - 4 (disagree to agree). However, toward the positive side of the Likert scale. In addition, the variabilities between the dimensions were relatively even, and the difference between the maximum and minimum values was 0.26. Noticeably, in specific dimensions of SRL, time management was the least regulated aspect perceived by students (2.74), whereas the highest dimension went for the selection of learning environment (3.71).

Moreover, the analysis by demographic groups shows that students rated instructor support with higher scores than those for peers' support. Among those pursuing degree levels, master's students rated higher scores for surveyed aspects than undergraduate students and the same pattern for PhD students, meaning that the higher their study levels, the higher awareness of instructor support, peers support, and SRL capacity students perceived.

Table 3. Descriptive Analysis

Group	Statistical	Instructor Support (IS)	Peers Support (PS)	Self-Regulated Learning				
				Metacog Skills (MS)	Environ Structuring (ES)	Persistence (PE)	Help-Seeking (HS)	Time Mgmt (TM)
Total N = 123	Means	3.78	3.41	3.48	3.71	3.17	3.43	2.74
	SD	.81	.85	.82	.99	1.02	.89	1.07
Undergraduate n = 86	Means	3.73	3.32	3.37	3.54	3.16	3.38	2.67
	SD	.83	.80	.77	.98	.92	.85	1.04
First-Year	Means	3.67	3.41	3.41	3.49	3.28	3.34	2.35
(n = 37)	SD	.78	.78	.82	.94	.95	.84	.83
Second-Year	Means	3.28	2.80	2.88	3.14	2.87	3.30	2.75
(n = 10)	SD	1.24	1.09	.81	1.00	.53	.91	1.11
Third-Year	Means	3.73	3.34	3.24	3.36	3.07	3.07	3.15
(n = 10)	SD	.81	.89	.66	1.12	.62	.70	1.29
Forth-Year	Means	3.93	3.38	3.58	3.89	3.19	3.62	2.98
(n = 26)	SD	.68	.61	.67	.92	1.01	.92	1.11
Other (year)	Means	4.19	3.29	3.15	3.00	2.67	3.00	2.17
(n = 3)	SD	.73	1.14	.68	.80	1.67	.67	.58
Master n = 23	Means	3.88	3.54	3.62	4.12	2.96	3.52	2.85
	SD	.75	1.04	.83	.88	1.22	.98	1.10
PhD n = 13	Means	4.08	3.85	4.15	4.28	3.79	3.74	2.77
	SD	.60	.63	.56	.56	.93	.81	1.09
Other (Degree) n = 1	Means	1.92	2.14	1.11	1.00	1.00	1.33	5.00
	SD	.	.	.	.	.	.	.

Correlation and Regression Analysis

The Relationship of Instructor Support and Peers Support with Dimensions of Self-Regulated Learning

Given the interval scales in the present research, Pearson correlation coefficients were generated to evaluate the relationship between instructor support, peers' support, and SRL variables. All coefficients in the Pearson correlation matrix were positive, meaning that if the instructor's or peers' support level increases, the student's SRL also increases. The interpretation of correlation coefficients in the present research was based on Senthilnathan's spectrum of correlation coefficients in social science studies (2019). According to Senthilnathan (2019), a correlation between two variables is considered reasonable when $r \geq 0.35$ or $r \leq -0.35$ and statistically significant. The results show that instructor and peers' support had a medium association with four SRL dimensions (Metacognitive Skills, Environmental Structuring, Persistence, and Help-seeking), with coefficients ranging from 0.348 to 0.507. Both instructor and peer support have important and equivalent roles in metacognitive skills at 0.468** and 0.466**, respectively. Similarly, instructor support and peers support have an equal and meaningful relationship with students' persistence in online learning (0.37** and 0.386**, respectively). In addition, the data shows that the environmental structuring dimension is more associated with instructor support than peers' support. Notably, the correlation between peers' support and help-seeking dimensions is the most significant among linear correlations in this study, at 0.507. Lastly, the correlations of time management are very low, with statistical insignificance. As stated earlier, the time-management dimension has a low score of Cronbach's alpha, meaning that the data of this dimension are homogeneous, thus causing a low correlation with other factors in the study.

Table 4. Correlation Matrix for Measurement Scales

	Instructor Support	Peers Support	Metacog Skills (MS)	Environ Structuring (ES)	Persistence (PE)	Help-Seeking (HS)	Time Mgmt (TM)
Instructor Support	1						
Peers Support	.587**	1					
Metacognitive Skills	.468**	.466**	1				
Environmental Structuring	.412**	.348**	.597**	1			
Persistence	.370**	.386**	.535**	.489**	1		
Help-Seeking	.409**	.507**	.565**	.481**	.377**	1	
Time Management	.044	.004	-.118	-.002	-.098	-.134	1

Note. **$p < .01$.

The Impact of Instructor Support and Peers Support on Student's Self-Regulated Learning

It was hypothesized that instructor and peers' support positively predict students' SRL in temporary online pivoted learning. A multiple regression analysis - stepwise method was performed to test the stated hypothesis.

H_1. There is a significant impact of instructor support and peers' support on the metacognitive skills dimension.

The result shows that collectively 28.7% of the variance of metacognitive skills can be accounted for by instructor and peers' support ($F = 24.146$, $p < .001$). Furthermore, results show that both instructor and peers support can positively predict the variation of students' metacognitive skills, particularly instructor support (β = .297, t-value = 3.092*) and peers support (β = .291, t-value = 3.035*). In conclusion, hypothesis H_1 is accepted.

H_2. There is a significant impact of instructor support and peers support on the environmental structuring dimension.

The variance of instructor support and peers support can jointly explain 19.3% of the variance of the environmental structuring ($F = 14.342$, $p < .001$). Regression analysis excluded peers support in the stepwise regression given the statistical insignificance (β = .163, t-value = 1.603, p = .112). The environmental structuring is predicted by instructor support (β = .412, t-value = 4.968**). As a result, hypothesis H_2 is rejected.

H_3. There is a significant impact of instructor support and peers support on the persistence dimension.

An amount of 18% of the variance in student persistence can be explained by predictors ($F = 13.032$, $p < .001$). Both types of support have important contributions to the predicted persistence with instructor support (β = .220, t-value = 2.151, p = .033) and peers support (β = .257, t-value = 2.517, p = .013). Hypothesis H_3 is accepted.

H_4. There is a significant impact of instructor support and peers support on the help-seeking dimension.

The results show that instructor and peer support constitute 27.7% of the variance of help-seeking during temporary online pivoted learning ($F = 22.959$, $p < .001$). Regression analysis excluded instructor support in the stepwise regression given the statistical insignificance (β = .170, t-value = 1.776, p = .078). The help-seeking dimension is predicted by peers support (β = .507, t-value = 6.473**). Hypothesis H_4 is rejected.

H_5. There is a significant impact of instructor support and peers support on the time-management dimension.

The partial correlations of separate instructor support and peers support on time management are negligible; as a result, regression analysis was not computed for this factor. It is concluded that H_5 is rejected.

Table 5. The multiple correlation

The online SRL variables	*R2*	*F*-value
Metacognitive Skills	.287**	24.146
Environmental Structuring	.193**	14.342
Persistence	.180**	13.032
Help-seeking	.277**	22.959
Time-management	.002	0.105

Note. **$p < .01$.

Table 6. Coefficients of regression models

SRL variables	Model	Predictor	*B*	*SE*	β	*t*-value	*Sig.*
	1	Constant	1.693	.314		5.393	.000
		Instructor Support	.473	.081	.468	5.824	.000
Metacognitive Skills	2	Constant	1.390	.320		4.346	.000
		Instructor Support	.300	.097	.297	3.092	.002
		Peers Support	.281	.093	.291	3.035	.003
Environmental Structuring	1	Constant	1.808	.391		4.627	.000
		Instructor Support	.503	.101	.412	4.968	.000
	1	Constant	1.604	.351		4.567	.000
		Peers Support	.460	.100	.386	4.599	.000
Persistence	2	Constant	1.089	.421		2.589	.011
		Peers Support	.306	.122	.257	2.517	.013
		Instructor Support	.275	.128	.220	2.151	.033
Help-Seeking	1	Constant	1.615	.288		5.604	.000
		Peers Support	.531	.082	.507	6.473	.000

DISCUSSION

Based on the descriptive analysis, it is known that students rated instructor support and peers support with relatively good results. However, instructor support had better results than peers support. Additionally, students also rated their online SRL abilities positively. In specific dimensions of SRL, learning environmental structuring and time management were the most and least regulated aspects perceived by students, respectively. Comparing demographic groups in the research, the results show that the level of SRL was positively associated with the level of the pursuing degree.

The correlation study indicated the medium relationships between instructor support and peers support individually with dimensions of the online SRL. In addition, both jointly accounted for 18% to 29% of the variance of each dimension in the online SRL process. This implies that the remained variance can be explained by sampled errors and other factors, for instance, the goals, the sense of self-efficacy, and the level of control the student has in their learning (Schunk et al., 2014) or student attitude to the studying, course quality, and learning infrastructure quality (Albelbisi & Yusop, 2019).

The regression analysis shows that both instructor support and peers support had significant and equivalent impacts on metacognitive skills and persistence in online learning. The present study confirmed the literature review that the external factors, particularly provided support from teachers and classmates, are predictive of the utilization of task definition, goal setting, strategic planning, comprehensive monitoring, strategy regulation, motivation control, and effort regulation in the online SRL process. In the dimension of help-seeking, the results demonstrated the role of peers over the instructor. The result of this study is supported by the previous findings from Karabenick and Knapp (1991) that students tend to look for peers rather than instructors when they need help. In the meantime, instructor support impacted students' actions to structure their physical learning environment. Lastly, the results show the negligible influence of provided support on time management behaviors. This could be explained by the high homogeneity among the three items of the time management sub-scale. However, the research does not eliminate other underlying reasons for this result.

The research highlights the characteristics of temporary online pivoted learning in two aspects. First and foremost, the research was conducted in the context of the emergency in Taiwan due to the third Covid pandemic wave. Moreover, the participants sampled were students who attended temporary online pivoted learning. As mentioned in the part of the introduction, given the differences in nature between this learning format and the fully online courses, stating temporary online pivoted learning in the current research is necessary to ensure the validity of the research findings in a particular type of online learning environment.

Zimmerman (1990) stated that SRL is a complex construct with a cyclical nature, meaning that per activity in each phase of the SRL process is non-linear and affects one another. In the current study, the "connectedness" (Wong et al., 2019, p. 369) can be seen in the case of the help-seeking dimension. The help-seeking items in the self-report questionnaire measured students' efforts in seeking help. However, the end purpose of help-seeking would be diverse and related to other components of the SRL process, such as emotional motivation (persistence) or academic feedback (cognition regulation). As a result, in the factor analysis, some items of metacognitive skills, help-seeking, and persistence factors were mixed and grouped into another scale. The SRL scale hence is subject to vary in the specific learning context and research population.

Limitation and Future Work

This study has some limitations. Firstly, the study's sample size is quite small compared to the number of questionnaire items due to budget constraints. For this reason, the researchers limited the scope to descriptive, correlation, and regression analyses. With more samples, we would extend the research to the Structural Equation Model (SEM) to propose a model of how provided support affects the dimensions of the online SRL. Secondly, the sub-scale time management in the SOL-Q scale has two negatively worded items that could have been more effectively applied in the context of the present study. Future studies employing the SOL-Q should consider the sampled population's sociocultural characteristics to have appropriate scale modification. Despite these limitations, the present study has still ensured its validity to the study scope, i.e., research instructor support, peers support and SRL process, as well as the levels of impact that instructor support and peers support have on the SRL process in the context of Taiwan during temporary online pivoted learning.

The research findings open up the potential for further research. First and foremost, even though students study online, physical environments are always allocated for learning and studying. These physical conditions would foster or constrain learning (Ng, 2021). With the demonstrated impact of instructors on the environmental structuring dimension of the online SRL, more studies should be implemented on how instructors and universities could facilitate to support students in regulating the physical learning contexts. Furthermore, since time management is an essential factor of the online SRL (Trentepohl & Leutner, 2022), future studies should continue to investigate the role of provided support in the time management dimension of the online SRL.

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REFERENCES

Albelbisi, N., & Yusop, F. (2019). Factors Influencing Learners' Self–Regulated Learning Skills in a Massive Open Online Course (MOOC) Environment. *Turkish Online Journal of Distance Education, 20*(3), 1-16. DOI 10.17718/tojde.598191.

Atmojo, S. E., Muhtarom, T., & Lukitoaji, B. (2020). The level of self-regulated learning and self-awareness in science learning in the covid-19 pandemic era. *Jurnal Pendidikan IPA Indonesia, 9*(4), 512–520. DOI 10.15294/jpii.v9i4.25544.

Barth, D. (2020). Seven ways of engaging the online learner to develop self-regulated learning skills. *Journal of Teaching and Learning with Technology, 9*(1), 19–29. DOI 10.14434/jotlt.v9i1.29165.

Boekaerts, M., & Cascallar, E. (2006). How far have we moved toward the integration of theory and practice in self-regulation? *Educational Psychology Review, 18*(3), 199-210. DOI 10.1007/s10648-006-9013-4.

Broadbent, J., & Lodge, J. (2021). Use of live chat in higher education to support self-regulated help seeking behaviours: a comparison of online and blended learner perspectives. *International Journal of Educational Technology in Higher Education, 18,*17. DOI 10.1186/s41239-021-00253-2.

Carneiro, R., Lefrere, P., Steffens, K., & Underwood, J. (2011). *Self-Regulated Learning in Technology Enhanced Learning Environments* (Vol.5). Rotterdam, The Netherlands: Sense Publishers.

Carter, R. A., Rice, M. F., Yang, S., & Jackson, H. A. (2020). Self-regulated learning in online learning environments: Strategies for remote learning. *Information and Learning Science, 121*(5), 321–329. DOI 10.1108/ILS-04-2020-0114.

Curley, R. G., & Strage, A. A. (1996). Instructional support and demands: Helping teachers help students meet increasing academic standards. *Education, 117*(1), 128. scholarworks.sjsu.edu/cgi/viewcontent.cgi?article=1003&context=chad_pub

Duffy, M. C., & Azevedo, R. (2015). Motivation matters: Interactions between achievement goals and agent scaffolding for self-regulated learning within an intelligent tutoring system. *Comp. Hum. Behav., 52,* 338–348. DOI 10.1016/j.chb. 2015.05.04.

Earwaker, J. (1992). *Helping and supporting students: Rethinking the issues.* Buckingham. England: Open University Press. https://files.eric.ed.gov/fulltext/ED415731.pdf

Edisherashvili, N., Saks, K., Pedaste, M., & Leijen, Ä. (2022). Supporting Self-Regulated Learning in Distance Learning Contexts at Higher Education Level: Systematic Literature Review. *Front. Psychol.,* 12:792422. DOI 10.3389/fpsyg.2021.792422.

Falchikov, N. (1996, July 8-12). *Improving learning through critical peer feedback and reflection.* The HERDSA Conference 1996: Different approaches: Theory and practice in Higher Education, Perth, Australia.

Gielen, S., Tops, L., Dochy, F., Onghena, P., & Smeets, S. (2010). A comparative study of peer and teacher feedback and of various peer feedback forms in a secondary school writing curriculum. *British Educational Research Journal, 36,* 143e162. http://www.informaworld.com/openurl?genre=article&id=doi:10.1080/01411920902894070

Gikandia, J. W., & Morrowa, D. (2016). Designing and implementing peer formative feedback within online learning environments. *Technol. Pedag. Educ., 25*(2), 153–170. DOI 10.1080/1475939X.2015.1058853.

Hoyle, R. H., & Dent, A. M. (2018). Chapter 4 Developmental Trajectories of Skills and Abilities Relevant for Self-Regulation of Learning and Performance. In Schunk, D.H., & Greene, J.A. (Eds.). *Handbook of Self-Regulation of Learning and Performance* (2nd ed.). Routledge. DOI 10.4324/9781315697048.

Huang, K., & Law, V. (2018). Learners' engagement online in peer help. *American Journal of Distance Education, 32*(3), 177–189. DOI 10.1080/08923647.2018.1475982.

Jansen, R., Leeuwen, A., Janssen, J., Kester, L., & Kalz, M. (2018). Validation of the self-regulated online learning questionnaire. Journal of Computing in Higher *Education, 29,* 6–27. DOI 10.1007/s12528-016-9125-x.

Karabenick, S. A., & Knapp, J. R. (1991). Relationship of academic help seeking to the use of learning strategies and other instrumental achievement behavior in college students. *Journal of Educational Psychology, 83*(2), 221–230. DOI 10.1037/0022-0663.83.2.221.

Kocdar, S., Karadeniz, A., Bozkurt, A., & Buyuk, K. (2018). Measuring self-regulation in self-paced open and distance learning environments. *Int. Rev. Res. Open Dist. Learn., 19*(1), 25–42. DOI 10.19173/irrodl.v19i1.3255.

Lee, Y., & Choi, J. (2011). A review of online course dropout research: implications for practice and future research. *Educ. Technol. Res. Dev., 59*(5), 593–618. DOI 10.1007/s11423-010-9177-y.

Lim, J. H., Tai, K., Peter, A. K., & Morrison, E. W. (2019). Soliciting Resources From Others: An Integrative Review. *Academy of Management Annals, 14*(1), 122–159. DOI 10.5465/annals.2018.0034.

Liu, N. -F., & Carless, D. (2006). Peer feedback: The learning element of peer assessment. *Teaching in Higher Education, 11*(3), 279–290. DOI 10.1080/13562510600680582.

Lynch, R., & Dembo, M. (2004). The relationship between self-regulation and online learning in a blended learning context. *The International Review of Research in Open and Distributed Learning, 5*(2), 1-16. DOI 10.19173/irrodl.v5i2.189.

Ma, X., Liu, J., Liang, J., & Fan, C. (2020). An empirical study on the effect of group awareness in CSCL environments. *Interactive Learrning Environment,* 1–16. DOI 10.1080/10494820.2020.1758730.

Mălureanu, F., & Enachi-Vasluianu, L. (2021). *Strategies Of Supporting Students' Interaction In Online Learning.* Bucharest: "Carol I" National Defence University, 1, 205-210. DOI 10.12753/2066-026X-21-027.

Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education, 3*(2), 1–7. DOI 10.1080/08923648909526659.

Muilenburg, L. Y., & Berge, Z. L. (2005). Student barriers to online learning: A factor analytic study. *Distance Education, 26*(1), 29–48. DOI 10.1080/01587910500081269.

Newman, R. S. (2008). The motivational role of adaptive help seeking in self-regulated learning. In Schunk, D. H., & Zimmerman, B. J. (Eds.), *Motivation and self-regulated learning. Theory, research, and applications* (pp. 327–350). New York. NY: Routledge.

Ng, CF. (2021). The Physical Learning Environment of Online Distance Learners in Higher Education – A Conceptual Model. *Front. Psychol.,* 12:635117. DOI 10.3389/fpsyg.2021.635117.

Nordmann, E., Horlin, C., Hutchison, J., Murray, J.-A., Robson, L., Seery, M., & MacKay, J. R. D. (2020). Ten simple rules for supporting a temporary online pivot in higher education. *PLoS Comput Biol, 16*(10): e1008242. DOI 10.1371/journal.pcbi.1008242.

Omar, E. -N. M. M. A., Abdalrahim, A., Drewish, A., Saeed, Y. M., & Abdalbagi. Y. M. (2015). Test of Information Technology (IT) - Self Efficacy and Online Learning Interaction Components on Student Retention: A Study of Synchronous Learning Environment," *2015 Fifth International Conference on e-Learning (econf),* 165–173, DOI 10.1109/ECONF.2015.17.

Panadero, E., Alonso-Tapia, J., & Reche, E. (2013). Rubrics vs. Self-assessment scripts effect on self-regulation, performance and self-efficacy in pre-service teachers. *Studies in Educational Evaluation, 39*(3), 125–132. DOI 10.1016/j.stueduc.2013. 04.001.

Rice, M. F., & Carter, R. A. (2016). Online teacher work to support self-regulation of learning in students with disabilities at a fully online state virtual school, *Online Learning, 20*(4), 118–135. DOI 10.24059/olj.v20i4.1054.

Rovai, A. P., & Downey, J. R. (2010). Why some distance education programs fail while others succeed in a global environment. *The Internet and Higher Education, 13*(3), 141–147. DOI 10.1016/j.iheduc.2009.07.001.

Sang, J. L., Srinivasan, S., Trail-Constant, T., Lewis, D., & Lopez, S. (2011). Examining the relationship among student perception of support, course satisfaction, and learning outcomes in online learning. Internet and Higher Education, 14(3), 158–163. DOI 10.1016/j.iheduc.2011.04.001.

Sason, H., & Kellerman, A. (2021). Teacher-Student Interaction in Distance Learning in Emergency Situations. *Journal of Information Technology Education: Research, 20,* 479-501. DOI 10.28945/4884.

Schunk, D. H., Meece, J., & Pintrich, P. (2014). *Motivation in Education: Theory, Research, and Applications* (4th ed.). Harlow. United Kingdom: Pearson Education.

Schunk, D. H., & Greene, J. A. (2018). Historical, Contemporary, and Future Perspectives on Self-Regulated Learning and Performance. In Schunk, D.H., & Greene, J.A. (Eds.). *Handbook of Self-Regulation of Learning and Performance* (2nd ed.). Routledge. DOI 10.4324/9781315697048.

Selim, H. M. (2007). Critical success factors for e-learning acceptance: Confirmatory factor models. *Computers & Education, 49*(2), 396–413. DOI 10.1016/j.compedu.2005.09.004.

Senthilnathan, S. (2019). Usefulness of Correlation Analysis. *SSRN Electronic Journal.* DOI 10.2139/ssrn.3416918.

Thorpe, M. (2002). Rethinking learner support: The challenge of collaborative online learning. *Open Learning, 17*(2), 105–119. DOI 10.1080/02680510220146887.

Trentepohl, S., & Leutner, D. (2022). Time Management in Higher Education. In *The Society for Research into Higher Education and Open University Press.* https://encyclopedia.pub/entry/22580.

Usher, E. L. (2012). Self-Efficacy for Self-Regulated Learning. In Seel N.M. (Ed.), *Encyclopedia of the Sciences of Learning.* DOI 10.1007/978-1-4419-1428-6_835.

Wong, J., Baars, M., Davis, D., Van Der Zee, T., Houben, G.-J., & Paas, F. (2019). Supporting Self-Regulated Learning in Online Learning Environments and MOOCs: A Systematic Review. *International Journal of Human–Computer Interaction, 35*(4-5), 356–373. DOI 10.1080/10447318.2018.1543084.

Yu-Hui, C., & Yu-Chang, H. (2013). Peer feedback to facilitate project-based learning in an online environment. *International Review of Research in Open and Distance Learning, 14*(5), 258-276. DOI 10.19173/irrodl.v14i5.1524.

Zimmerman, B. J. (1990). Self-Regulated Learning and Academic Achievement: An Overview, *Educational Psychologist, 25*(1), 3-17, DOI 10.1207/s15326985ep2501_2.

Zimmerman, B. J., & Bandura, A. (1994). Impact of Self-Regulatory Influences on Writing Course Attainment. *American Educational Research Journal, 31*(4), 845-862. DOI 10.3102/00028312031004845.

Zimmerman, B. J. (2000). Attaining self-regulation: A social cognitive perspective. *Handbook of self-regulation* (pp.13–39). San Diego: Academic Press.

Zimmerman, B. J. (2002). Becoming a Self-Regulated Learner: An Overview. *Theory Into Practice, 41*(2), 64-70. DOI 10.1207/s15430421tip4102_2.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: historical background, methodological developments, and future prospects. *American Educational Research Journal, 45*(1), 166-183. DOI 10.3102/0002831207312909.