

Using Self-Regulated Learning Strategies to Enhance the Effectiveness of an Online Course in Emergency Remote Teaching

Serhat Bahadır KERT¹, ORCID number: [0000-0002-1093-6326](https://orcid.org/0000-0002-1093-6326), sbkert@yildiz.edu.tr
M. Fatih Erkoç², ORCID number: 0000-0002-8278-2805, mferkoc@yildiz.edu.tr
Mohamed Ibrahim³, ORCID number: 0000-0003-4618-2463, mibrahim1@atu.edu
Rebecca Callaway⁴, ORCID number: 0000-0002-2866-6408, rcallaway@atu.edu

¹Yıldız Technical University, TURKEY, ²Yıldız Technical University, TURKEY,
³Arkansas Tech University, USA, ⁴Arkansas Tech University, USA.

Abstract

The covid-19 pandemic has negatively affected educational efforts all around the world. In many of the countries, restrictions put to face-to-face education were directed educators to use alternative instructional models such as Hybrid or online courses. Consequently, in many countries, the rate of online education has significantly increased. With the widespread use of online education, it has been observed that students had some difficulties in keeping up with this process. Because, They have been expected to organize their studies and intrinsic lesson motivations individually. Essentially, these individual features are mostly related to the self-regulation skills of the students. The self-regulated learning (SRL) process, refers to an active and constructive process in which the individual tries to adjust his/her behaviors, metacognitive competence and motivation, directs and limits his/her goals according to environmental effects (Bandura, 1994). In the literature, it can be seen that Students, having self-regulated learning skills can develop their own strategies to be able to reach academic success. The correlation among individuals' SRL skills and pedagogical growths has been studied for many years by researchers. Using SRL strategies effectively are among the main indicators showing the academic success of the students in an online learning environment. But, in the Covid-19 pandemic, well-planned online education environments has been transformed to "Emergency Remote Teaching (ERT)" classes. Therefore, using SRL strategies in an online course as a part of ERT can show us different results than using them in an online course given in regular conditions. In this study, the effectiveness of using SRL strategies in an online course was investigated regarding the new conditions brought out by ERT. Students attending the department of computer education and instructional Technologies of Yıldız technical university in the fall term 2020-2021 academic year participated to the research. This study was designed as a within-subject model. It was aimed to examine the effect of SRL activities to university students' pedagogical growth. There are two hypotheses of the study: (1) The weekly-conducted SRL activities significantly enhance students' SRL skills. (2) SRL skills of the students are significantly correlated with their academic performance. The strategies of within-subject design were used in the research. The class of Information Technologies in Education was selected and 41 students of the class learned the content with the support of Self-regulated learning activities. A survey getting demographic features of the student, a SRL survey adapted from the Motivated Strategy for Learning Questionnaire (MSLQ) (Pintrich et al., 1993) and academic performance assessment materials were used as data collection tools of the study. Findings showed that students' SRL skills developed significantly during the course process. it was found there was an important correlation between final course scores and self-efficacy scores of the students ($p < .05$). Multiple linear regression analysis was conducted to develop a model predicting students' course scores. It was seen that 32% of the variance in the dependent variable was significantly accounted for by the predictor model ($p < .05$). Additionally, individual predictors were examined. The result indicated that the students' self-efficacy is the main predictor of students' course scores ($t = 2.488$; $p < .05$). The reasons underlying these findings were discussed and recommendations were developed for future educational efforts.

Keywords: *Emergency remote teaching, Self-regulated learning, Online learning.*

Intruduction

Self-regulation is one of the most prominent skill areas in learner-centered learning environments. Especially, when students are expected to provide their own lesson motivation, they need to use their self-management and organizational skills effectively. SRL, which is one of the basic principles of social cognitive theory, emphasizes the role of individual control in human behavior and focuses mainly on controlling one's own behavior (Boeree, 2006). SRL refers to internal learner behaviors that occur systematically to achieve learning goals (Schunk, 1990). In order to show this internal behavior, learner needs to develop and implement his/her own strategies and own motivation to develop these strategies. Students' ability is crucial to engage in self-motivation and reflection to develop their own learning strategies and adapt to changes in learning contexts (Zimmerman, 2008). The self-regulated learning (SRL) is an active and constructive process in which the individual tries to adjust his/her behaviors, metacognitive competence and motivation, directs and limits his/her goals according to environmental effects (Bandura, 1994). Zimmerman (1990) states that SRL skills can be observed with the qualities of having a sense of trust, being diligent, being able to produce solutions, being responsible, seeking information effectively, being persistent, and having self-control skills. Developing individuals' SRL skills is one of the key features of education. Because the common goal of different educational efforts is to develop the learner's lifelong learning skills. Every individual has to be in an informal learning process and improve himself in order to continue his/her life and advance in business life (Zimmerman, 2002). According to the Pintrich (2000) model, SRL consists of the stages of foresight, planning, activation, monitoring, control, reaction, and reflection. There are detailed SRL processes in each stage. Many different approaches and models have been presented in the literature to explain the formation of a skill that is so important (Boekaerts, 1996; Zimmerman, 1989; Winne & Hadwin, 1998; Pintrich, 2000; Efklides, 2011). There are 3 important areas that are explored in common in these models, these are metacognition, motivation and emotion (Panadero, 2017).

SRL skills of students gain are more important in online education than other learning environments. During an online education process, to be aware of own learning speed and studying system and try to protect own learning motivation are essentials for success of students. Autonomous features make the use of SRL capabilities important in online environments (Dabbagh & Kitsantas, 2005). However, students can not develop their SRL skills by taking the online courses even those are very important for them. Empirical research shows that applying a variety of strategies in online courses can increase students' SRL skills and that structuring the online learning environment to encourage self-regulated learning has a central importance (Wandler & Imbriale, 2017). In the last two years, the most of the face-to-face education all around the World have been implemented online due to the Covid-19 pandemic. However, this rapid transition to online education has led to the emergence of important pedagogical deficiencies. This process, when face-to-face education is done online with synchronous communication tools, has been called as emergency remote teaching (ERT). In online education, sufficient time is given to the instructors for the preparation, detailed formatting and publication of the contents of the courses that are planned to be held completely online. However, the Covid-19 process, which is the only global crisis in recent history, has led to the rapid transfer of fully or largely face-to-face courses to the online environment. Therefore, there has been little time left for the instructors to prepare for the ERT process (Toti & Alipour, 2021). This rapid change in learning environments has led researchers to focus on increasing the efficiency of ERT processes. In one of these studies, Wittle, Tiwari, Yan and Williams (2020), purposed a framework for ERT. Their model is seen on Figure 1.

Their proposal has has three steps; querying, classifying available resources and designing educational experiences. These steps are iterative and critical factor in the realities of both the ERT and the adaptation of emergency education to the unpredictable shifts in resources and pedagogical goals (Wittle, Tiwari, Yan & Williams, 2020). One of the most important factors effecting ERT productivity, as in any other learning environment, is the level of students' SRL productivity. Therefore, in this study, the answers of following two research questions were investigated;

RQ1: Is there a relationship between students' final course scores and their self-regulated learning strategies measure after engaging in weekly reflections in emergency remote teaching?

RQ2: Which of the following student's self-regulated learning factors best predict their course scores in online learning environment: self-efficacy, intrinsic value, cognitive strategy use, and self-regulation learning?

Method

In the study, the strategies of within-subject design were used. It was aimed to examine the effect of SRL activities to university students' pedagogical growth in different aspects in an online course. In this section; Information on participants, data collection tools and the followed procedure is given respectively.

Participants

Students attending to the department of computer education and instructional Technologies of Yildiz Technical University in fall term of 2020-2021 academic year participated to the research. The class of Information Technologies in Education was selected and 41 students of the class learned the content with the support of Self-regulated learning activities.

Data Collection Tools

. A survey getting demographic features of the student, a SRL survey adapted from the Motivated Strategy for Learning Questionnaire (MSLQ) (Pintrich et al., 1993) and academic performance assessment materials were used as data collection tools of the study.

Procedure

In the first week of the information technologies in education course, the students who took the course were asked to fill in the SRL scale. At the same time, information was given about the way the course was taught and the SRL activities to be carried out during the semester. In 7 weeks of the 14-week period, students were allowed to participate in reflective SRL activities at the end of the lesson. The activity done in the first week is shown below.

"Activity 01: Discussion 01: Reflection 01

Short reflection on this week's readings and activities:

This reflection must be written after completing this week's learning activities and assignment. Address in no less than 300 words the following points related to this week's learning activities only.

You must be precise, clear, no general talk:

- ☐ *Most useful or valuable thing you learned this week?*
- ☐ *Most important point or central concept this week?*

- ☐ *Most surprising/unexpected idea this week?*
- ☐ *What idea(s) struck you as things you could/ should put into practice now after this week's learning activities?*
- ☐ *What stands out in your mind from this week's activities?*
- ☐ *What helped or hindered your understanding to complete this week's work?*
- ☐ *How does the content of this week connect or conflict with your prior knowledge, beliefs, or values?"*

Findings

All the data obtained in the study was shared in this section. Information about the findings presented at the bottom of the tables. First of all, the Pre-SRL, Post-SRL and Course grades data of all students participating in the study were shown in Table 1.

Table 1

Descriptive Statistics of students' final course grade and the self-regulated learning strategies measure

	N	Minimum	Maximum	Mean	Std. Deviation
Pre SRL Test					
Self-Efficacy	41	37.00	60.00	48.3902	6.34775
Intrinsic Value	41	35.00	62.00	51.3171	7.29876
Cognitive Strategy Use	41	50.00	84.00	69.6585	7.92657
Self-Regulation	41	28.00	54.00	38.6098	5.54923
Learning					
SRL Total	41	157.00	247.00	207.9756	20.22682
Post SRL Test					
Self Efficacy	41	34.00	63.00	50.7317	6.75287
Intrinsic Value	41	36.00	63.00	52.5610	6.11984
Cognitive Strategy Use	41	52.00	91.00	70.8780	8.56211
Self-Regulation	41	30.00	63.00	42.1463	6.75485
Learning					
SRL Total	41	160.00	280.00	216.3171	22.34663
Course Grade					
Final Course Scores	41	25.00	92.00	78.2439	11.71917

When Table 1 is examined, it can be seen that there is a difference between the Pre-SRL and Post-SRL score averages of the students in favor of the post-tests. In addition, the average of final course grades of the students are 78.24 out of 100. In the next step, the relationship between Final course grades and SRL scores were analyzed and the data were presented in Table 2.

Table 2

Correlations between students' final course grade and the self-regulated learning strategies measure

		Self-Efficacy	Intrinsic Value	Cognitive Strategy Use	Self-Regulation Learning	SRL Total
Student Final course grade	Pearson Correlation	.512**	.168	.146	.032	.266
	Sig. (2-tailed)	.001	.294	.364	.842	.093
	Sum of Squares and Cross-products	1619.683	481.390	584.220	101.537	2786.829
	Covariance	40.492	12.035	14.605	2.538	69.671
	N	41	41	41	41	41

Note: **. Correlation is significant at the 0.01 level (2-tailed).

There was no significant relationship between students' total SRL scores and final course grades. However, it was seen that Final scorers were significantly related with students' Self-Efficacy sub-scores. Linear regression analysis was performed to find the possible predictors of the students' final course scores. Analysis results are shown in Table 3.

Table 3

Model summary of the multiple linear regression analysis predicting students' course scores

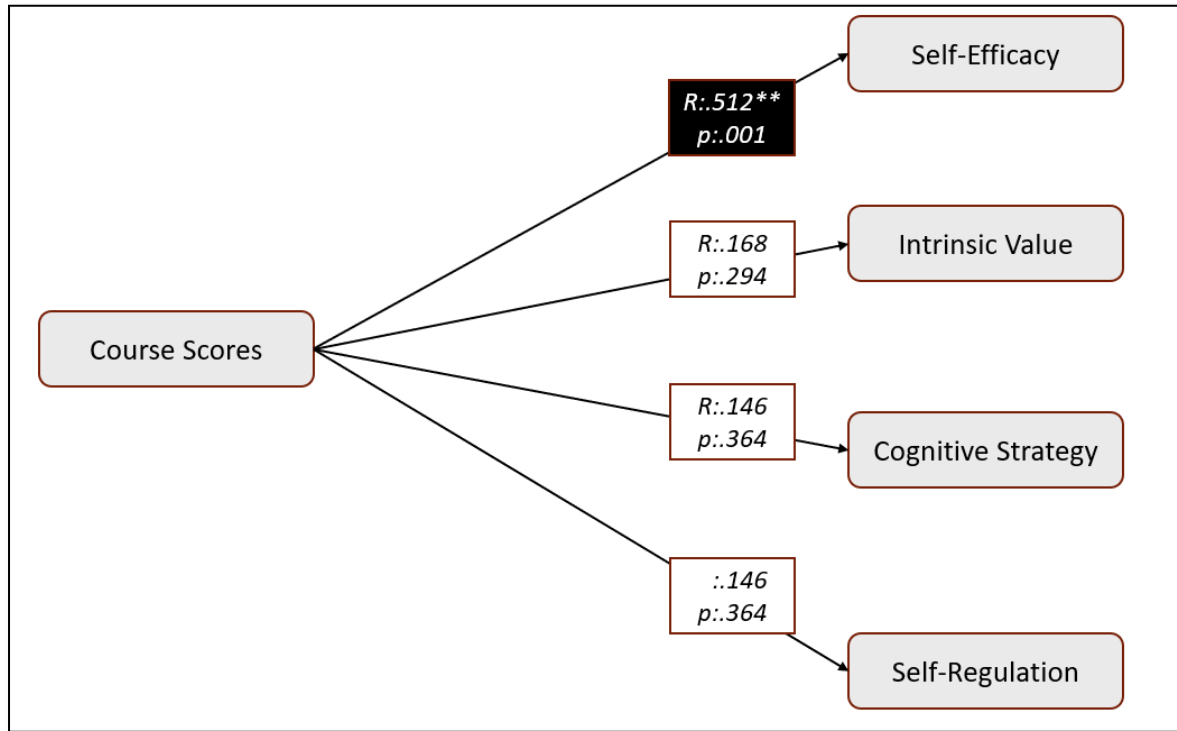
Model	R	R Square	Adjusted R Square	Std. Err. the Est.	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.565a	.319	.243	10.19345	.319	4.218	4	36	.007

Note: a. Predictors: (Constant), POSTTOTAL, PostSrITOTAL, PostSeTOTAL, PostIvTOTAL .
b. Dependent Variable: Students' course scores

In table 3, it is seen that 32% of the variance in the dependent variable was significantly accounted for by the predictor model ($p < .05$). The visual representation of this finding is seen on Figure 1.

Figure 1

The visual representation of the multiple linear regression analysis



The individual predictors of the students' course grades were analyzed with coefficients of multiple linear regression analysis. Findings were presented in table 4.

Table 4

Summary of standardized and unstandardized coefficients of the multiple linear regression analysis

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	48.681	15.851		3.071	.004
Self-Efficacy	1.079	.434	.622	2.488	.018
Intrinsic Value	-.676	.635	-.353	-1.063	.295
Self-Regulation	-.448	.524	-.258	-.854	.399
Learning					
SRL Total	.135	.302	.257	.448	.657

Note: Dependent Variable: Students' course scores

As seen in table 4, the students' self-efficacy is the main predictor of students' course scores ($t = 2.488$; $p < .05$). Finally, paired groups t-test was conducted to find whether the variation between students' pre-SRL and pst-SRL scores was significant. Test results are presented in Table 5.

Table 5*Paired sample t-test statistics between Pre and Post SRL scores of the students*

		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Group	Self-Efficacy	-48.06098	6.54773	.72308	-66.467	81	.000
	Intrinsic Value	-50.43902	6.69457	.73929	-68.226	81	.000
	Cognitive Strategy Use	-68.76829	8.20012	.90555	-75.941	81	.000
	Self-Regulation Learning	-38.87805	6.27437	.69289	-56.110	81	.000
	SRL Total	-210.64634	21.50072	2.37436	-88.717	81	.000

The results of paired samples t-test showed that there was a significant difference between pre and and post SRL scores of students in favor of post scores.

Discussion

The study has 4 important results; in an ERT process; (a) Students' SRL skills can be developed with weekly reflective activities, (b) Students' academic performance is significantly correlated with their self-efficacy skills, (c) Students' self-efficacy is significant predictor of students' course grades, (d) Students' SRL scores can be used as predictors for 34% of their course grades. The use of motivation-enhancing teaching strategies gains importance in the Covid-19 pandemic, where students' lesson motivations are greatly affected. This study showed that SRL activities can be used to increase students' SRL skills and lesson motivation in different subjects. In accordance with the statement of Wandler and Imbriale (2017), it has been seen that SRL strategies can be used to improve students' SRL skills in an online education process. In this study, it was seen that the self-efficacy skills of the students came to the fore more than the other SRL skills of them. The significant relationship between student's academic achievement and self-efficacy skills is seen as a point to focus on. In addition, it was found that students' self-efficacy scores are the most important indicators of their academic achievement. This finding supports Schunk and Zimmerman (2006) and shows that self-efficacy and self-regulation are key factors affecting students' academic success. Self-efficacy describes an individual's beliefs about their ability to perform behaviors that will lead to success in a task (Bandura, 1994).

Given all findings, it can be stated that it is important to observe that students' SRL skills and academic success can be increased with reflective SRL activities even in an ERT process having pedagogical deficiencies. In future studies, it is believed that SRL activities done with students from different countries, regions and cultures can reveal comparative findings and provide more detailed results.

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