Structural Equation Modelling Analysis of the Relationships Among University Students' Online Self-Regulation Skills, Satisfaction and Perceived Learning

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Teaching-learning activities carried out face-to-face in physical classrooms in higher education have been moved to the online environment due to the Covid-19 pandemic obligation. It is obvious that students' learning experiences and perceptions need to be researched empirically in order to optimize higher education strategies that have been moved to the online environment. Data were collected from 451 students studying in different departments in two education faculties in order to reveal the relationship between their satisfaction in the e-learning environment and their perceived learning experiences and using online self-regulation strategies based on the autonomous movement of students in the online environment. Descriptive analyses and path analysis were applied in order to answer the proposed research questions. As a result of this structural equation modeling, a relationship was determined between online self-regulation skills, goal setting and help seeking sub-factors, and satisfaction, goal setting, task strategies and self-evaluation sub-factors and perceived learning. In addition, a direct relationship was determined between satisfaction and perceived learning, supporting previous studies. With this research, it is thought that higher education institutions, administrators and instructors carrying out online teaching and learning activities will provide new perspectives on satisfaction and perceived learning outcomes when students' self-control skills are supported.

Introduction

Innovations in information and communication technology and the fast conversion in digitalization affect all aspects of our business life and have led to very important development processes, especially in the education field. With the effects of technology on education, the advent of e-learning or online education has affected teaching and learning approaches. Within the scope of the Emergency Action Plan (EAP), which was prepared after epidemics, natural disasters, and fires, especially for the Covid-19 process that every country is coming up against today, the necessity of the distance education process has been seen as a priority. This situation also provided great opportunities for the discovery and understanding of the possibilities of distance education (König, Jäger-Biela & Glutsch, 2020). The use of

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online teaching and learning environments by teachers, students, and institutions in normal or emergency situations has brought along an educational strategy, innovation experience, as well as being able to adapt to new and different scenarios (Bao 2020; Flores & Gago 2020; Quezada, Talbot & Quezada-Parker 2020). Such periods of change require understanding of what works and what doesn't, what features the online applications should have, what has been experienced during the process, and the results obtained based on evidence (Carillo & Flores, 2020).

The student is at the center of teaching and learning activities. In online environments, different activities need to be prepared in order to make students ready for the necessary situation, involve them in the process, organize and complete the process in order to use their high level of independence (autonomous) and self-management skills (Martin, Stamper & Flowers, 2020).

As in the whole world and in our country, education has been started both synchronously and asynchronously through electronic learning or online learning at every grade of education system that teaching and learning activities are carried out, especially in higher education as well. All lectures and students were caught off guard and had to adapt to this model. Under these circumstances, an extensive success should not be expected in a short time. However, developing digital skills for the instructors and students who will use this system in the future will be an example of several implications for developing strategies for successful online teaching and learning (Burd & Bunchanan, 2004; Luka 2020; Pasch & Stewart, 2020).

It is evident that the quality of the platform used in the education process will contribute positively to the online performance of the students. The quality of the data presented in the online learning process, the quality of the learning unit, system, services will contribute positively to increasing user satisfaction, effective use of the online education system and acceptance of opportunities as well as its compatibility with students' needs and expectations (Aldholay, Abdullah, Isaac & Mutahaar, 2019; Hofmeister & Pilz, 2020).

The researches on the use of skills during online learning like self-management (Beach, 2017; Karataş & Arpaci, 2021; Zhu, Bonk & Doo, 2020), self-regulation (İnan, Yükseltürk, Kuruçay & Flores, 2016; Cho & Kim, 2013; Landrum, 2020), self-efficacy (Bradley, Browne & Kelley, 2017; Wilde & Hsu, 2019; Zhu, 2019) have gradually increased, because it is evident that the use of these skills during face-to-face learning environments and online learning environments will differ (Horzum, 2007). The reason for this could be that students are more autonomous in the online learning environment and online learning process (Artino & Stephens, 2009; Barnard, Lan, To, Paton, & Lai, 2009). Although the interaction tools are made available and used in online environments, the student is on his/her own within the system and acts accordingly.

Online environments are different from face-to-face environments, and using the strategies and theories used in face-to-face environments is not appropriate in this process (Barnard, et al., 2009).). It is necessary to develop theories and strategies that are appropriate for these environments in order to make the online learning environments more effective (Horzum, 2007). It is obvious that the use of appropriate theories and strategies for these learning environments are necessary to increase the effectiveness and permanence of learning in online environments. Self-regulation plays an important role in learning outcomes in online environments where students are autonomous due to their structure and conditions (Barnard, et al., 2009). The positive effects of self-regulation on students' academic performances in

face-to-face environments are evident (Çalışkan & Selçuk, 2010; Matthews, Ponitz & Morrison, 2009). The same effect is thought to be in the online environment.

Several studies have been conducted to determine the relationship between use their self-regulation skills of the students using online learning environments and motivation (Zheng, Liang, Li & Tsai, 2018), academic achievement (Vanslambroucka, Zhua, Pynooa, Lombaertsa & Tondeurb 2019), self-efficacy (Su, Zheng, Liang & Tsai, 2018) and satisfaction (Teo & Wong, 2013). From this point of view, the literature needs more hierarchical empirical evidences to reveal the effects of using self-control in the online learning environment on perceived success and satisfaction in the e-learning environment. In this context, this study was conducted to suggest and examine a comprehensive model for university students' online self-regulation skills, their satisfaction in this environment and their perceived learning in an online learning environment.

Self-Regulation and Online Self-Regulation

Self-regulation aims to set achievable goals and develop strategies to reach these goals, to monitor and self-evaluate while reaching the goals that are expected to reach, to make adjustments at the stages where necessary, that is, to be able adapt to the environment (Niemi, Nevgi & Virtanen, 2003; Pintrich, 2000; Zimmerman & Kitsantas, 2014; Zimmerman & Risemberg, 1997). The first definition of self-regulation was made in 1986 at a symposium in the American Educational Research Association (Zimmerman, 1986). Later, different definitions were made based on different fields of expertise. Different theories are seen to have different approaches regarding self-regulation (Lai & Gu, 2011; Ranalli, 2012). The common points of the concept of self-regulation, which is explained theoretically and empirically, are that it is a multidimensional and high-level skill with its metacognitive, cognitive, affective, and social behavioral aspects (Teng & Zhang, 2016). According to Zimmerman (1994), self-regulation is explained as an individual's effort to maintain it by taking responsibility for his own learning. This effort is not only realized behaviorally, but also metacognitively and motivationally.

Pintrich (2000) thinks the learner cognition with self-regulation is a mediating factor between the learning environment the learner is in and the achievement of the learner. In addition, self-regulated learning is among the important issues that educational psychology focuses on (Zimmerman & Schunk, 2011).

When the differences between the face-to-face learning environment and the online environment are into account, students' online self-regulation becomes a structure that includes different variables (Zheng, et al., 2018). According to the Transactional Distance Theory, students are known to exhibit more autonomous and self-regulating positive behaviors in online environments (Moore, 1997).

According to the social cognitive theory, personal and environmental factors contribute to the behavior of the individual (Bandura, 1986). Face-to-face learning consists of physical and social environments. Cognitive and environmental factors affect student behavior and performance (Wua, Tennyson & Hsia, 2010). Five more dimensions - technology, content, interaction, learner control and learning model- are added to the online environment expanding the definition of face-to-face learning environment (Piccoli, Ahmad & Ives, 2001). The student becomes autonomous and faces more components in the online environment.

Self-regulation is related to students' designing their own learning process, setting achievable

goals, choosing learning methods according to their individual characteristics, making interventions where necessary by following their own learning process, and internal motivation dynamics (Üredi & Üredi, 2007)). It is certain that this differs from a student to another. There may be students with low internal motivation dynamics. External motivation dynamics can be used to increase internal motivation. To achieve this, it is possible to make the environments that can be effective on the learning process of the student and evaluate his own learning in the online environment available. In these environments, students can make their own plans, give feedback, and make corrections on their own (Üredi & Üredi, 2007). Online learning environments are systems that have such features. In online environments, students can activate both internal and external motivation dynamics in a positive way by using their self-regulation skills. Some researchers have stated that students' online self-regulation is closely linked to learning outcomes in electronic learning environments and helps them organize and integrate information into appropriate mental models while learning in online environments (Azevedo & Cromley, 2004; Winters, Greene & Costich, 2008). In online or blended environments, students' self-regulation skills play an essential role in their effective learning (Lee & Tsai, 2011; Strømsø & Bråten, 2010).

The importance of using self-regulation skills of students in online environments is gradually increasing. Many researchers are investigating the relationships between different variables and self-regulation skills in the online environment (Chiu, Liang, & Tsai, 2013; Strømsø & Bråten, 2010). In this sense, the important issues that need to be emphasized are what learning skills the students prefer to use as self-regulating ones, and how these skills affected students during online learning process.

Satisfaction in Online Environment

Satisfaction is explained as individuals' perception to what content their needs, goals, and aspirations are fully met. In addition, in the context of student satisfaction can be explained as "the realization of students' expectations and wishes" (DeShields, Kara & Kaynak, 2005, p. 133)

Satisfaction in online environment is one of the five elements of online learning, reflecting the student's perception of their learning experience (Moore, 2005). Student satisfaction in the online environment appears as an indicator of student success and an instructional outcome (Virtanen, Kääriäinen, Liikanen & Haavisto, 2017). Karataş (2005) listed some of these factors in the online and face-to-face classrooms as interaction, feedback, behaviors of the student and teacher, activities, materials, online discussions, teaching and technical support, technological features, learning styles of students, online discussions, self-efficacy, knowledge and skills, and demographics. In addition to these, the concepts of support types, student autonomy, self-efficacy and self-control were mentioned as factors affecting student satisfaction in the online environment (Artino 2007; Ejubovi & Puska 2019; Kuo 2010; Kuo, et al., 2014).

The more experience students have in the online environment, the greater is their satisfaction. Satisfaction in the online environment is also affected by Zimmerman's self-regulation learning based on the student factor (Landrum, 2020). According to Bandura's (1986) Social Cognitive Theory, self-regulation consists of three stages - self-observation, self-evaluation, and self-reaction. Schunk (2012) students monitor their performance in self-observation; compare their performance with current standards in self-evaluation; show feelings of self-efficacy (perceived abilities) and emotional reactions (satisfaction) towards their performance

in self-reaction.

It also focuses on evaluating the effect of learning strategies such as students' self-regulation on both satisfaction and usefulness (Landrum, 2020). Although there are positive and negative aspects of the studies on the use of online environments, it remains an important issue to determine the critical factors related to the effective use of these environments and to lead them to the better.

Perceived Learning

Perceived learning is the whole of students' beliefs and feelings about current learning. In other words, it can be explained as a retrospective evaluation of students' learning experiences (Caspi & Blau, 2008; Yunusa & Umar, 2020). In another definition, it is the change in students' perceptions of their knowledge and skill level before and after the learning experience (Alavi, Marakas & Youngjin, 2002). Perceived learning has an effect on improving improve the quality of the online learning environment and students' learning experiences (Swan, Shea, Fredericksen, Pickett, Pelz & Maher, 2000). It is stated that students' learning outcomes can be assessed either by academic performance criteria such as grades and crediting, or by perceived learning reported by the student himself at the end of a teaching activity (Eom & Ashill, 2016).

Pérez-Pérez et al. (2019) stated that the satisfaction of students in the online environment is a predictive factor related to perceived learning. Various factors affecting perceived learning are available in the online environment and some of them are explained as interaction (Gray & DiLoreto, 2016; Kang & Im, 2013), satisfaction (Alqurashi, 2018; Baber, 2020), motivation (Eom & Ashill, 2016; Horzum, Kaymak). & Güngören, 2015), social presence (Andel, Vreede, Spector, Padmanabhan, Singh & Vreede, 2020; Yaman & Muhlis, 2020).

Proposed Model

According to the proposed model, the basic structure was created within the framework of the online learning environment. Online learning has been used to mean an individual's access to learning experiences using internet-based technologies. The structural model in Figure-1 has been designed by taking the motivation and behavior of the students into account in online environments to examine students' knowledge. The design of the model is obtained by literature review considering two different theories. The first is related to the relationship between perceived learning and satisfaction in the online environment and the second is related to the effect of online self-regulation on online satisfaction and perceived learning in the online environment.

The proposed model has three main hypotheses. The first one is the expectation that students with developed online self-regulation skills will have a high level of satisfaction in the online environment. There are two reasons to support this expectation: (1) it can be said that online self-regulation skills mediate students' online satisfaction according to studies carried out (Wang, Shannon & Ross, 2013; Li, 2019), and (2) self-regulation has three stages as self-observation, self-evaluation and self-reaction according to the Bandura's (1986) social cognitive theory, and is related to self-reaction, which is one of the self-regulation skill stages, on online environment satisfaction. It affects the student's emotional reactions; that is, satisfaction against self-efficacy feelings and performances with self-reaction (Schunk, 2012).

The second hypothesis is the expectation that students who use online self-assessment skills

will have greater awareness of their perceived learning levels. Therefore, it can be expected that the achievements obtained in the online environment will evaluate themselves independently of the measurement and evaluation tools offered in the system, because while learning generally measured by referring to academic performance and academic achievement levels, the perceived learning is the self-assessment of students with a holistic approach to the learning process with the way they perceive themselves (Porat, Blau & Barak, 2018).

The third hypothesis is that students' online environment satisfaction levels will positively affect their perceived learning levels. We can support this hypothesis in two ways. The first is the expectation to be related to students' evaluation of how they perceive their learning by improving their learning experience in the online environment (Baturay; 2011; Kuo, et al., 2014). The second is seeking ways to uncover opportunities to be able to build their own learning experiences online (Alqurashi, 2019).
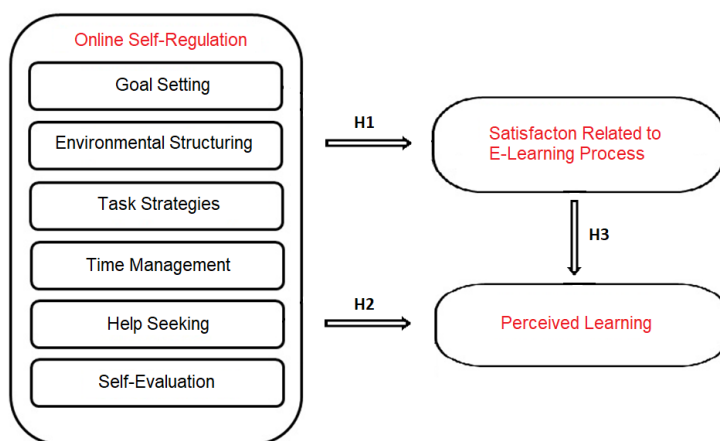

Figure 1. Proposed research model

There are two limitations in the suggested model of the study, namely the theoretical framework of the study, in terms of online satisfaction and the use of online self-regulation skills. The first limitation relates to satisfaction in online environment. Technical competencies, teaching process, technical and pedagogical competencies of instructors, teaching content, attitude towards online learning approach, interaction levels and the usefulness of the learning management system is known to affect students' online satisfaction (Ilgaz & Gülbahar, 2015). However, the technical competence of the student, the technical and pedagogical competencies of the instructors, and the attitude towards the online learning approach were excluded from the study regarding the satisfaction of the students in the online environment in this study.

The second limitation is related to online self-regulation. Although there are different definitions of self-regulation according to various fields, the common denominator of these definitions is the concepts of metacognitive, cognitive, affective, and social behavior (Teng & Zhang, 2016). In this study, as Pintrich (2000) states, the learning environment of the student and the effect of success on his/her cognitive aspect will be researched.

The relational model in Figure-1 is suggested to examine the research model. The structural relationships between online self-regulation skills, satisfaction, and perceived learning of students in the online environment expressed in the suggested model will be examined.

In order to examine the research issue, the research model presented and suggested in Figure

1, taking into account the above theoretical framework and empirical studies includes three (3) hypotheses:

H1: Online self-regulation skills of students in the online environment positively predict their satisfaction. (Goal setting, Environment structuring Regulation, Task strategies, Time management, Help seeking, Self-evaluation).

H2: Online self-regulation skills of students in the online environment positively predict their perceived learning. (Goal setting, Environment structuring, Task strategies, Time management, Help seeking, Self-evaluation).

H3: The satisfaction of the students in the online environment predicts the perceived learning positively.

Importance of the study

The model suggested in Figure-1 is thought to contribute in four ways. First, the results obtained in this study are also valuable in supporting the empirical aspect of the theoretically explained relationships. Online self-regulation which is a different type of self-regulation of students trying to learn in the online environment (depending on the literature) has been explained above and it is also aimed to contribute to such a feature by enriching it with empirical evidence. Based on this evidence, different models showing the structural relationships that may be related to online self-assessment will be possible to design. Secondly, it is an incontrovertible situation that the Council of Higher Education will activate online learning specific to Covid-19 in order to prevent the disruption of teaching activities against emergencies that may be encountered in the region or throughout the country. In such a case, students, lecturers, and university administrations will be ready in any event. This will ensure the continuation of the teaching activity without interruption within the system hierarchy. Third, in this study, mainly students, instructors and administrators, who were caught unprepared for online learning and transitioned to online teaching in a short time are expected to adapt to this process. Thus, it may constitute as a potential example of this situation experienced worldwide by presenting empirical evidence for students' ability to employ their online self-regulation skills in the online environment. Finally, the students in the online environment need for studies that will show the relationships between students' use of online self-regulation with various variables and in the online environment. In the literature, the relationship of online self-regulation between online satisfaction and perceived learning can be clarified and suggestions can be made to eliminate the deficiencies that may arise in student learning by activating the use of online environments in case of emergencies. Likewise, the results of this study can help higher education institutions to adopt e-learning technology by overcoming potential barriers and accordingly, minimize the risk of failure at the implementation level. On the other hand, the findings of this study can be used in the literature to initiate other related studies in the field of e-learning.

Method

The researcher aimed to test the relationship between Online Self-Regulation (OSR), Perceived Learning (PL) and Satisfaction in the E-Learning Process (SELP) variables and their effects on structural equation modeling in this study. In relational studies, it is aimed to reveal the relationship between two or more variables (Creswell, 2008). In the meantime, it can also be revealed whether the variables studied affect each other and the relationship between their degree of affect. However, testing the relationship between variables in

structural modeling brings a strong theoretical background with it. A situation that exists theoretically can also be revealed experimentally (Fraenkel, Wallen & Hyun, 2012).

Sample

The data of the research were collected from 451 pre-service teachers who were studying in two education faculties of a state university and who took their faculty courses completely in the online learning environment in the fall semester of the 2020-2021 academic years.

Table 1. Demographic characteristics of research participants

Demographic variable		f	%
Gender	Male	106	23.5
	Female	345	76.5
Class Level	Freshman	129	28.6
	Sophomore	108	23.9
	Junior	108	23.9
	Senior	106	23.6
Departments	Computer Education and Instructional Technology	15	3.3
	Fine Arts	38	8.4
	Math and Science	103	22.4
	Special Education	34	7.5
	Elementary Education	114	25.3
	Turkish and Social	78	17.3
	Foreign Language	69	15.4

Participants are formed of the Departments of Computer Education and Instructional Technologies (15), Fine Arts Education (38), Mathematics and Science Education (103), Special Education (34), Elementary Education (114), Turkish and Social Sciences Education (78), and Foreign Language Education (69).

Within the scope of the research, the suggested model for OSR, ELES and PL is thought to be explained. Demographic information of the pre-service teachers was also obtained during the data collection process in line with the research hypotheses. In this study, instead of directly revealing the academic achievements of pre-service teachers in the online environment, it focused on the individual behaviors of the students as having been focused more on student behaviors in the online environment.

Data Collection Tools

Data were collected with three different measurement tools - Online Self-Regulation (Kilis & Yıldırım, 2018), Perceived Learning (Albayrak, Güngören & Horzum, 2014) and Satisfaction in the E-Learning Process (Gülbahar, 2012).

Online Self-Regulation Scale: The online self-regulation scale was first developed by Barnard, Paton & Lan (2008) to measure the self-regulation skills of students in the online environment. The OSR scale has six dimensions, and this scale consists of twenty-four (24) items in total. The dimensions of the scale consist of "Goal Setting (5)", "Environmental Structuring (4)", "Task Strategies (4)", "Time Management (3)", "Help Seeking (4)" and "Self-Evaluation (4)". The OSR scale was designed to have a 5-point Likert response (1 = strongly disagree, 5 = strongly agree). OSR was adapted into Turkish by Kilis & Yıldırım (2018). The Cronbach's alpha coefficients showing the internal consistency coefficients for

the reliability values of the scale vary between 0.67 and 0.87. The value for the entire scale was found to be 0.95. The dimensions of the scale are suitable to study the concordance (χ^2 /sd = 2.45; CFI = .90; RMSEA = .060) and high validity scores have been reported.

Satisfaction Scale in E-Learning Environments: The Satisfaction in E-Learning Environments scale was developed by Gülbahar (2012) to measure the satisfaction of students in the online environment. The ELES scale has four dimensions, and this scale consists of twenty-nine (29) items in total. The dimensions of the scale consist of "Delivery and Usability (7)", "Teaching Process (8)", "Teaching Content (4)" and "Interaction and Evaluation (10)". A 5-point Likert-type rating was applied in the ELES scale (Almost always=5, Often=4, Sometimes=3, Rarely=2, and almost never=1). The Cronbach's alpha coefficients showing the internal consistency coefficients for the reliability values of the scale vary between 0.91 and 0.96. The value for the entire scale was found to be 0.97. Good model fit for the dimensions of the scale (χ^2 /sd = 2.45; CFI = .99, RMSEA = .064) and high validity scores have been reported.

Perceived Learning Scale: The Perceived Learning Scale was first developed by Rovai, Wighting, Baker & Grooms (2009) for self-assessment by highlighting students' being active in the learning process. The PL scale is three-dimensional, and the scale consists of nine (9) items in total. The dimensions of the scale consist of "Cognitive (3)", "Affective (3)" and "Psychomotor (3)". The participation levels of each item in the original form of the PL scale are marked among the options (definitely false=1 and definitely true=7). PL was adapted into Turkish by Albayrak, Güngören & Horzum (2014). The Cronbach's alpha coefficients showing the internal consistency coefficients for the reliability values of the scale vary between 0.65 and 0.76. The value for the entire scale was found to be 0.83. Good model fit for the dimensions of the scale (χ^2 /sd = 2.45; CFI = .96; RMSEA = .059) and reported high validity scores.

Data Collection

Electronic media was preferred for data collection within the scope of the research. A Personal Information Form (PIF) was developed to collect the demographic information of the students participating in the study. In this form, data about the gender, grade level and department of the students were collected. After getting the necessary permissions for the scales to be used in the application, the items belonging to PIF, ELES, PL and OSR were brought together in Google Form in sections to form the final form. Students were asked to participate in the study voluntarily presenting the informative explanations about the aims of the study in written form. The link of the form prepared in the electronic environment was sent to approximately 5000 students via e-mail, and answers from 451 students were received.

Data Analysis

Analysis of the data was carried out in two steps - descriptive and inferential. Descriptive analyses such as mean, standard deviation and reliability and confirmatory factor analyzes were performed using SPSS 21 and AMOS 16. First-degree confirmatory factor analysis (n=451) was performed for construction validity of ELES, PL and OSR results. Inferential statistics include structural equation modeling analysis using AMOS 16 to examine the structural relationships suggested in Figure-1. Factor loadings and certain fit indices ($\chi 2$ / df , CFI, TLI and RMSEA) were examined through AMOS in confirmatory factor analysis and structural equation modeling analysis, Kline (2011) stated that values equal to at least 0.7 in relation to factor loads are named high standardized factor loads. Similarly, Shevlin and

Miles (1998) expect to observe a factor loading value of at least around 0.30 in confirmatory factor analyzes to protect an item.

Results

Validation of OSR

First-order confirmatory factor analysis (n=451) was performed to confirm the values of the OSR scale. χ^2/df, CFI, TLI and RMSEA indicative index values were also examined for model fit. According to the results of confirmatory factor analysis, the scale has acceptable fit index values (χ^2/df= 2.05, CFI=.92, TLI=.91 and RMSEA=.048). Factor loads of the scale were found to vary between .70 and .78. As a result of the reliability analysis, Cronbach alpha internal consistency coefficients were determined to be .70 for the sub-dimension of online self-regulation scale *goal setting*, .76 for *environmental structuring* sub-dimension, .72 for *task strategies* sub-dimension, .70 for *time management* sub-dimension, .77 for *help seeking* sub-dimension, and .74 for *self-evaluation* sub-dimension. In Table 2, Factor Loads (FL), Mean (M), Standard deviations and Cronbach's Alpha (α) reliability scores for each dimension and general are given.

Table 2. Descriptive results of OSR

	FL	**M**	**SD**	**α**
1	.59	3.72	.81	.78
2	.52	3.54	.99	
3	.70	3.55	.86	
4	.72	3.64	0.91	
5	.67	3.27	1.05	
6	.64	3.86	.98	.76
7	.71	4.10	.83	
8	.70	4.08	.78	
9	.60	3.95	.87	
10	.50	3.59	1.12	.72
11	.33	3.06	1.23	
12	.64	2.76	1.08	
13	.67	3.14	1.09	
14	.63	3.60	.98	.70
15	.63	2.86	1.10	
16	.73	3.24.	1.08	
17	.57	3.40	1.15	.77
18	.49	3.79	.96	
19	.47	3.08	1.13	
20	.44	2.92	1.13	
21	.74	3.63	1.01	.74
22	.68	3.40	1.00	
23	.48	3.07	1.18	
24	.56	3.24.	1.16	

The reliability coefficient of "Goal Setting" in the OSR scale was found to be (α= .78), the reliability coefficient of "Environmental Structuring" (α= .76), reliability coefficient of "Task Strategies" (α= .62), reliability coefficient of "Time Management" (α= .70), reliability coefficient of "Help Seeking" (α= .57) and the reliability coefficient of "Self-Evaluation" (α= 74). The overall reliability coefficient of the OSR scale was calculated to be (α= .as .89). In Table 2, the lowest average scores are observed for items related to study strategies while the highest average scores are observed to be for items related to landscaping.

Validation of ELES

First-order confirmatory factor analysis (n=451) was performed to confirm the values for the ELES scale. For model fit χ^2/df, CFI, TLI and RMSEA indicative index values were also examined. According to the results of confirmatory factor analysis, the scale has acceptable fit index values (χ^2/df= 2.05, CFI=.91, TLI=.90 and RMSEA=.059. Factor loads of the scale are seen to vary between .81 and .90. As a result of the reliability analysis, Cronbach alpha internal consistency coefficients are determined as .82 for e-learning process satisfaction scale *Delivery and Usability* sub-dimension, .81 for *teaching process* sub-dimension, .90 for *teaching content* sub-dimension, and .90 for *interaction and evaluation* sub-dimension. In Table 2, Factor Loads (FL), Mean (M), Standard Deviations and Cronbach's Alpha (α) reliability scores for each dimension and general are given.

Table 3. Descriptive results of ELES

	FL	M	SD	α
1	.67	3.14	.94	.82
2	.68	3.55	1.09	
3	.73	3.52	1.02	
4	.74	3.68	.99	
5	.74	3.53	.97	
6	.56	4.12	.90	
7	.34	3.19	1.15	
8	.49	2.53	1.20	.81
9	.46	3.49	1.20	
10	.31	2.95	1.31	
11	.49	3.24.	1.25	
12	.61	2,77	1.23	
13	.66	3.50	1.06	
14	.83	3:36.	1.10	
15	.79	3.24.	1.04	
16	.82	3.47	.99	.90
17	.87	3.40	1.01	
18	.81	3.60	.98	
19	.79	3.39	1.01	
20	.54	3.10	1.16	.90
21	.56	2.65	1.21	
22	.66	2.57	1.18	
23	.68	2.59	1.17	
24	.63	3.05	1.17	
25	.79	3.09	1.07	
26	.80	2.86	1.07	
27	.80	3.09	1.15	
28	.58	3.26	1.17	
29	.66	3.31	1.16	

The reliability coefficient of the "Transmission and Usability" of the ELES scale was found to be (α= .82), reliability coefficient of "Teaching Process" (α= .81), reliability coefficient of "Instructional Content" (α= .90) and the reliability coefficient of "Interaction and Evaluation" (α= -.90). The overall reliability coefficient of the OSR scale was calculated to be (α= .94). In Table 3, the lowest mean scores were seen to observe for interaction and evaluation items while the highest mean scores were being observed for the items related to communication and usability.

Validation of PL

First-order confirmatory factor analysis (n=451) was performed to confirm the values for the ELES scale. For model fit, χ^2/df, CFI, TLI and RMSEA indicative index values were also examined. According to the results of confirmatory factor analysis, the scale has acceptable fit index values (χ^2/df= 2.05, CFI=.92, TLI=.91 and RMSEA=.048). Factor loads of the scale were found to vary between .70 and .78. As a result of the reliability analysis, the Cronbach alpha internal consistency coefficients of the perceived learning scale *cognitive* for the sub-dimension was determined to be .64 for *cognitive* sub-dimension, .65 for *affective* sub-dimension and .73 for *psychomotor* sub-dimension. In Table 2, Factor Loads (FL), Mean (M), Standard Deviations and Cronbach's Alpha (α) reliability scores for each dimension and general are given.

Table 4. Descriptive results of PL

	FL	M	SD	α
1	.57	5.26	1.16	.64
2	.35	5.62	1.35	
5	.83	5.31	1.30	
4	.49	5.01	1.52	.65
6	.66	5.82	1.29	
9	.69	4.91	1.61	
3	.74	5.41	1.38	,73
7	.55	4.42	1.92	
8	.78	4.87	1.55	

The reliability coefficient of the "Cognitive" of the PL scale were found to be (α= .57), the reliability coefficient of "Affective" (α= .65) and the reliability coefficient of "Psychomotor" (α= .73). The overall reliability coefficient of the OSR scale was calculated to be (α= .83). In Table 4, the lowest mean scores were seen to observe for the psychomotor items while the highest mean scores were being observed for the informatics-related items.

Relationships Among OSR, ELES and PL

Structural equation modeling analysis was conducted to determine the relationships between online self-regulation skills, satisfaction with the e-learning process and perceived learning of university students who continue their campus-based online education. The structural model showing the relationship obtained in the analysis result is shown in Figure-2. According to the analysis results, the model is seen to have acceptable fit values (χ^2/df= 2.60, CFI=.92, TLI=.91 and RMSEA=.059).
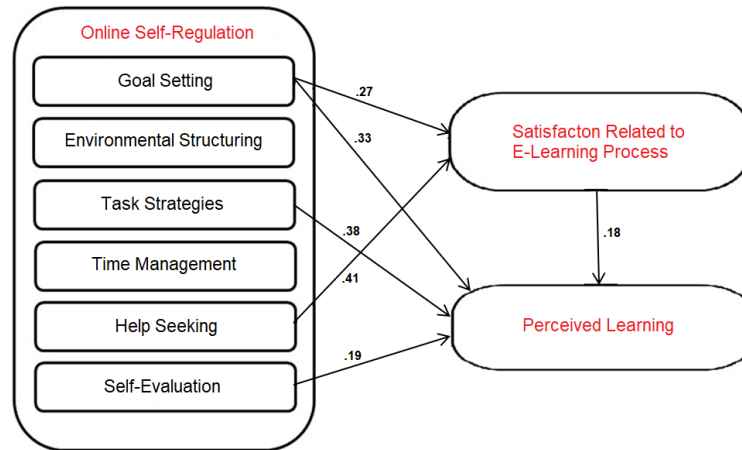
Figure 2. Standardized coefficients observed in proposed model (p<.05).

During an online learning process, online self-regulation skills of university students are accepted as the predictor of their satisfaction in the e-learning process partially (H1). In other words, it was determined that using online self-regulation skills like goal setting and request for help seeking positively predicted their satisfaction, and other sub-dimensions did not have a significant effect. In addition, it can be said that the sub-dimensions like goal setting and request for help seeking have a great impact on their satisfaction in the e-learning process in terms of regression weights.

According to another result of the study, the online self-regulation skills of the students in the online environment are accepted as the predictor of the perceived learning partially (H2). When the relationship between students' online self-regulation skills and perceived learning is examined, this result indicated a positive effect in terms of goal setting, task strategies and self-evaluation, while other dimensions have no significant effect.

The satisfaction of the students in the e-learning process in the online environment could be accepted as a significant predictor of the perceived learning (H3). Based on the results, it can be said that student satisfaction in the e-learning process will have a positive effect on perceived learning.

Discussion

When the findings related to the structural model in which the hypotheses put forward for the purpose of the research are taken into account, the H1, H2 and H3 hypotheses were determined to be confirmed.

According to the first hypothesis of the research, the environmental regulation and time management, which are sub-dimensions of the online self-regulation scale, were seen not to relate to any of the other variables (e-learning process satisfaction and perceived learning) found in this study. From a similar point of view, other researchers stated that time management, one of the components of online self-regulation, is not related to or predictive of student satisfaction and academic achievement (İnan, et al., 2016). This situation may prevent the student's attention and focus by the fact that the students taking online courses at the university where the research was conducted are not aware of their responsibilities in the online learning processes, their interest in the course is low, the appropriate environment cannot be provided at home due to the pandemic conditions, the participation in the live (synchronous) courses with the camera and microphone turned off (Ünal, Şanlıer & Şengil,

2020; Yılmaz, 2020). This may have limited the use of cognitive and metacognitive skills in an unfamiliar environment. It can also be explained by the inability of students who have no experience of learning in the online environment to adapt to a new and different learning environment compared to the face-to-face learning environment (Blackburn, 2014; Sakal, 2017). Hence, making the necessary effort to fulfill the environmental structuring and time management sub-dimensions of online self-regulation skills is thought to be prevented.

Looking at the other findings of this research, it is seen that goal setting and help seeking, which are among online self-regulation skills, are positive predictors of satisfaction in the e-learning environment and perceived learning. It is stated that there is a positive relationship between goal setting skills, which is one of the online self-regulation skills, and academic achievement (Lazowski & Hulleman, 2016; Schwinger & Otterpohl, 2017). In another study, İnan, et al. (2016) stated that the goal setting (planning) skill of the students in an online certificate program is a positive predictor of satisfaction.

In another finding, it is seen that the request for help seeking from online self-regulation skills is a positive predictor of satisfaction in the e-learning environment and perceived learning. In a similar study, it was determined that there is a significant relationship between the ability to request for help seeking, satisfaction with learning outcomes, and academic achievement (Azevedo, Guthrie & Seibert, 2004). In other words, it is thought that using the skill of getting help seeking from both the instructor and friends actively is a predictor of satisfaction and perceived learning against the negative effects of the online learning environment (Hurd, 2006; Martin & Valdivia, 2017) for students to feel themselves in an autonomous environment, not to be physically together with the instructor and their peers or to have a low level of interaction with them, to have a certain level of cooperation. On the other hand, it was determined that the ability to request for help seeking in a certificate program given online is not related to satisfaction and academic success (İnan, et al., 2016).

Task strategies and self-evaluation, of the online self-regulation skills, appear to be not related to satisfaction in the e-learning environment. In a similar study, it was determined that time management, requesting for help seeking and self-evaluation among self-regulation skills in the online environment did not make any difference (İnan, et al., 2016). However, Zhou, Chai, Jong & Xiong (2021) determined in their study that online self-regulation skills, task strategies and self-evaluation were positively related to satisfaction.

Research shows that self-regulation is critical in determining students' successful learning experiences in online learning environments (Cho & Kim, 2013). It was determined that there was a significant relationship between online self-regulation skills such as goal setting, task strategies and self-evaluation, and perceived learning, while there was no relationship between help seeking and perceived learning. In a similar study, it was stated that university students who carry out learning activities in the online environment revealed a positive and significant relationship with their perceived learning of goal setting, task strategies and self-evaluation sub-skills, and similarly, no relationship could be determined with the ability of seeking for help (Zhou, Chai, et al. Jong & Xiong, 2021). On the other hand, Yükseltürk & Bulut (2007) reported that students who cannot use their self-regulation skills online may lack success.

Considering the relationships between student satisfaction and perceived success in the online environment, these two variables are expected to be highly correlated with each other. Studies have shown that there is a significant and positive relationship between satisfaction in the

online environment and perceived learning (Chu & Chu, 2010; Kara, et al., 2021; Liao & Hsieh, 2011; Turhangil-Erenler, 2019). Nevertheless, Eom & Ashill (2016) reported in their study with university students that there was no relationship between self-regulation skills in the online environment and both satisfaction and perceived learning.

When the above-mentioned findings and arguments are taken in consideration, three different conclusions can be drawn from this study.

(1) Goal setting and help seeking that are among university students' online self-regulation skills significantly predicted satisfaction with the e-learning process. In other words, online self-regulation partially predicts satisfaction with the e-learning process.
(2) Goal setting, task strategies and self-evaluation that are of the online self-regulation skills of university students are significantly predicted their perceived learning. In other words, online self-regulation partially predicts their perceived learning.
(3) University students' satisfaction with the e-learning process significantly predicts their perceived learning.

Conclusion

Keeping students in the system in online learning environments is known to be more difficult than in face-to-face learning environments. It is normal not to expect students who do not have online learning experience to adapt to this new and different learning environment immediately, as all teaching activities have been moved to the online environment due to the recent pandemics. However, it seems that this teaching method can be used in different ways in the coming years.

Teaching-learning activities to be carried out online are no longer an option but a necessity. It is evident that the studies for students should be evaluated, and the missing areas should be improved in order that the online learning, for which a large pilot study has been made, is to be useful in the future and to achieve its purpose.

Satisfaction with the e-learning process and perceived learning, relationships between the variables were tried to be revealed in this study which was carried out by creating a structural equation modeling between online self-regulation. When the results obtained were examined, it was seen that similar and different results were obtained with the previous studies in the literature and it was discussed.

Partial significant relationships were determined between the variables in this study which was carried out with structural equation modeling. The followings can be said as the reasons for the variables that could not be related: All students in higher education were directed to the online environment due to necessity. Not having learning experiences in such an environment, not knowing how to behave in an online environment and trying to learn this in the process has resulted in various difficulties. It is important that the lack of belonging to the virtual environment as a result of not being able to fulfill the interaction and types of the main components of the online environment and adapting to the community in the online learning environment and may prevent its reaching to sufficient level in relation occurrence.

The research is structured on online self-regulation. Students' use of self-regulated learning strategies is related to their perceived ability to adopt them (Landrum, 2020). However, students' self-efficacy and self-regulation skills are skills that are expected to improve over

time with more experience in online learning environments (Bradley, Browne & Kelley, 2017; Wang, Shannon & Ross, 2013). Therefore, it would be appropriate to determine the system components that would develop these skills, especially in the online environment, and to make appropriate designs.

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