Current Psychology (2023) 42:19955–19969
https://doi.org/10.1007/s12144-022-03136-5

The impact of flipped learning on the relationship between self-regulated online learning and academic procrastination

Funda Ergulec[1] · **Ahmet Kara**[2] · **Esra Eren**[1]

Accepted: 19 April 2022 / Published online: 29 April 2022

Abstract
To understand the relationships between flipped learning, self-regulated online learning and academic procrastination, this study constructs a mediation model to examine the impact of flipped learning on pre-service teachers' self-regulated online learning behaviors and academic procrastination. A total of 396 pre-service teachers enrolled in a university in Turkey participated in the study, 306 (77.3%) of the participants were female and 90 (22.7%) were male. Three different data collection tools were used in the study: Flipped Learning Scale, Self-Regulated Online Learning Questionnaire, and The Scale of Academic Procrastination. Path analysis technique was used to analyze the data. The study found that while learning support, the dimension of the flipped learning scale, predicts self-regulated online learning in a significant and positive way, self-regulated online learning predicts academic procrastination in a significant and negative way. One unit increase in learning support increases students' self-regulated online learning by 0.25 units ($t = 5.05$; $p < .001$). On the other hand, a one-unit increase in self-regulated online learning decreases students' academic procrastination by 0.54 units ($t = -12.80$; $p < .001$). In addition, self-regulated online learning has a full mediating effect in the relationship between learning support and academic procrastination.

Keywords Flipped learning · Self-regulated online learning · Academic procrastination · Pre-service teachers

Introduction

As more students enroll in online courses, more research has started to focus on the ways to support student learning in this kind of environment. Self-regulated learning strategies and procrastination in online learning settings have become more important as the students and instructors are not physically present. While designing student-centered learning settings have always been valued in face-to-face learning (Hannafin & Land, 1997), this has also been prioritized in online education (Means et al., 2009). Although designing of such online learning environments remains a challenge, flipped learning model has started to be used by researchers as an alternative to create student-centered learning environments. It is one of the innovative pedagogical approaches with the use of technology in education (Cheng et al., 2019; Sun et al., 2017). Considering the importance of self-regulated learning behaviors and academic procrastination in learning, especially in online learning environments, this study aimed to investigate the relationship between pre-service teachers' perceptions of the flipped model, use of self-regulated online learning, and academic procrastination. The study was conducted to understand which features of flipped learning are primarily responsible for self-regulated skills and academic procrastination.

Conceptual Framework

Academic Procrastination

Procrastination refers to the tendency of a person to postpone performing important tasks, despite knowing that the delay would be worse (Ferrari et al., 1995; Solomon &

✉ Funda Ergulec
fundaergulec@gmail.com

Ahmet Kara
ahmetkara9126@gmail.com

Esra Eren
esisman@gmail.com

[1] Eskisehir Osmangazi University, Eskisehir, Turkey

[2] Kastamonu University, Kastamonu, Turkey

Rothblum, 1984; Steel, 2007). Similarly, academic procrastination refers to a tendency of a person to postpone academic related actions, such as studying or completing assignments (Rabin et al., 2011; Steel & Klingsieck, 2016). Academic procrastination usually concludes with unsatisfactory academic results, including time management issues with a result of a decrease in course accomplishment (Akinsola et al., 2007) and emotional upset (Solomon & Rothblum, 1984). To date, several studies researched academic procrastination behaviors of students. For instance, in 2007, Steel found that 80–95% of students accepted procrastination and 50% of them were found to have problematic academic procrastination. Similarly, in 2015, You reported that 70% of students admitted procrastination.

Previous studies have examined the reasons of procrastination and its correlation with different kinds of variables. For instance, one of the most cited articles which was conducted almost three decades ago (Solomon & Rothblum, 1984) examined students' reasons to procrastinate. It was found that academic procrastination was not simply related with poor study habits or time management issues, rather it involved behavioral, affective, and cognitive components (Solomon & Rothblum, 1984). In other studies, a negative correlation was found between academic achievement and procrastination (Kim & Seo, 2015; You, 2015). While there is a correlation between procrastination and several different kinds of variables, self-regulation, self-efficacy, and self-esteem have been studied in the academic procrastination literature (Klassen & Kuzucu, 2009).

Procrastination was usually found to be associated with a lack of self-regulation and low confidence in accomplishment (Steel, 2007). Procrastination is considered to be a kind of anti-motivation that is a failure of self-regulation (Ferrari et al., 2005). Individuals with high level of self-efficacy for self-control tend to be less prone to procrastination (Senécal et al., 1995; Tan et al., 2008). Additionally, chronic procrastinators were found to fail to effectively organize performance skills and perform worse under pressure (Ferrari, 2001).

As the previous studies reported procrastination usually negatively influences student academic achievement, it is important to identify reasons and factors that lead academic procrastination. Since a negative correlation is found between academic performance and procrastination in empirical studies (e.g., Beswick et al., 1988; Goroshit & Hen, 2021; Kim & Seo, 2015; Wesley, 1994; You, 2015), understanding the effects of students' self-regulated learning behaviors on academic procrastination is important.

Academic Procrastination and Self-Regulation

Understanding the relationship between self-regulation and procrastination is important as students' self-regulated learning strategies can be improved. Self-regulated learning is defined as the approach by which students achieve personal learning objectives (Zimmerman, 1989). Self-regulated learners are "metacognitively, motivationally, and behaviorally active participants in their own learning process" (Zimmerman, 1989, p. 329). As a result, they can keep track of their progress and adapt strategies accordingly. On the other hand, poor self-regulated learners often fail to use effective learning strategies; thus, experience anxiety and fear of failure (Zimmerman, 1989). Similar characteristics have also been observed among academic procrastinators. Thus, academic procrastination was found to be related to poor self-regulatory skills (Cao, 2012; Choi & Moran, 2009; Park & Sperling, 2012).

A direct evidence between academic procrastination and time management of students was found in some empirical studies published to date. For instance, in Cao (2012) study 125 students were categorized as active, passive, and non-procrastinators. Active procrastination was found to be related with "maladaptive motivational and behavioral traits" which were also described in literature related to self-regulated learning. In Cao's study, active procrastinators found to have "low mastery-approach goal, high performance-avoidance and work-avoidance goal, and low intrinsic motivation and task value" (p. 515). Similarly, in another empirical study, Park and Sperling (2012) established a link between academic procrastination and a lack of self-control and low procrastinator students reported better time and work environment management than high procrastinators. In a recent study by Wolters and colleagues (2017), self-regulated students who know when and how long they study would increase their academic achievement by avoiding delays. The researchers found that students who have time management skills tend to use various regulatory strategies more often (Wolters et al., 2017). According to the study, a self-regulated learning model incorporating time management can assure a suitable framework to understand the academic procrastination of students.

Self-Regulation and Flipped Learning

Flipped learning model has gained popularity among instructors looking for alternative ways to traditional teaching methods. Broadly, flipped learning is a pedagogical innovation which outside of class by previewing course materials and completing tasks in class (Hwang et al., 2015). In more detail, in the flipped learning approach, the instructor creates instructional videos and resources for students to watch in preparation for classes. Then, the students self-study those materials and gain content knowledge before the class. Afterwards, they carry out activities such as hands-on practice, application, peer interaction, and teacher feedback in class (Akçayır and Akçayır, 2018; Hwang et al., 2015).

The flipped learning approach provide a student-centered approach with active and interactive in-class sessions (Akçayır and Akçayır, 2018; Strelan et al., 2020) and positive changes in students' success, motivation, engagement, and satisfaction (Al-Zahrani, 2015; Sun et al., 2017; Thai et al., 2017). Considering the scope of teacher competencies and teacher education programs, adopting various and effective instructional strategies such as flipped learning model would be beneficial for pre-service teachers. In fact, several studies found flipped learning method as effective in teacher education (Debbağ & Yıldız, 2021; Lee & Martin, 2019; Nikitova et al., 2020; Yurtseven Avci et al., 2021).

There are various types of flipped learning approaches that can be planned based on the students' requirements and the class's fit. El Miedany (2019) classified the flipped learning models as standard inverted classrooms, discussion-focused flipped classrooms, demonstration-oriented flipped classes, faux-flipped classroom, group-based flipped classrooms, virtual flipped classrooms, and flipping the teacher. In this particular study, the students' perception of the virtual flipped classroom model was studied where lecture videos were shared with students and their work collected online via learning management system.

Student self-regulation and engagement in learning are the core elements of flipped learning mentioned in the literature (Shyr & Chen, 2018; Sletten, 2017). As students are required to self-study and preview course content outside of class, they need to have self-regulation behaviors to learn and to be ready for in-class activities. In a traditional learning environment, careful instructional design and development can be helpful for learners to regulate their learning (Paris & Winograd, 2003). In a technology-based learning setting, individuals need more intensive instructional support to self-regulate their learning (Azevedo & Hadwin, 2005; Chen et al., 2013). Especially in technology-based learning environments, integrating instructional techniques that support self-regulated learning is more significant for instructors. As mentioned in Shyr and Chen, (2018) study, creating supportive technology-based flipped learning environments should be studied more to understand which features of flipped learning are primarily responsible for academic self-regulation behaviors.

In a few studies, the influence of the flipped model on self-regulated learning behaviors of students is examined. For instance, in Sletten (2017) study, 76 students who registered in a flipped classroom course were asked about their self-regulated learning behaviors and perceptions of the model. Students' perceptions of the model were proven to be a favorable predictor of their usage of self-regulated learning strategies, including "study strategies, metacognition, self-talk, interest enhancement, effort, and help-seeking" (p. 355). Sletten (2017) also suggested that while out-of-class videos are important in flipped learning, in order for students to effectively learn from videos and to become more self-directed learners, they need to practice self-regulated learning abilities. In Chen et al. (2014) study, students who have low self-regulated skills struggled in the flipped learning. These students had failed in out-of-class preparation; thus, felt behind in class activities. In a meta-analytical flipped learning study of nursing education, Tan et al. (2017) found that self-learning abilities of students in flipped environments improved significantly better compared to traditional classrooms. In addition, Shyr and Chen (2018) measured self-regulated learning as a variable in understanding the flipped learning approach. The study found self-regulated learning as an important variable for the success of flipped learning. Students who took the flipped classroom with self-regulated learning support performed better than the students who enrolled flipped classrooms without self-regulated learning support.

Flipped Learning and Academic Procrastination

While research points to the negative outcomes of academic procrastination (Akinsola et al., 2007; Kim & Seo, 2015; Solomon & Rothblum, 1984; You, 2015), a few studies examined the influence of specific teaching strategies in preventing procrastinating behaviors (e.g., Svartdal et al., 2020; Zacks & Hen, 2018). Svartdal and colleagues identified factors that may "foster or facilitate procrastination (such as large degree of freedom in the study situation, long deadlines, and temptations and distractions), document their research basis, and provide recommendations for changes in these factors to reduce and prevent procrastination" (Svartdal et al., 2020, p. 1). While some of the recommendations are directly related to the student, some can be used by the instructors of the course. These include designing a detailed syllabus with a timeline, deadlines, course objectives, and resources (Svartdal et al., 2020), having closer sub-goals than distant goals (Steel et al., 2018), breaking assignments into manageable chunks (Bandura, 1997), and designing group work with subtasks (Weber & Hertel, 2007).

A few researches examined the correlation between the flipped learning model and academic procrastination. In a study conducted in 2018, AlJarrah, Thomas, and Shehab examined students' learning behaviors in a flipped class. The researchers used learning analytics data to explore students' behavioral patterns and its relationship with performance. The study found all of the students tend to access course materials late, specifically on the lecture day. The researchers explained this by stating it from students' perspectives. Students might have thought it is better to access the videos right before the class so that they can use their fresh information on their in-class assignments. Thus, the researchers found procrastination behavior in all three performance groups in a flipped classroom. Recently, Abuhmaid and Mohammad (2020) explored

the impact of flipped learning model on academic procrastination behaviors. 80 students were divided into two and one group was taught by traditional model and the other taught by flipped learning model. Flipped learning was found to have no significant impact on academic procrastination. However, the students showed a positive attitude toward learning with the flipped model. The researchers suggested using additional efforts that can help students to tackle their procrastination. As the researchers conclude while the teaching model has an important role in learning, there can be lots of teaching strategies in the flipped learning approach that influence students' procrastination.

Research Goals

As a few studies examined the correlation between the flipped learning model and academic procrastination, based on this gap in the literature, there is a need for additional research where the relationship between pre-service teachers' perceptions of the flipped model and academic procrastination are investigated. To address this need, the aim of this study was to examine the relationship between students' perceptions of the flipped model, use of self-regulated online learning, and academic procrastination. To understand the features of flipped learning that are related to self-regulated skills and academic procrastination, the following research questions were explored: are students' perceptions of a flipped learning predictive of their self-regulated online learning strategy use?, does self-regulated online learning strategies predict academic procrastination?, are students' perceptions of a flipped learning predictive of their academic procrastination?, and has self-regulated online learning a mediating effect between flipped learning and academic procrastination? Based on these research questions and related literature, the following four hypotheses were formed:

Hypothesis 1: perceptions of a flipped approach predict self-regulated online learning strategy use.
Hypothesis 2: self-regulated online learning strategies predict academic procrastination.
Hypothesis 3: perceptions of a flipped approach predict academic procrastination.
Hypothesis 4: self-regulated online learning mediates the relationship between flipped learning and academic procrastination.

Method

Study Group

The study utilized a cross-sectional survey design where three questionnaires focused on flipped learning perceptions, self-regulated online learning, and academic procrastination was distributed to participants at the time of conclusion of the semester. Each questionnaire consists of multiple questions that reflects students' perceptions on these constructs. The participation was entirely voluntary, and all information was gathered via google forms. The sample consisted of 396 pre-service teachers enrolled in a public university in Turkey, 306 females (77.3%) and 90 males (22.7%), aged 17 and 22 years old. The questionnaires were administered at the 14th week of a sixteen-week semester via Google Forms. All questions were marked mandatory in the Google Forms to avoid missing values. The participants were reached through the learning management system and social media platforms. Students from six different education departments were among the attendees.

The classes in this particular study were delivered online by using various communication platforms such as video, forums, chat and asynchronous and synchronous meetings. The instructors and the students of the classes were not physically together. Thus, virtual flipped classroom model was used to deliver the classes. The lecture videos were shared with students and their work collected online via learning management system. The students watched and listened the videos at home and then the interactive part of the classes was performed in virtual synchronized classroom.

Instruments

Three different data collection tools were used in this study: Flipped Learning Scale (FLS), Self-Regulated Online Learning Questionnaire (SOL-Q), and The Scale of Academic Procrastination (SAP).

Flipped Learning Scale (FLS)

The Flipped Learning Scale (FLS) was used to measure students' perceptions of the flipped model. The FLS was developed by Ersoy and colleagues (2022). The scale consists of 22 items and has three-dimensions. These dimensions are; preparation to learn, learning support, motivational interaction. Preparation to learn dimension includes items related to activities that assist students in preparing for class. Learning support dimension refers to both the overall structure and specific characteristics of the flipped design that help students learn, such as offering relevant tools and information, ensuring a learning environment that is student-centered, and the instructor guidance to support students. Motivational interaction dimension contains items on student involvement, motivation, and general satisfaction, as well as items linked to peer and instructor interaction. Within the scope of the scale's validity investigation by Ersoy et al. (2022), for construct validity, exploratory and confirmatory factor analysis were used.

According to the exploratory factor analysis, the FLS had a three-factor structure and the explained total variance was 57.59%, and the factor loads varied between 0.501 and 0.822. Based on the confirmatory factor analysis, the following values were calculated $\chi 2/df = 3.57$, NFI = 0.96, CFI = 0.97, GFI = 0.84, AGFI = 0.80 and RMSEA = 0.08. Internal consistency reliability coefficient for the whole scale was found 0.93. The validity and reliability analysis findings of the FLS undertaken as part of this study's scope are presented in Table 1.

Self-Regulated Online Learning Questionnaire (SOL-Q)

The Self-Regulated Online Learning Questionnaire (SOL-Q) was used to measure students' self-regulated online learning. The SOL-Q was developed by Jansen et al. (2017). The questionnaire adaptation to Turkish has been carried out by Yavuzalp and Özdemir (2020). SOL-Q consists of 36 items and has five dimensions. These dimensions are; "metacognitive skills, help-seeking, time management, persistence, and environmental structuring" (Jansen et al., 2017, p. 13). In this present study, the evaluation was made by taking the total score of SOL-Q, not on the basis of sub-dimensions. The construct validity was examined using exploratory and confirmatory factor analysis techniques by Yavuzalp and Özdemir (2020). Based on the exploratory factor analysis in Yavuzalp and Özdemir's (2020) study, SOL-Q has five-factor structure, the total eigenvalue was 22.34, the total explained variance was 62.06%, and the factor loadings varied between 0.393 and 0.906. Based on the confirmatory factor analysis, the following values were calculated $\chi 2/df = 4.21$, NFI = 0.98, NNFI = 0.98, CFI = 0.99, GFI = 0.82, AGFI = 0.79 and RMSEA = 0.071. The internal consistency reliability coefficient for the whole scale was found as 0.96 by Yavuzalp and Özdemir (2020). The validity and reliability analysis findings of SOL-Q conducted within the scope of this research are presented in Table 1.

Table 1 Results for validity and reliability analysis of measures

Parameter	FLS	SOL-Q	SAP
α	0.94	0.95	0.95
x^2/df	3.12	2.91	2.66
RMSEA	0.07	0.07	0.06
RMSEA for %90 CI	(0.067-0.080)	(0.066-0.073)	(0.061-0.069)
CFI	0.91	0.87	0.90
TLI	0.90	0.86	0.89
IFI	0.92	0.87	0.90

FLS Flipped Learning Scale; *SOL-Q* Self-Regulated Online Learning Questionnaire; *SAP* The Scale of Academic Procrastination

The Scale of Academic Procrastination (SAP)

The Scale of Academic Procrastination (SAP) was used to measure academic procrastination behaviors of students. The SAP was developed by Ocak and Bulut (2015) consisting 38 items with four dimensions. These dimensions are; academic perfectionism, perceived quality of academic duty, negative perception of teachers, and irresponsibility. In this present study, the evaluation was made by taking the total score of SAP, not on the basis of sub-dimensions. Based on the exploratory factor analysis, Ocak and Bulut (2015) found that the factor loads of the SAP varied between 0.516 and 0.815, the total explained variance was 53%, and total eigenvalue was 0.60. The internal consistency reliability coefficient calculated by Ocak and Bulut (2015) was determined as α = 0.94 for the total of the scale. The validity and reliability analysis findings of SAP undertaken as part of this study's scope are included in Table 1.

Validity and Reliability Analysis of the Measurements

The validity and reliability analysis of the measurements were made in this particular study. First level confirmatory factor analysis technique was used to reveal the construct validity of the measurements. In addition, internal consistency coefficient was used in the reliability analysis of the measurements. Based on these analyses, the validity and reliability findings of the measurements are given in Table 1.

Data Analysis

First, the conceptual framework of the hypothetical model was created. Then, the model was tested. The statistical methodology stages of this research are as follows:

Hypothetical Model Development

While creating the hypothetical model, the literature on academic procrastination was searched. Within the scope of this literature, general information and findings about academic procrastination and the factors affecting it were obtained. In addition, studies that reveal the relations between the variables in the hypothetical model have been reached (Cao, 2012; Chen et al., 2014; Choi & Moran, 2009; Ferrari et al., 2005; Klassen & Kuzucu, 2009; Park & Sperling, 2012; Senécal et al., 1995; Shyr & Chen, 2018; Sletten, 2017; Steel, 2007; Tan et al., 2008, 2017). In addition to the literature, twenty students were interviewed in semi-structured interviews about their academic procrastination behaviors to determine the factors affecting it. According Nastası (2015), the sample size in qualitative studies varies according to the data collection method. For example, about five people

are sufficient when collecting data by key information interview. Our research was also in the form of key information interview as a data collection method and was conducted with 20 people. These interview data were transformed into findings through qualitative analysis. As a result, in line with the interview findings and theoretical and empirical studies in the literature, a hypothetical path model was created that shows the relationships between flipped learning (preparation to learn, learning support, motivational interaction), self-regulated online learning, and academic procrastination (Fig. 1).

In this hypothetical path model; the total score of the FLS Preparation to Learn sub-factor constitutes the observed variable "Preparation to Learn", the total score of the FLS Learning Support sub-factor constitutes the observed variable of the "Learning Support", the total score of the FLS Motivational Interaction sub-factor constitutes the observed variable "Motivational Interaction". In addition, the SOL-Q total score constitutes the observed variable of "Self-Regulated Online Learning" and the total score of the SAP constitutes the observed variable of "Academic Procrastination."

Empirical Trial of the Model

The study aimed to reveal the relationships between observed variables of flipped learning (preparation to learn, learning support, motivational interaction), self-regulated online learning, and academic procrastination. For this purpose, path analysis technique was used to uncover if the cause-and-effect relationships between observed variables are significant. The significance of these relationships was evaluated according to standardized path coefficients and goodness of fit indices (Kline, 2019). The following are the goodness of fit indices used in this study: "χ^2, χ^2/df, RMSEA, TLI, IFI, NFI, CFI, GFI and AGFI."

In addition, a mediation test was performed in this study and the mediation method suggested by Baron and Kenny (1986) was used. Finally, whether this mediation was significant or not was evaluated according to the bootstrapping analysis. Within the scope of the bootstrapping analysis, 1000 resampling was created and the bootstrap coefficient and lower–upper limit confidence intervals were calculated. The fact that the obtained confidence intervals do not cover zero proves that the mediation effect is significant (Hayes, 2017).

Results

Preliminary Analysis

Preliminary analysis within the scope of this research was done by evaluating normality and multiple linear connection assumptions. In the assumption of normality, the skewness

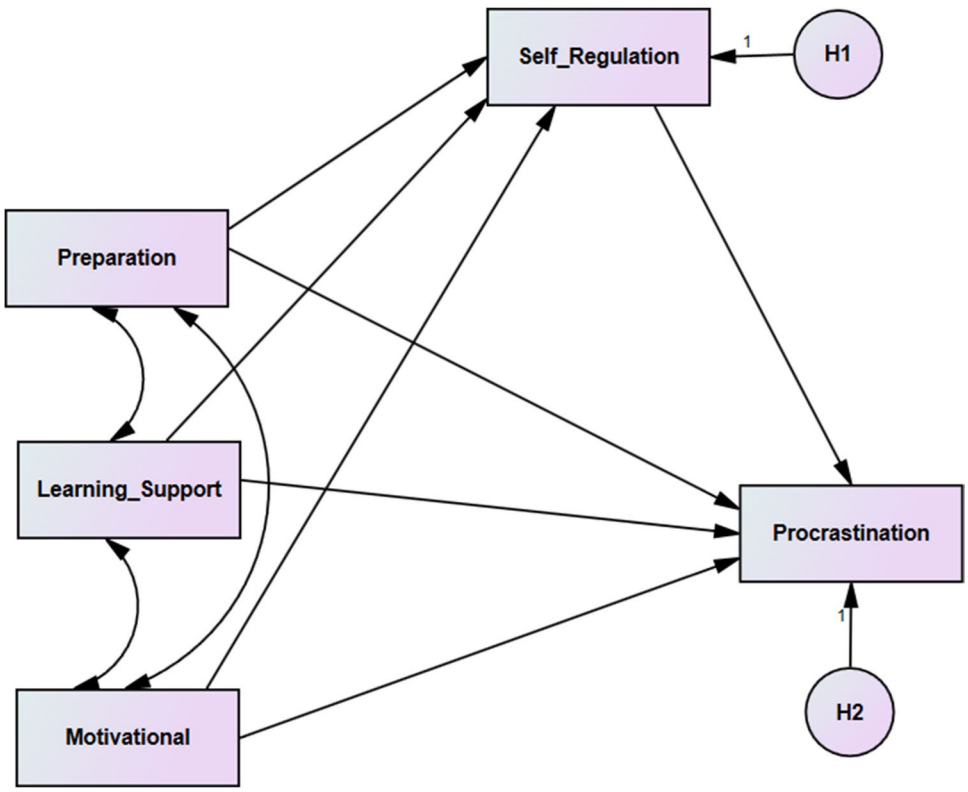

Fig. 1 Hypothetical Model. Note. Preparation to Learn; Learning Support; Motivational Interaction; Self-Regulation Online Learning; Academic Procrastination

and kurtosis coefficients were examined. The skewness values are between -1.19 and 0.12; kurtosis values vary between -0.66 and 2.61. These results are within the normality assumptions suggested by Finney and DiStefano (2006). Finally, the multiple linear connection assumption was evaluated with VIF and tolerance values. VIF values are between 1.06 and 3.26; tolerance values are between 0.30 and 0.93. These reached values do not create a multi-linear connection problem according to Kline (2019). Descriptive statistics and bivariate correlation values are shown in Table 2.

Table 2 Descriptive Statistics and Bivariate Correlations

Variable	1	2	3	4	5
(1) Preparation to Learn	1				
(2) Learning Support	0.73**	1			
(3) Motivational Interaction	0.55**	0.73**	1		
(4) Self-Regulation	0.21**	0.24**	0.17**	1	
(5) Academic Procrastination	-0.11*	-0.10*	-0.04	-0.54**	1
M	20.71	35.53	29.25	164.07	94.31
SD	3.30	5.67	6.35	35.32	27.71
Skewness	-1.19	-0.74	-0.67	-0.35	0.12
Kurtosis	2.61	1.29	0.53	0.25	.-0.66

**$p < 0.01$; *$p < 0.05$; Self-Regulation: Self-Regulation Online Learning

Hypothetical Model Testing

To reveal the relationships between observed variables of flipped learning, self-regulated online learning, and academic procrastination, path analysis technique was used. Based on the path analysis test, the standardized path coefficients of the hypothetical model are shown in Fig. 2. In addition, the path analysis findings of the hypothetical model are given in Table 3.

As seen in the path analysis findings in Table 3, some values of the model were not statistically significant. Accordingly, non-meaningful ways were excluded from the analysis and the analysis was repeated. Goodness of fit index values of the revised model obtained by the new analysis are $\chi^2(1, N = 396) = 0.64$, $p > 0.05$; $\chi^2/df = 0.64$; CFI = 1.00; NFI = 0.99; GFI = 0.99; AGFI = 0.99; RMSEA = 0.00 (for RMSEA %90 CI = 0.000-0.123). Table 4 includes the goodness of fit index values and interpretation of the revised model.

When the goodness of fit index values of the revised model in Table 4 are examined, the model was found to be perfectly compatible with the data. As a result, the standardized path coefficients of the revised model reached by repeating the analysis are shown in Fig. 3 and path analysis findings are given in Table 5.

Standardized path coefficients of the revised full-mediator model are shown in Fig. 3. The findings showed that one

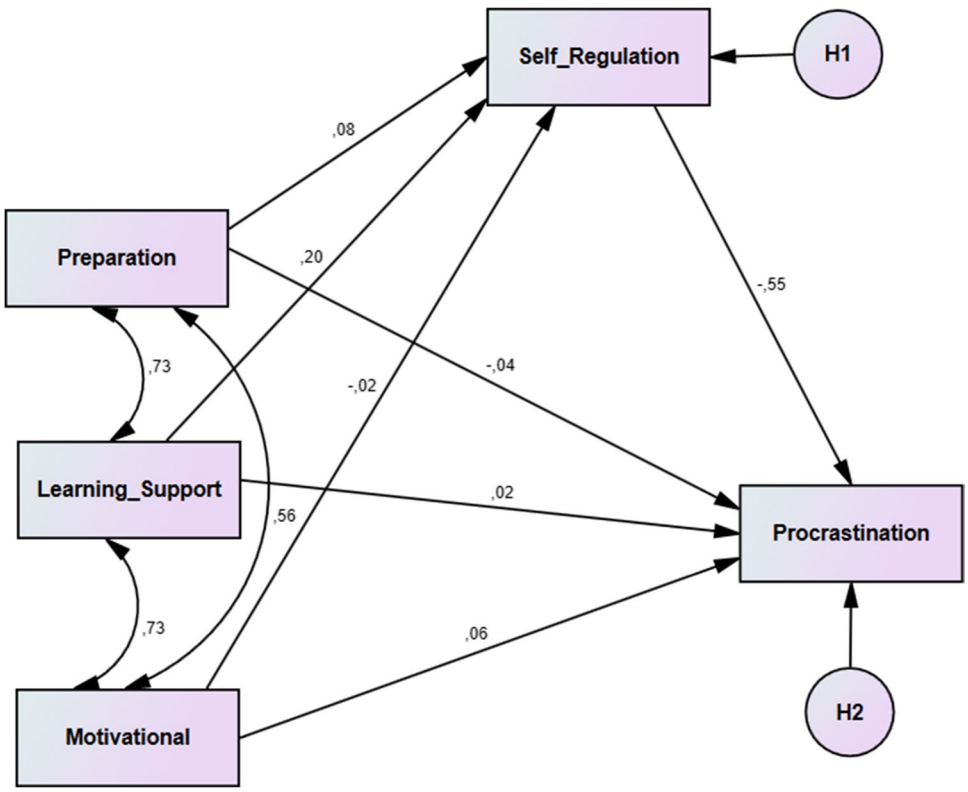

Fig. 2 Standardized path coefficients of the hypothetical model. ***Note*.** ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; Preparation: Preparation to Learn; Motivational: Motivational Interaction; Self-Regulation: Self-Regulation Online Learning; Procrastination: Academic Procrastination

Table 3 Path analysis findings of the hypothetical model

Dependent variable		Independent variable	Estimate	S.E	C.R	P
Self-Regulation	**<—**	**Learning Support**	**1.22**	**0.54**	**2.24**	**0.02**
Self-Regulation	<—	Preparation to Learn	0.89	0.76	1.17	0.24
Self-Regulation	<—	Motivational Interaction	-0.08	0.39	-0.22	0.82
Academic Procrastination	**<—**	**Self-Regulation**	**-0.43**	**0.03**	**-12.56**	***
Academic Procrastination	<—	Motivational Interaction	0.27	0.26	1.00	0.31
Academic Procrastination	<—	Learning Support	0.10	0.37	0.27	0.78
Academic Procrastination	<—	Preparation to Learn	-0.36	0.52	-0.69	0.48

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; Self-Regulation: Self-Regulation Online Learning

Table 4 Goodness of Fit Indices of the Revised Full-Mediator Model

Goodness of Fit Indices	Fit Criteria	Values of the Model	State of the Fit
χ^1	$0 \leq \chi 2 \leq 2df$	0.64	Good fit
p value	$0.05 < p \leq 1.00$	$p = 0.42$	Good fit
χ^2/df	$0 \leq \chi 2/df \leq 2$	0.64	Good fit
RMSEA	$0 \leq RMSEA \leq 0.05$	0.00	Good fit
GFI	$0.95 \leq CFI \leq 1.00$	0.99	Good fit
CFI	$0.97 \leq CFI \leq 1.00$	1.00	Good fit
NFI	$0.95 \leq NFI \leq 1.00$	0.99	Good fit
AGFI	$0.90 \leq AGFI \leq 1.00$	0.99	Good fit

Source: Schermelleh-Engel, Moosbrugger and Müller (2003)

unit increase in learning support increases the self-regulated online learning of students by 0.25 units (t = 5.05; $p < 0.001$). On the other hand, a one-unit increase in self-regulated online learning decreases the academic procrastination of students by 0.54 units (t = -12.80; $p < 0.001$).

Mediation Analysis

For the mediation analysis, Baron and Kenny's (1986) mediation method was used. The steps of the mediation analysis followed in this study are as follows:

1. The independent variable (learning support) has a statistically significant effect on the dependent variable (academic procrastination).

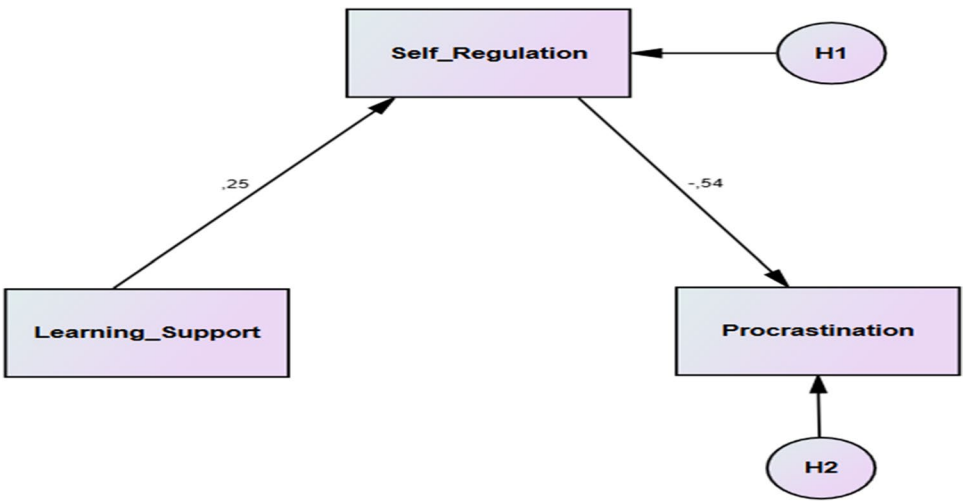

Fig. 3 Standardized Path Coefficients of the Revised Full-Mediator Model. ***Note.*** ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; Self-Regulation: Self-Regulation Online Learning; Procrastination: Academic Procrastination

Table 5 Path Analysis Results of the Revised Full-Mediator Model

Dependent variable		Independent variable	Estimate	S.E	C.R	P
Self-Regulation	<—	Learning Support	1.53	0.30	5.05	***
Academic Procrastination	<—	Self-Regulation	-0.42	0.03	-12.80	***

***$p < 0.001$; Self-Regulation: Self-Regulation Online Learning

2. Independent variable (learning support) has a statistically significant effect on self-regulated online learning.
3. The mediator variable (self-regulated online learning) has a statistically significant effect on the dependent variable (academic procrastination).
4. When the mediator variable (self-regulated online learning) and the independent variable (learning support) are analyzed together, the significant effect of the mediator variable on the dependent variable is expected to continue and the effect of the independent variable (learning support) on the dependent variable (academic procrastination) is expected to decrease. Accordingly, the effect of the independent variable (learning support) on the dependent variable (academic procrastination) is evaluated as its significance (full mediation) or its decrease (partial mediation).

When the study was evaluated according to the steps mentioned above, it was found that the direct effect (β: -0.10; t = -2.00) of the independent variable (learning support) on the dependent variable (academic procrastination) was found to be significant ($p < 0.05$). When self-regulated online learning is included in this evaluation, the effect of the independent variable (learning support) on academic procrastination (β: 04; t = 0.80) becomes insignificant ($p > 0.05$). These findings confirmed the full mediating effect of self-regulated online learning in the relationship between learning support and the dependent variable (academic procrastination).

Significance of Indirect Effects (Bootstrapping Analysis)

A bootstrapping analysis was applied to examine whether the full mediating effect of self-regulated online learning was significant. Analysis findings are included in Table 6.

The results of the bootstrapping analysis (Table 6) confirmed the full mediating effect of self-regulated online learning was significant in the relationship between learning support and academic procrastination (b = -0.13, 95% CI = -0.194, -0.081). In line with all this information, the full mediating role of self-regulated online learning in the relationship between learning support and academic procrastination has been proven.

Discussion and Conclusion

The variety of information resources and ease of access to information, the ownership of multiple technological devices, and advanced learning technologies have transformed teacher-centered classroom environments into online, blended, adaptable and active learning environments, where learners demand greater flexibility (Brown et al., 2020; Cox, 2021). Current trends in learning technologies and education emphasize individualized, differentiated, personalized and continuous learning (Wanner & Palmer, 2015). Flipped learning model, one of the innovative pedagogical approaches with the use of technology to education (Cheng et al., 2019; Sun et al., 2017), has become more popular every day. For a successful learning experience in such a technology-based learning environment, individuals need to take responsibility for their learning (van Alten et al., 2020b). Without appropriate guidance or assistance, students may display little responsibility and low self-regulated behaviors in the process of learning (Sun et al., 2017). Therefore, designing a self-regulated learning environment comes to the fore in increasing the effectiveness of the flipped learning approach and encouraging individuals to learn self-regulated (Azevedo & Hadwin, 2005; Chen et al., 2013; Lai & Hwang, 2016; Sun et al., 2017).

The aim of this study was to examine the relationship between students' perceptions of the flipped model, use of self-regulated online learning, and academic procrastination. According to the findings of the study, while the sub-dimension of flipped learning of 'learning support' positively predicted self-regulated online learning, self-regulated online learning negatively predicted academic procrastination. In addition, self-regulated online learning has a full mediating effect on the relationship between learning support and academic procrastination. According to these findings, when the perceived learning support increases, the self-regulation skills of students increase. In addition, with the increase of students' self-regulation skills academic procrastination decreases.

Learning Support and Self-Regulation

Firstly, the relationship between students' perceptions of flipped learning and self-regulation skills was examined in

Table 6 Bootstrapping Test Results of the Revised Full-Mediator Model

Independent variable		Mediator Variable		Dependent variable	Bootstrap Katsayısı (β)	%95CI (Lower–Upper)
Learning Support	→	Self-Regulation	→	Academic Procrastination	-0.13*	(-0.194, -0.081)

Bootstrap was conducted on 1000 samples (Hayes, 2017). β = Standardized. * $p < 0.05$

Self-Regulation: Self-Regulation Online Learning

the study. A positive significant relationship between learning support, which is a sub-dimension of flipped learning, and students' self-regulation skills was found. In other words, the increase in the perceived learning support in the flipped learning increases the self-regulation skills of the students. This finding supports the results of other similar studies (Chen et al., 2014; Fraga & Harmon, 2014; Lai & Hwang, 2016; Shih & Huang, 2020; Shyr & Chen, 2018; Sletten, 2017; Sun et al., 2017; Tan et al., 2017; Zheng & Zhang, 2020). Students' taking responsibility in planning and monitoring their learning processes is expressed as self-regulated learning (Lai & Hwang, 2016). Particularly in a flipped learning environment, self-regulation is a crucial skill affecting students' out-of-class learning which is a prerequisite for in-class success (Anthonysamy et al., 2020; Cheng et al., 2019; Sletten, 2017). Thus, students need more intensive instructional support to self-regulate their learning (Azevedo & Hadwin, 2005; Chen et al., 2013). Providing learning support in the flipped learning model can be considered under three categories: preparation of necessary materials and activities, preparation of instructions, and providing assistance and feedback.

The first dimension of providing learning support includes providing students with the necessary information about the structure of the course (e.g., course syllabus), providing the necessary course materials (presentation, video, e-book, etc.), and preparing the in-class activities. Having detailed information about the course activities help students to plan their learning process. For example, having a detailed syllabus at the beginning of the semester with a timeline, deadlines, course outcomes, and resources (Svartdal et al., 2020) may prevent academic procrastination and also help students to become more self-directed learners. Particularly, considering learning support in a flipped learning environment, instructional videos shared before the class allow students to learn at their own pace and have the ability to monitor their learning (Bergmann & Sams, 2012; Yu & Wang, 2016). In the flipped learning model, delivering the content with short instructional videos and having weekly assignments that are completed in-class may help students to effectively overcome procrastination.

Another way of providing learning support, along with the preparation of materials and activities, can be the preparation of instructions. Instructions can encourage students to become self-regulated as they become aware of the task, expectations; thus, create a plan to complete the task (Puustinen & Pulkkinen, 2001). The instructions may be related to the tools or materials to be used during the class, as well as assignments or activities (He et al., 2016; Zainuddin & Attaran, 2015). Clearly prepared instructions make the workload manageable for students (Wanner & Palmer, 2015). For example, sharing rubrics with the expectations for an assignment, sharing the standards of quality of the assignment, and allowing students to evaluate their own work if it needs revision or improvement would help learners know the goals of their learning (Reddy & Andrade, 2010). Breaking distant goals into closer sub-goals (Steel et al., 2018) and breaking assignments into manageable chunks (Bandura, 1997) may also increase students' perceived learning support and self-regulation skills, as a result may decrease the academic procrastination behavior.

The third way of providing learning support can be considered as providing assistance and feedback. Communication and support from teachers play a crucial role in self-regulation in the online learning environment (Pelikan et al., 2021). Providing assistance and feedback helps learners evaluate their learning process. Providing feedback to learners about their assignment and facilitating their learning play a significant influence in the success of flipped learning (Akçayır & Akçayır, 2018; Al-Zahrani, 2015; Davies et al., 2013). It encourages learners to think reflectively, creates awareness about what they should do to eliminate learning deficiencies, which also encourages the development of self-regulation skills (Kim et al., 2014; Labuhn et al., 2010).

Self-Regulation and Academic Procrastination

In addition to the relationship between learning support in flipped learning and self-regulation skills, the relationship between students' self-regulation skills and academic procrastination was examined in the study. As a result, a significant negative relationship between self-regulation and academic procrastination was found. The result is consistent with other similar studies which examine the particular relationship (Akinsola et al., 2007; AlJarrah et al., 2018; Klassen et al., 2008; Park & Sperling, 2012; Rakes & Dunn, 2010; Tan et al., 2008).

Self-regulation skills were found as one of the main difficulties' students encounter in a flipped learning environment (Rasheed et al., 2020). Especially out-of-class work in flipped learning requires higher levels of self-regulation skills, as students manage and conduct their work independently and at their own pace (Rasheed et al., 2020; van Alten et al., 2020a). The concept of academic procrastination, which is explained by the lack or absence of self-regulation skills in starting or completing a task (Ferrari, 2001), is generally considered together with the concept of self-regulation in the literature. Janssen (2015) explains the negative correlation between self-regulation and procrastination with the intense mental effort required by self-regulation. An unsuccessful learning approach or inappropriate objective forces students to review their decisions, and the constant repetition of this situation leads to insufficient self-regulation and ultimately postponement (Janssen, 2015). Researchers consider academic procrastination as a state of unmotivation involving more than time-management skills or constant

indolence (Ferrari et al., 2005; Senécal et al., 1995). As the intrinsic motivation and effort regulation for procrastination decreases, procrastination tendency emerges (Rakes & Dunn, 2010).

The Mediating Role of Self-Regulation

As a result of the study, self-regulation skill was found to have a full mediating effect on the relationship between learning support, which is the sub-dimension of flipped learning, and academic procrastination. Thus, self-regulation skills can be considered as a crucial aspect in the relationship between learning support and procrastination. Online learning necessitates a high level of self-control and intrinsic drive, and it might lead to passive procrastination (Pelikan et al., 2021). Accordingly, while the responsibility of learning in a flipped environment belongs to the student, it is the responsibility of the instructors or school to create a motivating and encouraging flexible learning environment (Wanner & Palmer, 2015). Thus, instructors, who use flipped learning approach, should develop effective teaching strategies that would help individuals become more self-directed learners and reduce procrastinating tendencies.

Self-regulation in learning environments, in which there is not face-to-face contacts with an on-site instructor, becomes even more important (Sun et al., 2017). The self-regulated learning model assumes that students can effectively judge if their learning processes are working for them or if changes are required by monitoring and regulating various aspects of their cognition, behavior, and work environment (Pintrich, 2004). Thus, flipped learning model is also be considered as one of these learning environments, where students have more autonomy over their own learning processes. In a flipped learning environment, students need to regulate their learning, especially in extracurricular processes (Cheng et al., 2019; He et al., 2016; Shih & Huang, 2020; van Alten et al., 2019; Tan et al., 2017).

In this study, it was found that the design of the learning environment and the support provided to the learners to construct the knowledge are important factors in self-regulated learning. As Schunk (2001) states, self-regulated behaviors are highly context dependent, and students' self-regulated learning behaviors can change quite rapidly depending on the context of the learning environment. For this reason, it is important to design learning environments in a way that supports self-regulated learning in order to carry out learning processes effectively (Haşlaman, 2016). Lay and Young (2001) lists the principles that should be considered in the organization of learning environments that support self-regulated learning as follows: (1) learners should be guided to create effective learning environments, (2) the teaching process should be organized in a way that facilitates cognitive and metacognitive processes, (3) students should be offered opportunities to monitor themselves using instructional objectives and feedback, (4) students should be offered opportunities to self-assess. Similarly, in the online flipped learning environment that supports self-regulated learning, it should be arranged in a way that enables students to set learning goals, realize their learning according to their own plans, evaluate their learning performance and reflect (Lai & Hwang, 2016). In this research, learning support in the online flipped learning model was discussed in three dimensions: preparation of materials and activities, sharing of instructions about materials and / or assignments, and providing help and feedback mechanisms.

It is expected that the learners' knowledge about the general appearance of the course, what is expected of them and what they need to do to be successful in the course, especially at the beginning of the teaching process, will positively affect their behavior and motivation towards the course. These kinds of instructional approaches would help students, who are in the foresight stage of the self-regulated learning process (Zimmerman, 2002), to examine their learning objectives and come up with particular learning goals and techniques for achieving them.

Research emphasize the importance of quality materials and flipped learning activities that encourage class participation in supporting students' self-regulation skills (Abeysekera & Dawson, 2015; Al-Zahrani, 2015; Bergmann & Sams, 2012; Huang & Chiu, 2015; Tune et al., 2013; Wanner & Palmer, 2015). In the flipped learning model, instructional videos that can regulate learners' academic cognitions, motivations and behaviors and give them the ability to re-watch play an important role (Sletten, 2017). Instead of reading assignments, students learn better through pre-class video resources (Lo & Hew, 2017). However, for students who lack self-regulation competencies, they may not take the time to watch videos and understand (Lai & Hwang, 2016). Basically, the learning content should be covered concisely in a limited time, which is recommended by most to be less than 15 min (Lo & Hew, 2017). Preparation of course materials and activities within the framework of multimedia design principles such as attracting attention, redundancy, temporal proximity and spatial proximity, which will help to reduce extraneous cognitive load, will positively affect the selection, arrangement and integration processes that occur in working memory (Mayer, 2009). Presenting long-term assignments/projects by breaking into small pieces and presenting them in a way that facilitates their management (Kitsantas et al., 2013) would help students to remember previous knowledge and manage cognitive load.

According to the findings, improving students' self-regulation skills would make it easier for students to cope with procrastination. Learners should be provided with support for managing their learning processes, apart from only material and resource support. Providing support to

foster self-regulation, especially during pre-lesson learning activities (e.g., with directions), has proven to be an effective strategy in improving students' self-regulation skills and academic achievement (Cheng et al., 2019; Çakıroğlu & Öztürk, 2021; Lai & Hwang, 2016; Komarraju, 2008; van Alten et al., 2020a). Guidance with specific learning strategies can help students plan and evaluate their learning (Jovanović et al., 2017). Learners can be supported to plan their studies and use time management strategies effectively with the help of applications such as calendars, and they can be supported to monitor themselves at regular intervals with the help of scales such as rubrics (Kitsantas et al., 2013). In addition, enriching the materials with interactive elements (e.g., interactive videos) will encourage learners to examine the materials carefully and help them learn. These strategies may enable the realization of the performance stage of self-regulated learning (Zimmerman, 2002), where students can use effective learning strategies to achieve their objectives.

Another way to provide learning support to learners is to communicate with them and provide them with feedback, which can be done by the tools in the learning management system, as well as other e-mail and social networks. By using communication tools such as e-mail and chat, the implementation of the help-seeking strategy can be facilitated by the learners (Kitsantas et al., 2013). In addition, learners may be asked to prepare portfolios that include their experiences with the course materials and assignments in the learning process. This may support the students, who are in the reflection stage of self-regulated learning, evaluate the relationships between learning outcomes and learning strategies, which enable them to assure the efficacy of learning strategies (Zimmerman, 2002).

In the present study, the other dimensions of the flipped learning model perception scale, which are lesson preparation and motivational interaction factors, did not predict learners' self-regulated learning skills. Regarding the lesson preparation dimension; only sharing course materials in the online flipped learning environment without employing self-regulated learning strategies within a certain planning does not contribute to self-regulated learning. Thus, involving students in an online learning setting does not automatically enable them self-regulate, and that self-regulated learning will not develop spontaneously without purposeful instructional designs (Barnard-Brak et al., 2010).

Motivational interaction dimension contained items on student involvement, motivation, and general satisfaction, as well as items linked to peer and instructor interaction. The fact that motivational interaction does not predict self-regulated learning can be explained by Zimmerman's (1989) social cognitive perspective which diretly influence procrastination. As Zimmerman (1989) discussed there is a causal association between self-regulated learning and personal, behavioral, and environmental factors. Thus, individual and behavioral factors may have a greater effect on self-regulated learning than external factors. Similar to Barnard-Brak and colleagues (2010) finding, personal and behavioral factors may have a greater impact on the development of online learners' self-regulation skills than the environment. By designing a well-structured learning environment and involving students in this kind of a platform, students may need less motivational interaction. However, it is not realistic to count on instructional design alone, as personal and behavioral factors are also important. The learning experience has an interplay among instructional design and the students' experiences with them.

Limitations and Future Directions

The study's conclusions must be interpreted in light of some limitations. First, the study assumes that students answer questions accurately by reporting their self-regulated online learning behaviors, academic procrastination behaviors, and perceptions of the flipped model on the questionnaire. Second, the cross-sectional survey design method also restricts the results as data collection was completed at a single timepoint. Future researchers could adopt a longitudinal survey design technique as it would provide a more reliable data set. Moreover, future research is needed to investigate the effects of flipped learning and self-regulated online learning on the components of metacognitive abilities, time management, environmental factors, and tenacity. Experimental studies can be planned to investigate the impact of self-directed learning support on students' self-regulation behaviors and academic procrastination. In addition, future research can be conducted to determine students' self-regulated online learning behaviors and academic procrastination using students' learning analytics records in learning management systems.

Authors' Contributions On behalf of all authors, the corresponding author states that all the authors have contributed equally. All authors read and approved the final manuscript.

Availability of Data and Materials The datasets generated and/or analysed during the current study are not publicly available due individual privacy but are available from the corresponding author on reasonable request.

Declarations

Competing Interests The authors declare that they have no competing interests.

References

Abuhmaid, A., & Mohammad, A. (2020). The impact of flipped learning on Procrastination and students' attitudes toward it. *Universal Journal of Educational Research, 8*(3), 566–573. https://doi.org/10.13189/ujer.2020.080228

Abeysekera, L., & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. *Higher Education Research & Development, 34*(1), 1–14. https://doi.org/10.1080/07294360.2014.934336

Akçayır, G., & Akçayır, M. (2018). The flipped classroom: A review of its advantages and challenges. *Computers & Education, 126*, 334–345. https://doi.org/10.1016/j.compedu.2018.07.021

Akinsola, M. K., Tella, A., & Tella, A. (2007). Correlates of academic procrastination and mathematics achievement of university undergraduate students. *Eurasia Journal of Mathematics, Science & Technology Education, 3*(4), 363–370. https://doi.org/10.12973/ejmste/75415

AlJarrah, A., Thomas, M. K., & Shehab, M. (2018). Investigating temporal access in a flipped classroom: Procrastination persists. *International Journal of Educational Technology in Higher Education, 15*(1), 1–18. https://doi.org/10.1186/s41239-017-0083-9

Al-Zahrani, A. M. (2015). From passive to active: The impact of the flipped classroom through social learning platforms on higher education students' creative thinking. *British Journal of Educational Technology, 46*(6), 1133–1148. https://doi.org/10.1111/bjet.12353

Anthonysamy, L., Koo, A. C., & Hew, S. H. (2020). Self-Regulated learning strategies and non-academic outcomes in higher education blended learning environments: A one decade review. *Education and Information Technologies, 25*, 3677–3704. https://doi.org/10.1007/s10639-020-10134-2

Azevedo, R., & Hadwin, A. F. (2005). Scaffolding self-regulated learning and metacognition: Implications for the design of computer-based scaffolds. *Instructional Science, 33*, 367–379. https://doi.org/10.1007/s11251-005-1272-9

Bandura, A. (1997). *Self-efficacy: The Exercise of Control*. Macmillan.

Barnard-Brak, L., Paton, V. O., & Lan, W. Y. (2010). Self-regulation across time of first-generation online learners. *ALT-J, 18*(1), 61–70. https://doi.org/10.1080/09687761003657572

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day*. International Society for Technology in Education.

Beswick, G., Rothblum, E. D., & Mann, L. (1988). Psychological antecedents of student procrastination. *Australian Psychologist, 23*(2), 207–217.

Brown, M., McCormack, M., Reeves, J., Brooks, D.C., Grajek, S., & Bali, M., … (2020). *2020 EDUCAUSE Horizon Report, Teaching and Learning Edition.* Retrieved December 15, 2021, from https://www.educause.edu/horizon-report-2020

Cao, L. (2012). Examining 'active'procrastination from a self-regulated learning perspective. *Educational Psychology, 32*(4), 515–545. https://doi.org/10.1080/01443410.2012.663722

Chen, Y., Wang, Y., & Chen, N. S. (2014). Is FLIP enough? Or should we use the FLIPPED model instead? *Computers & Education, 79*, 16–27. https://doi.org/10.1016/j.compedu.2014.07.004

Chen, C. H., Wu, I. C., & Jen, F. L. (2013). Designing online scaffolds for interactive computer simulation. *Interactive Learning Environments, 21*(3), 229–243. https://doi.org/10.1080/10494820.2010.549831

Cheng, L., Ritzhaupt, A. D., & Antonenko, P. (2019). Effects of the flipped classroom instructional strategy on students' learning outcomes: A meta-analysis. *Educational Technology Research and Development, 67*(4), 793–824. https://doi.org/10.1007/s11423-018-9633-7

Choi, J. N., & Moran, S. V. (2009). Why not procrastinate? Development and validation of a new active procrastination scale. *The Journal of Social Psychology, 149*(2), 195–212. https://doi.org/10.3200/SOCP.149.2.195-212

Cox, J. (2021). The higher education environment driving academic library strategy: A political, economic, social and technological (PEST) analysis. *The Journal of Academic Librarianship, 47*(1), 102219. https://doi.org/10.1016/j.acalib.2020.102219

Çakıroğlu, Ü., & Öztürk, M. (2021). Cultivating self-regulated learning in flipped EFL courses: A model for course design. *European Journal of Open, Distance and E-Learning, 23*(2), 20–36. https://doi.org/10.2478/eurodl-2020-0008

Davies, R. S., Dean, D. L., & Ball, N. (2013). Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course. *Educational Technology Research and Development, 61*(4), 563–580. https://doi.org/10.1007/s11423-013-9305-6

Debbağ, M., & Yıldız, S. (2021). Effect of the flipped classroom model on academic achievement and motivation in teacher education. *Education and Information Technologies, 26*, 3057–3076. https://doi.org/10.1007/s10639-020-10395-x

El Miedany Y. (2019) Flipped Learning. In: Rheumatology Teaching. Springer, Cham. https://doi.org/10.1007/978-3-319-98213-7_15

Ersoy, M., Eren, E., Yurtseven-Avcı, Z., & Kandemir, C.M. (2022). *Development of perception scale for flipped learning model*. [Unpublished manuscript]. Computer Education and Instructional Technologies Department, Eskisehir Osmangazi University.

Ferrari, J. R. (2001). Procrastination as self-regulation failure of performance: Effects of cognitive load, self-awareness, and time limits on 'working best under pressure.' *European Journal of Personality, 15*, 391–406. https://doi.org/10.1002/per.413

Ferrari, J. R., O'Callaghan, J., & Newbegin, I. (2005). Prevalence of procrastination in the United States, United Kingdom, and Australia: Arousal and avoidance delays among adults. *North American Journal of Psychology, 7*, 1–6.

Ferrari, J. R., Johnson, J., & Snyder, C. R. (1995). *Procrastination and task avoidance theory, research, and treatment*. Plenum Press.

Finney, S. J., & DiStefano, C. (2006). Non-normal and categorical data in structural equation modeling. *Structural Equation Modeling: A Second Course, 10*(6), 269–314.

Fraga, L. M., & Harmon, J. (2014). The flipped classroom model of learning in higher education: An investigation of preservice teachers' perspectives and achievement. *Journal of Digital Learning in Teacher Education, 31*(1), 18–27. https://doi.org/10.1080/21532974.2014.967420

Goroshit, M., & Hen, M. (2021). Academic procrastination and academic performance: Do learning disabilities matter? *Current Psychology, 40*(5), 2490–2498. https://doi.org/10.1007/s12144-019-00183-3

Hannafin, M. J., & Land, S. (1997). The foundations and assumptions of technology-enhanced, student-centered learning environments. *Instructional Science, 25*, 167–202. https://doi.org/10.1023/A:1002997414652

Haşlaman, T. (2016). Özdüzenleyici öğrenmeyi destekleyen çevrimiçi öğrenme ortamları. *Eğitim Teknolojileri Okumaları*, 491–514.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford publications.

He, W., Holton, A., Farkas, G., & Warschauer, M. (2016). The effects of flipped instruction on out-of-class study time, exam performance, and student perceptions. *Learning and Instruction, 45*, 61–71. https://doi.org/10.1016/j.learninstruc.2016.07.001

Huang, Y. M., & Chiu, P. S. (2015). The effectiveness of the meaningful learning-based evaluation for different achieving students in a ubiquitous learning context. *Computers & Education, 87*, 243–253. https://doi.org/10.1016/j.compedu.2015.06.009

Hwang, G. J., Lai, C. L., & Wang, S. Y. (2015). Seamless flipped learning: A mobile technology-enhanced flipped classroom with

effective learning strategies. *Journal of Computers in Education, 2*(4), 449–473. https://doi.org/10.1007/s40692-015-0043-0

Jansen, R. S., Van Leeuwen, A., Janssen, J., Kester, L., & Kalz, M. (2017). Validation of the self-regulated online learning questionnaire. *Journal of Computing in Higher Education, 29*(1), 6–27. https://doi.org/10.1007/s12528-016-9125-x

Janssen, J. (2015). Academic procrastination: prevalence among high school and undergraduate student and relationship to academic achievement (doctoral thesis). Georgia State University.

Jovanović, J., Gašević, D., Dawson, S., Pardo, A., & Mirriahi, N. (2017). Learning analytics to unveil learning strategies in a flipped classroom. *Internet and Higher Education, 33*, 74–85. https://doi.org/10.1016/j.iheduc.2017.02.001

Kim, M. K., Kim, S. M., Khera, O., & Getman, J. (2014). The experience of three flipped classrooms in an urban university: An exploration of design principles. *The Internet and Higher Education, 22*, 37–50. https://doi.org/10.1016/j.iheduc.2014.04.003

Kim, K. R., & Seo, E. H. (2015). The relationship between procrastination and academic performance: A meta-analysis. *Personality and Individual Differences, 82*, 26–33. https://doi.org/10.1016/j.paid.2015.02.038

Kitsantas, A., Dabbagh, N., Huie, F. C., & Dass, S. (2013). Learning technologies and self-regulated learning: Implications for practice. In H. Bembenutty, T. J. Cleary, & A. Kitsantas (Eds.), *Application of Self-Regulated Learning Across Diverse Disciplines: A Tribute to Barry J. Zimmerman* (pp. 325–354). Information Age Publishing.

Klassen, R. M., Krawchuk, L. L., & Rajani, S. (2008). Academic procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels of procrastination. *Contemporary Educational Psychology, 33*(4), 915–931. https://doi.org/10.1016/j.cedpsych.2007.07.001

Klassen, R. M., & Kuzucu, E. (2009). Academic procrastination and motivation of adolescents in Turkey. *Educational Psychology, 29*(1), 69–81. https://doi.org/10.1080/01443410802478622

Kline, R. B. (2019). *Principles and practice of structural equation modeling*. Guilford publications.

Komarraju, M. (2008). Relationships between perceived value of instructional techniques and academic motivation. *Journal of Instructional Psychology, 35*(1), 70–82.

Labuhn, A. S., Zimmerman, B. J., & Hasselhorn, M. (2010). Enhancing students' self-regulation and mathematics performance: The influence of feedback and self-evaluative standards. *Metacognition and Learning, 5*(2), 173–194. https://doi.org/10.1007/s11409-010-9056-2

Lai, C. L., & Hwang, G. J. (2016). A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course. *Computers & Education, 100*, 126–140. https://doi.org/10.1016/j.compedu.2016.05.006

Lee, Y., & Martin, K. I. (2019). The flipped classroom in ESL teacher education: An example from CALL. *Education and Information Technologies, 25*, 2605–2633. https://doi.org/10.1007/s10639-019-10082-6

Lay, K., & Young, D. B. (2001). Instructional Principals for Self-regulation. *Educational Technology Research and Development, 49*(2), 93–103. https://doi.org/10.1007/BF02504930

Lo, C. K., & Hew, K. F. (2017). Using first principles of instruction to design secondary school mathematics flipped classroom: The findings of two exploratory studies. *Educational Technology & Society, 20*, 222–236.

Mayer, R. E. (2009). *Multimedia learning* (2nd edition). Cambridge University Press.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. U.S. Department of Education.

Nastası, B. (2015). Study notes: Qualitative research: Sampling ve sample size considerations. Retrieved March 20, 2021, from https://www.studypool.com/documents/90822/sampling-sample-size-considerations-adapted

Nikitova, I., Kutova, S., Shvets, T., Pasichnyk, O., & Matsko, V. (2020). "Flipped learning" methodology in professional training of future language teachers. *European Journal of Educational Research, 9*(1), 19–31. https://doi.org/10.12973/eu-jer.9.1.19

Ocak, G., & Bulut, R. (2015). Akademik erteleme davranışı ölçeği: Geçerlilik ve güvenirlilik çalışması [The Scale of Academic Procrastination: Validity and Reliability Study]. *International Journal of Social Sciences and Education Research, 1*(2), 709–726.

Paris, S. G., & Winograd, P. (2003). *The Role of Self-Regulated Learning in Contextual Teaching: Principals and Practices for Teacher Preparation*. Washington, D. C., U.S. Department of Education.

Park, S. W., & Sperling, R. A. (2012). Academic procrastinators and their self-regulation. *Psychology, 3*(1), 12–23. https://doi.org/10.4236/psych.2012.31003

Pelikan, E. R., Lüftenegger, M., Holzer, J., Korlat, S., Spiel, C., & Schober, B. (2021). Learning during COVID-19: The role of self-regulated learning, motivation, and procrastination for perceived competence. *Zeitschrift Für Erziehungswissenschaft, 24*(2), 393–418. https://doi.org/10.1007/s11618-021-01002-x

Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review, 16*(4), 385–407. https://doi.org/10.1007/s10648-004-0006-x

Puustinen, M., & Pulkkinen, L. (2001). Models of self-regulated learning: A review. *Scandinavian Journal of Educational Research, 45*(3), 269–286. https://doi.org/10.1080/00313830120074206

Rabin, L. A., Fogel, J., & Nutter-Upham, K. E. (2011). Academic procrastination in college students: The role of self-reported executive function. *Journal of Clinical and Experimental Neuropsychology, 33*(3), 344–357. https://doi.org/10.1080/13803395.2010.518597

Rakes, G. C., & Dunn, K. E. (2010). The impact of online graduate students' motivation and self-regulation on academic procrastination. *Journal of Interactive Online Learning, 9*(1), 78–93.

Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education, 144*, 103701. https://doi.org/10.1016/j.compedu.2019.103701

Reddy, Y. M., & Andrade, H. (2010). A review of rubric use in higher education. *Assessment & Evaluation in Higher Education, 35*(4), 435–448. https://doi.org/10.1080/02602930902862859

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online, 8*(2), 23–74.

Schunk, D. H. (2001). Social cognitive theory and self-regulated learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (pp. 125–151). Lawrence Erlbaum Associates Publishers.

Senécal, C., Koestner, R., & Vallerand, R. J. (1995). Self-regulation and academic procrastination. *Journal of Social Psychology, 135*, 607–619.

Shih, H. C. J., & Huang, S. H. C. (2020). College students' metacognitive strategy use in an EFL flipped classroom. *Computer Assisted Language Learning, 33*(7), 755–784. https://doi.org/10.1080/09588221.2019.1590420

Shyr, W. J., & Chen, C. H. (2018). Designing a technology-enhanced flipped learning system to facilitate students' self-regulation and performance. *Journal of Computer Assisted Learning, 34*(1), 53–62. https://doi.org/10.1111/jcal.12213

Sletten, S. R. (2017). Investigating flipped learning: Student self-regulated learning, perceptions, and achievement in an introductory

biology course. *Journal of Science Education and Technology, 26*(3), 347–358. https://doi.org/10.1007/s10956-016-9683-8

Solomon, L. J., & Rothblum, E. D. (1984). Academic procrastination: Frequency and cognitive-behavioral correlates. *Journal of Counseling Psychology, 31*(4), 503–509. https://doi.org/10.1037/0022-0167.31.4.503

Steel, P. (2007). The Nature of procrastination: A Meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin, 133*(1), 65–94. https://doi.org/10.1037/0033-2909.133.1.65

Steel, P., & Klingsieck, K. B. (2016). Academic procrastination: Psychological antecedents revisited. *Australian Psychologist, 51*(1), 36–46. https://doi.org/10.1111/ap.12173

Steel, P., Svartdal, F., Thundiyil, T., & Brothen, T. (2018). Examining procrastination across multiple goal stages: A longitudinal study of temporal motivation theory. *Frontiers in Psychology, 9*, 327. https://doi.org/10.3389/fpsyg.2018.00327

Strelan, P., Osborn, A., & Palmer, E. (2020). The flipped classroom: A meta-analysis of effects on student performance across disciplines and education levels. *Educational Research Review, 30*, 100314. https://doi.org/10.1016/j.edurev.2020.100314

Sun, J. C. Y., Wu, Y. T., & Lee, W. I. (2017). The effect of the flipped classroom approach to OpenCourseWare instruction on students' self-regulation. *British Journal of Educational Technology, 48*(3), 713–729. https://doi.org/10.1111/bjet.12444

Svartdal, F., Dahl, T. I., Gamst-Klaussen, T., Koppenborg, M., & Klingsieck, K. B. (2020). How study environments foster academic procrastination: Overview and recommendations. *Frontiers in Psychology, 11*, 540910. https://doi.org/10.3389/fpsyg.2020.540910

Tan, C. X., Ang, R. P., Klassen, R. M., Yeo, L. S., Wong, I. Y. F., Huan, V. S., & Chong, W. F. (2008). Correlates of academic procrastination and students' grade goals. *Current Psychology, 27*(2), 1046–1310. https://doi.org/10.1007/s12144-008-9028-8

Tan, C., Yue, W. G., & Fu, Y. (2017). Effectiveness of flipped classrooms in nursing education: Systematic review and meta-analysis. *Chinese Nursing Research, 4*(4), 192–200. https://doi.org/10.1016/j.cnre.2017.10.006

Thai, N. T. T., De Wever, B., & Valcke, M. (2017). The impact of a flipped classroom design on learning performance in higher education: Looking for the best "blend" of lectures and guiding questions with feedback. *Computers & Education, 107*, 113–126. https://doi.org/10.1016/j.compedu.2017.01.0103

Tune, J. D., Sturek, M., & Basile, D. P. (2013). Flipped classroom model improves graduate student performance in cardiovascular, respiratory, and renal physiology. *Advances in Physiology Education, 37*(4), 316–320. https://doi.org/10.1152/advan.00091.2013

van Alten, D. C. D., Phielix, C., Janssen, J., & Kester, L. (2019). Effects of flipping the classroom on learning outcomes and satisfaction: A meta-analysis. *Educational Research Review, 28*, 1–18. https://doi.org/10.1016/j.edurev.2019.05.003

van Alten, D. C. D., Phielix, C., Janssen, J., & Kester, L. (2020a). Effects of self-regulated learning prompts in a flipped history classroom. *Computers in Human Behavior, 108*, 106318. https://doi.org/10.1016/j.chb.2020.106318

van Alten, D. C., Phielix, C., Janssen, J., & Kester, L. (2020b). Self-regulated learning support in flipped learning videos enhances learning outcomes. *Computers & Education, 158*, 104000. https://doi.org/10.1016/j.compedu.2020.104000

Wanner, T., & Palmer, E. (2015). Personalising learning: Exploring student and teacher perceptions about flexible learning and assessment in a flipped university course. *Computers & Education, 88*, 354–369. https://doi.org/10.1016/j.compedu.2015.07.008

Weber, B., & Hertel, G. (2007). Motivation gains of inferior group members: A meta-analytical review. *Journal of Personality and Social Psychology, 93*, 973–993. https://doi.org/10.1037/0022-3514.93.6.973

Wesley, J. C. (1994). Effects of ability, high school achievement, and procrastinatory behavior on college performance. *Educational and Psychological Measurement, 54*(2), 404–408. https://doi.org/10.1177/0013164494054002014

Wolters, C. A., Won, S., & Hussain, M. (2017). Examining the relations of time management and procrastination within a model of self-regulated learning. *Metacognition and Learning, 12*(3), 381–399. https://doi.org/10.1007/s11409-017-9174-1

Yavuzalp, N., & Özdemir, Y. (2020). Öz-Düzenlemeli Çevrimiçi Öğrenme Ölçeğini Türkçe'ye Uyarlama Çalışması [Adaptation of the Self-Regulated Online Learning Questionnaire (SOL-Q)]. *Journal of Higher Education/yükseköğretim Dergisi, 10*(3), 269–278. https://doi.org/10.2399/yod.19.512415

You, J. W. (2015). Examining the effect of academic procrastination on achievement using LMS data in e-learning. *Educational Technology & Society, 18*(3), 64–74. https://www.jstor.org/stable/pdf/jeductechsoci.18.3.64.pdf

Yu, Z., & Wang, G. (2016). Academic achievements and satisfaction of the clicker-aided flipped business English writing class. *Educational Technology & Society, 19*(2), 298–312.

Yurtseven Avci, Z., Ergulec, F., Misirli, O., & Sural, I. (2021). Flipped learning in information technology courses: benefits and challenges. *Journal of Further and Higher Education*, 1-15. https://doi.org/10.1080/0309877X.2021.1986623

Zacks, S., & Hen, M. (2018). Academic interventions for academic procrastination: A review of the literature. *Journal of Prevention & Intervention in the Community, 46*(2), 117–130. https://doi.org/10.1080/10852352.2016.1198154

Zainuddin, Z., & Attaran, M. (2015). Malaysian students' perceptions of flipped classroom: A case study. *Innovations in Education and Teaching International*, 1-11. https://doi.org/10.1080/14703297.2015.1102079

Zheng, B., & Zhang, Y. (2020). Self-regulated learning: The effect on medical student learning outcomes in a flipped classroom environment. *BMC Medical Education, 20*, 1–7. https://doi.org/10.1186/s12909-020-02023-6

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81*(3), 329–339. https://doi.org/10.1037/0022-0663.81.3.329

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2