Available online at ijci.wcci-international.org

International Journal of Curriculum and Instruction 15(3) (2023) 1939–1956

IJCI
International Journal of Curriculum and Instruction

The mediating role of online self-regulation skills in the effect of self-management and self-control on pre-service mathematics teachers' achievement

Şahin Danişman [a] *, Emine Nur Ünveren Bilgiç [a], Ahmet Sapancı [a]

[a] *Duzce University, Faculty of Education, Konuralp, 81620, Düzce,Turkey*

Abstract

Self-management, self-control, and self-regulation skills of students are closely related to their achievement. This study aims to examine the mediating role of online self-regulation skills in the effect of pre-service mathematics teachers' self-management and self-control skills on their achievements in distance education process. The participants of the research which employed structural equation modeling consisted of 473 pre-service mathematics teachers. The data collected through the use of Self-Control and Self-Management Scale and Self-Regulated Online Learning Questionnaire. Positive and significant relationships have been found among the sub-factors of the scales and achievement scores. Furthermore, the study finds a mediating role of online self-regulation skills between the relationship of self-management and self-control skills and academic achievement. Hence the study recommends the encouragement and development of self-regulation, self-management and self-control skills to enhance the academic achievement of pre-service mathematics teachers.

Keywords: Self-regulation, self-management, self-control, achievement

1. Introduction

All kinds of transformations that take place in social life also deeply affect the education-teaching processes. Effectively conducting distance education, the importance of which has been recognized more recently at all levels of teaching processes has also led to the differentiation and diversification of the concepts. As educational understanding goes through a serious transformation, it has become more prominent that "every student is the most important component of their own learning experience" (Weinstein & Huma, 1998). In this process, in which the immediate distance education approach, which is

* Corresponding author: Şahin DANİŞMAN. ORCID ID.: https://orcid.org/0000-0003-4739-3625
E-mail address: sahin.danisman@gmail.com

carried out together with asynchronous and synchronous applications, is adopted, the importance of students' learning to take responsibility for their own learning, to gain sensitivity to differences in their individual learning and to organize their learning processes has become more evident (Pillilion & McNeil, 2020; Rutherford et al., 2021). The transformation experienced in the teaching processes may have an impact on the learning approaches adopted by the students. In many studies, the effects of students' approaches on their motivation, thinking processes, and self-regulation skills are reconsidered in different contexts (Adl & Alkharusi, 2020; Costa et al., 2020; Halif et al., 2020; Hwang et al., 2021; Landrum, 2020).

Online learning applications have been used by many well-established universities for years, as they enable flexible access to teaching content at any time and place at the higher education level (Bates, 2018; Cambridge, 2020; Massachusetts Institute of Technology [MIT], 2020; Stanford, 2020). For many students, the examination of skills for newly encountered online learning processes is very important, especially in teaching abstract mathematics, since students' perceptions of the process will significantly affect their mathematics learning outcomes (Sahidin & Jamil, 2013). The way students manage and perceive the mathematics learning processes in the distance education process is likely to vary compared to the face-to-face teaching practices. Goulão and Menedez (2015) stated that due to the independent and flexible nature of online learning environments, students should take more responsibility in terms of independence, maturity, motivation and discipline in the learning process. The components of this proposal are closely related to the concept of self-regulation, which is based on Bandura's social-cognitive theory, which is related to one's ability to master one's own learning processes, to choose the right learning strategies in their own learning, to self-evaluate and organize these strategies when necessary, and to motivate oneself throughout the learning process (Pintrich, 2000; Zimmerman, 2015). Based on the cumulative structure of the discipline of mathematics, the necessity of cumulative learning makes it necessary for students to be able to control their learning processes and keep their motivation high (Schunk, 2001). This is closely related to students' self-regulation skills, as Zimmerman (2015) states.

Academic achievement, in practice, indicates the set of knowledge learned, the degree of development of capacities, and skills in the academic environment (Jeynes, 2008). In line with this definition, it can be said that the effect of individual factors may have a significant effect on mathematics achievement (National Council of Teachers of Mathematics [NCTM], 2014; Organisation for Economic Cooperation and Development [OECD], 2016; Usher & Pajares, 2009). In the cognitive dimension of self-regulated learning, which is defined based on socio-cognitive learning theories, the student is not considered as a passive recipient of information, but as an element who actively constructs information through his/her own meaning-making, goal setting and strategy selection processes (Pintrich, 2000). In this context, self-regulated learning skills have a multidimensional structure that integrates the cognitive, motivational and behavioral

components of learning (Artino, 2008). Self-regulated learning is associated with volitional and active behaviors that include task strategies, time management, environment structuring, goal setting, help seeking (Barnard-Brak et al., 2010) and metacognitive skills.

Self-regulated learning requires the individual to manage learning processes. This enables the concept of self-management to emerge as an important component in the self-regulated learning process. In a certain sense, self-management encompasses, among other things, self-discipline, self-control, self-regulation, will power, ego strength, and effortful control (Duckworth & Kern 2011; McClelland & Cameron, 2011). In a widespread manner, self-management and self-control have been used together for a long time in the literature (Halford, 2003). Many studies reveal the importance of self-management for academic success (Adam et al. , 2017; Chen & Li, 2021; Claro & Loeb, 2019; Galla et al., 2019; Hofer et al., 2012; Kulusaklı, 2022; Verstege et al., 2019). When these studies are examined it has been revealed that researchers have a significant share in managing their choices in a healthy, realistic and applicable ways in order to provide individuals with the intrinsic motivation they will need to succeed.

The expression of control, which is included in the components of self-regulation, includes not only the control of the elements outside the learner, but also the provision of individual control. Self-control, which has positive effects on academic achievement (Mischel, 2014), is defined by Duckworth et al. (2019) as deciding in favor of a less desirable option that will benefit in longer-term planning instead of an instant benefit or attractive option in life. From this point of view, Goulão and Menedez (2015) state that self-control should take a pro-active role in the realization of self-regulation. In the literature, there are studies showing that self-control affects school success (Duckworth et al., 2010), general success at the end of secondary school, and permanence in the first year of university education (Galla & Duckworth, 2015). Lindner et al. (2018) explained this situation as the effect of self-control on the motivation of individuals and on success. It has been revealed that self-control is a strong predictor of a range of cognitive and social competencies in adolescence, such as the ability to delay gratification in early life, planning, orientation and maintaining attention, effective pursuit of goals, and self-confidence (Mischel et al., 1988). Herewith, self-control enables students to complete tasks on time, balance their free time successfully, and prevent their emotional states from preventing them from working, thus resulting in better academic results (Duckworth et al., 2012; Tangney et al., 2004).

In this context, it is necessary to consider the concepts of self-management and self-control together with the concept of self-regulation in the distance education process and online learning environments (Barlovits et al., 2021), where the responsibility for learning should be carried out more individually. Students' knowledge about management of their learning processes and determining the ways of providing

motivation that will help them in the process have the feature of being a cognitive and behavioral feedback set (Rascón-Hernán, 2019). Kremer-Hayon and Tillema (1999) drew attention the importance of self-regulated learning suggesting the examination of pre-service teachers' self-regulation skills. For this reason, it is a current and important issue to consider the self-management and self-control skills that students have in the context of mathematics lessons in distance education. In addition, having a detailed knowledge of the students' understanding of the abstract structure of mathematics due to the nature of the discipline can also serve as a road map for such a situation that may occur in the future. From this point of view, the aim of this study is to examine the mediating role of online self-regulation skills in the effect of pre-service mathematics teachers' self-management and self-control skills on their achievements in distance education process.

2. Method

2.1. Research Design

Structural Equation Modeling, one of the quantitative research designs, was used to determine the mediating role of self-regulated online learning in the relationship between self-control and self-management and academic achievement. The research employed a two-stage method to detect and eliminate measurement errors in structural equation studies. The first step involved developing a measurement model and testing its validity with confirmatory factor analysis. After the measurement model was constructed, a structural model was proposed by testing the structural relationships between the latent variables.

2.2. Participants

Within the scope of the research, convenient sampling, one of the non-probability sampling methods, was used to determine the study group from which the data were collected. Information on the demographic characteristics of the participants is presented in Table 1.

Table 1. Demographic characteristics of the participants

Variable	Groups	f	%
Gender	Female	374	79.1
	Male	99	20.9
	Total	473	100
Grade level	1	168	35.5
	2	159	33.6
	3	102	21.6
	4	44	9.3
	Total	473	100

Table 1 presents that female participants predominate by gender. According to the grade level, although the number of senior pre-service mathematics teachers is low, it is seen that there is a balanced distribution in general.

2.3. Data collection tools

The participants were asked to indicate their grade point averages for achievement variable. The data for other variables were obtained through the use of self-control and self-management scale and Self-Regulated Online Learning Questionnaire.

2.3.1. Self-Control and Self-Management Scale (SCMS)

This self-evaluation tool measures self-control and self-management skills in terms of their overall features. Additionally, the scale is structured cognitively and behaviorally (Mezo, 2009). Using SCMS, each component of self-management, which are self-monitoring [SM], self-evaluating [SE], and self-reinforcing [SR], is evaluated in a process-oriented manner (Mezo & Short, 2012; Xue & Sun, 2011). Ercoşkun (2016) adapted the scale into Turkish with a three-factor structure including 16 items. Regarding the findings about linguistic equivalence, the correlation coefficients of self-control and self-management scale (SCMS) in both Turkish and English versions were found to be r_{SCMS} = .91, r_{SR} = .81, r_{SE} = .79 and r_{SM} = .84. The construct validity was carried out via exploratory factor analysis (EFA) to evaluate the structure of the draft scale in Turkish culture, and confirmatory factor analysis (CFA) was administered. CFA showed that the three-dimensional structure of the scale has a good fit (RMSEA = .052, NFI = .97, CFI = .98, GFI = .96, AGFI = .94, RFI = .97). The reliability coefficients which were determined via test-retest method were obtained as .87 for the whole scale, .81, .73 and .80 for SR, SE and SM respectively.

2.3.2. Self-Regulated Online Learning Questionnaire (SROL)

The Turkish adaptation of the scale developed by Jansen et al. (2017) was made by Yavuzalp and Özdemir (2020). The scale consists of five factors (metacognition skills [MS], help seeking [HS], time management [TM], persistence [P], environmental structuring [ES]) and 36 items. MS refers to the metacognitive thinking skills of the students in online platforms such as organizing the learning materials, assessing the learning or determining the relationships among the concepts. HS refers to asking the teacher or peers for help when needed. TM includes items regarding the planning and timing for the tasks and courses. P refers to motivating oneself even when bored during the courses or doing homework. ES means organizing the environment so that one can study or engage the course better.

EFA and CFA results validated the factor structure of the scale (RMSEA = .071, NFI = .98, CFI = .99, GFI = .82, AGFI = .79). The reliability coefficients which were determined

via test-retest method were obtained as .96 for the whole scale, and ranged from .70 to .95 for the factors.

2.4. Data Analysis

Data were collected after obtaining the necessary ethics committee permission to collect data within the scope of the research. SPSS and Lisrel softwares were used in the analysis of the collected data. It was checked whether normality, linearity, covariance, absence of multicollinearity, independence of residuals, and absence of extreme values were required assumptions for confirmatory factor analysis and path analysis, and the analyses were conducted after verifying that none were violated.

3. Results

The variables in the research model are described in Table 2 by descriptive statistics.

Table 2. Descriptive statistics regarding the variables (N=473)

	M	SD	Min.	Max.	Skewness	Kurtosis
SCMS_SR	3.75	.83	1.00	5.00	-.56	-.04
SCMS_SE	3.97	.62	160	5.00	-1.27	2.29
SCMS_SM	3.80	.65	1.33	5.00	-.53	.42
SROL_MS	4.51	1.25	1.44	7.00	-.30	-.48
SROL_TM	4.88	1.15	1.00	7.00	-.20	-.48
SROL_ES	5.55	1.20	1.60	7.00	-.87	.07
SROL_P	4.88	1.33	1.20	7.00	-.42	-.56
SROL_HS	4.71	1.39	1.00	7.00	-.63	-.09
SUC	3.08	.42	1.67	4.00	-.77	.42

Note: SCMS_SR, SE, SM: Self-Reinforcing, Self-Evaluating, and Self-Monitoring Subscales of SCMS; SROL_MS, TM, ES, P, HS: Metacognitive Skills, Time Management, Environmental Structuring, Persistence, and Help Seeking Subscales of SROL; SUC: Success

Table 2 shows that the skewness and kurtosis values are within acceptable ranges and the data do not violate the normal distribution assumption. The correlation values between the variables in the research model are presented in Table 3.

Table 3. Pearson product-moment correlation coefficients among the variables

	1	2	3	4	5	6	7	8	9
1. SCMS_SR	1								
2. SCMS_SE	.03	1							
3. SCMS_SM	.53**	.15**	1						
4. SROL_MS	.38**	.09*	.52**	1					
5. SROL_TM	.17**	.28**	.24**	.30**	1				
6. SROL_ES	.33**	.15**	.39**	.60**	.36**	1			
7. SROL_P	.31**	.12*	.43**	.67**	.33**	.54**	1		
8. SROL_HS	.26**	.09*	.32**	.58**	.19**	.43**	.48**	1	
9. SUC	.02	.06	.16**	.18**	.29**	.21**	.22**	.19**	1

Table 3 shows that there is no multicollinearity between the independent variables, and the data is suitable for mediation analysis.

3.1. Findings regarding the measurement model

The standardized path coefficients of the measurement model, the t-values regarding whether these coefficients are significant and the model goodness of fit indices showing whether the model can be accepted are presented in Figure 1.

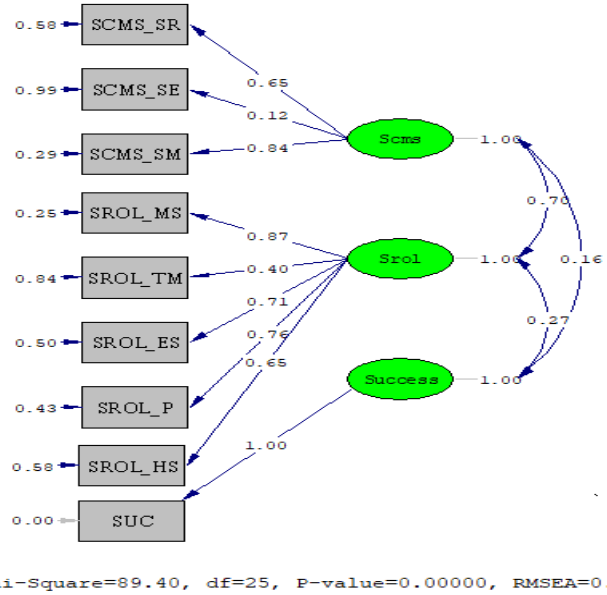

Figure 1. Standardized path coefficients regarding the measurement model

Based on the standardized path coefficients for the measurement model in Figure 1, it can be seen that the latent variables have a high correlation with the observed variables,

while the observed variables have a low error variance. The data collected in the study are compatible and acceptable with the measurement model. Based on the standardized path coefficients of the measurement model, Figure 2 presents t-values indicating their statistical significance.

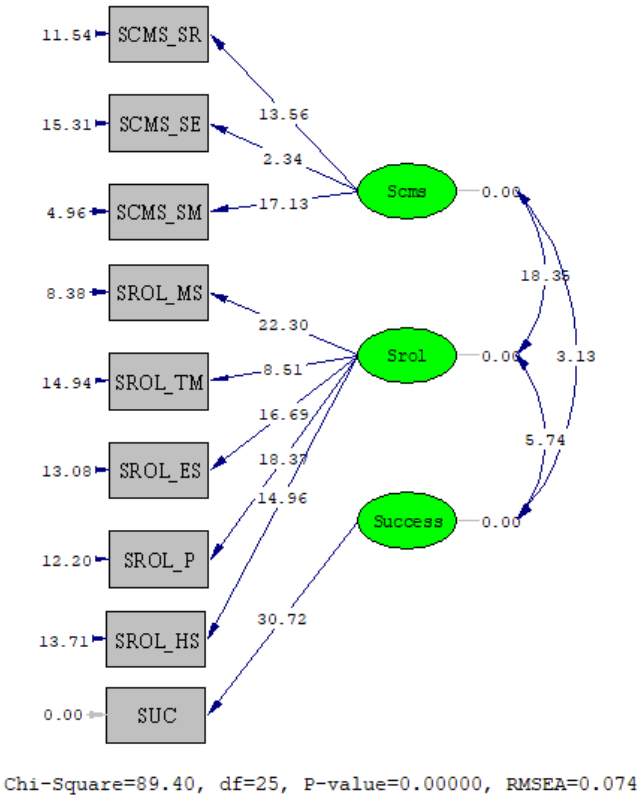

Figure 2. t-values for the factors of measurement model

According to Figure 2, the latent variables explaining the observed variable are represented by arrows with their t-values. A significant difference is observed at the significance level of .01 for all paths from latent variables to observed variables.

Goodness of fit indices have to be between certain intervals to accept a measurement model as a whole. It is imperative to examine more than one fit indices when evaluating the goodness of fit between the theoretical structure and the collected data due to the fact that each index has strengths and weaknesses. A number of common goodness-of-fit indices are used in this study, including RMSEA, NFI, NNFI, CFI, IFI, SRMR. Table 4 below presents the goodness-of-fit values obtained in this study and the acceptance criteria of various goodness-of-fit indices used in determining model fit.

Table 4. Goodness of fit values for the measurement model

Goodness of fit index	**Acceptance criteria**	**Value for the measurement model**
x2 /sd	≤ 5	3.57
Root Mean Square Error of Approximation (RMSEA)	≤ .08	.07
90 Percent Confidence Interval for RMSEA	≤ .08	(.06; .09)
Normed Fit Index (NFI)	≥ .90	.96
Non-Normed Fit Index (NNFI)	≥ .90	.95
Comparative Fit Index (CFI)	≥ .90	.97
Incremental Fit Index (IFI)	≥ .90	.97
Standardized RMR	≤ .08	.05
Goodness-of-fit Index (GFI)	≥ .90	.96
Adjusted Goodness-of-fit Index (AGFI)	≥ .90	.93

Using goodness-of-fit statistics, the measurement model meets all of the acceptance criteria, or, in other words, all values are consistent with the model at a level that can be accepted. The measurement model was confirmed based on these findings.

3.2. Findings regarding the structural model

The measure model developed in the first stage of the two-stage structural equation study had a good goodness-of-fit statistic. A structural relationship model was created and tested in the second stage that explained how latent variables relate to each other. Good fit indices showing whether the structural model can be accepted are given below, along with the standardized path coefficients of the model, their t-values, and the significant coefficients.

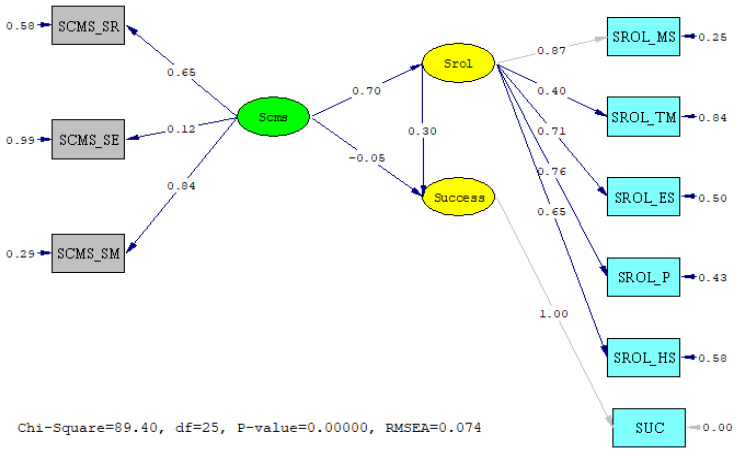

Figure 3. Standardized path coefficients of the structural model

When the relationships between latent variable of SCMS and observed variables are examined, the highest relationship exists with Self-Monitoring (SM), followed by Self-Reinforcing (SR). It is seen that the relationship between SCMS and Self-Evaluating (SE)

is lower than other factors. When the relationships between the latent variable of SROL and observed variables are examined, the highest correlation exists with Metacognitive Skills (MS), followed by Persistence (P), Environmental Structuring (ES) and Help Seeking (HS), respectively. It is seen that the lowest relationship is with Time Management (TM). It is seen that the independent variable of SCMS has a path coefficient of .70 with the mediating variable of SROL, and a path coefficient of .30 between the mediating variable and the dependent variable of achievement. The t values for the statistical significance of the standardized path coefficients of the structural model are presented in Figure 4.

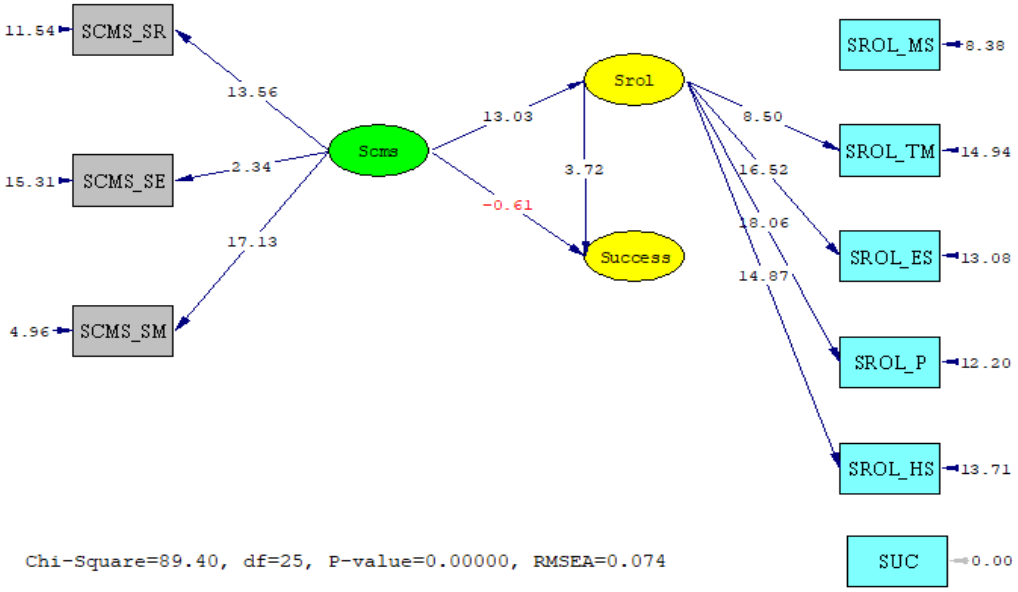

Figure 4. t-values regarding the structural model

The t value of the path from SCMS to achievement variable is not statistically significant. This led to the relevant path being removed from the model and the model being retested. In the following table, we display the standardized path coefficients of the new model, t-values indicating whether the coefficients are significant, and goodness of fit indices indicating if the model has been accepted or not.

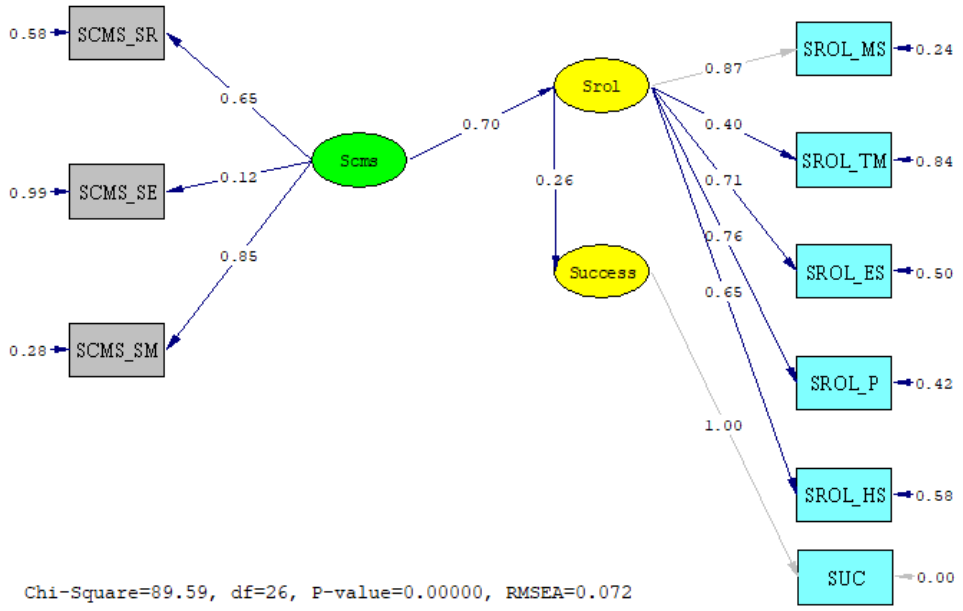

Figure 5. Standardized path factors of the revised structural model

According to the path diagram in Figure 5, the path coefficient between Self-Control and Self-Management (SCMS) and Self-Regulated Online Learning (SROL) is .70, and the path coefficient between Self-Regulated Online Learning (SROL) and achievement is .26. The t values regarding whether the above coefficients are significant or not are presented in Figure 6.

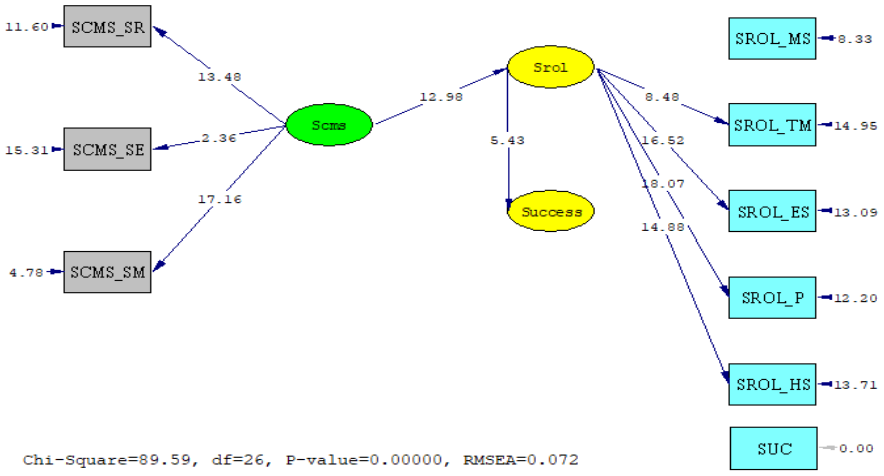

Figure 6. t-values regarding the revised structural model

Figure 6 shows that all paths are significant at the significant level of .01 considering t values of the revised structural model.

3.3. Goodness of fit values of the structural model

Table 5 presents the goodness of fit values for the structural model and the theoretical structure as well as the acceptance criteria for the goodness of fit indices.

Table 5. Goodness of fit values of the structural model

Goodness of fit index	**Acceptance criteria**	**Value for the structural model**
x2 /sd	≤ 5	3.44
Root Mean Square Error of Approximation (RMSEA)	≤ .08	.07
90 Percent Confidence Interval for RMSEA	≤ .08	(.06; .09)
Normed Fit Index (NFI)	≥ .90	.96
Non-Normed Fit Index (NNFI)	≥ .90	.96
Comparative Fit Index (CFI)	≥ .90	.97
Incremental Fit Index (IFI)	≥ .90	.97
Standardized RMR	≤ .08	.04
Goodness-of-fit Index (GFI)	≥ .90	.96
Adjusted Goodness-of-fit Index (AGFI)	≥ .90	.93

Table 5 presents the goodness-of-fit statistics for this model, which indicate that the collected data support this model at an acceptable level. The constructed model is verified since all relationships are quite high and significant.

Considering all the findings presented above, the research hypothesis regarding the mediating role of Self-Regulated Online Learning [SROL] between Self-Control and Self-Management [SCMS] and success has been confirmed. It plays a partial mediating role in the relationship between Self-Control and Self-Management [SCMS] and success. The structural equations between the variables are as follows:

Self-Regulated Online Learning = 0.70*Self-Control and Self-Management, Errorvar.= 0.51, R2 = .49

Success = 0.26*Self-Regulated Online Learning, Errorvar.= 0.93, R2 = .07

According to this finding, Self-Control and Self-Management explain 49% of the variance in Self-Regulated Online Learning. Self-Regulated Online Learning explains about 7% of the variance in academic achievement.

4. Discussion

This study aimed to determine the mediating role of self-regulated online learning in the relationship between self-control and self-management and pre-service mathematics teachers' academic achievement. The findings confirmed the mediating role of self-regulated online learning in the relationship between self-control and self-management and academic achievement. Todd et al. (1999) argue that self-management strategies increase appropriate behaviors at schools in addition to enhancing the academic performance of the students. Self-control can be regarded as the internal processes that help the individuals to direct their behavior towards the desired activities by controlling thoughts and behavior (Karoly, 1993; Epstein, 1997). It can be inferred that self-control and self-management may help individuals change or determine the results of their behaviors. This leads to the improvement of the academic performance of pre-service mathematics teachers as this study puts forth. Studies revealed that the individuals who have the ability of self-management and self-control have increased perceptions about their ability to control and organize environmental factors and increase their motivation to further develop, resulting in less dependence on others (Goldstein, 1994; Hudley, 1999). These abilities refer to self-regulation which requires individuals to master the learning processes, set their goals, determine and organize their learning strategies, and motivate themselves throughout the process (Hofer et al., 1998; Pintrich, 2000). Kremer-Hayon and Tillema's (1999) study put forth that pre-service teachers consider self-regulated learning as an important factor for their motivation to learn. These study results support the mediating role of self-regulated learning in the relationship between self-management and self-control and achievement, since self-managing and self-controlling individuals are prone to regulate their behaviors in line with their purposes as the studies verified. The individuals are not likely to take good decisions, solve problems and organize their behaviors accordingly unless they have the abilities to control and manage themselves (Fox & Calkins, 2003). As Baumeister and Vohs (2007) put forth self-regulation ability allows the individuals to motivate themselves to judge, organize and change their behaviors to resolve conflicts experienced. The participants of this study might have used their self-regulation strategies when they had problems in online learning environments in line with these findings, which supports the mediating role of self-regulated learning. The study by Zanting, Verloop, and Vermunt (2001) reveals that pre-service teachers perceive self-regulated learning as taking the initiative for their teaching processes as well as their learning processes. This implies that pre-service teachers may benefit from self-regulated learning skills both for teaching and learning processes. Pre-service mathematics teachers are prone to establish a mutually reinforcing relationship between these two processes (Ebby, 2000). Moreover, Gürel et al. (2022) poited out that the teachers' monitoring and control behaviors were affected by the goals they set. Paris and Winograd (2001) emphasize the need to understand teachers'

and pre-service teachers' own thinking processes to help their students in their learning processes. Furthermore, Hsu et al., (2009) set forth the contribution of distance education environments into pre-service teachers' self-regulated learning skills as they help them in planning, study routines, monitoring their learning performance and seeking help from others.

An attention grabbing finding of the study is that self-control and self-management has no direct effect on the achievement. This result yields that self-control and self-management alone cannot be the determinant of the achievement. Although they include perseverance, delaying instant gratification, using time effectively, planning and effective coping strategies (Kenneth, 1994; Kenneth & Keefer, 2006), it is asserted that individuals with high academic self-control obtain better grades in the long term (Tangney, Baumeister, & Boone, 2004). This suggests that self-control and self-management influence achievement over a time period or needs additional abilities, such as self-regulated learning as the study suggests, for revealing its impact in the short term. The absence of self-regulation may hinder the effect of self-control and self-management on student performance as Baumeister, Bratslavsky, Muraven, and Tice (1998) claim that people don't persist in the accomplishment of challenging tasks if they fail in the self-regulation process. What is more, teaching environment may support the regulation processes of the studens. Manning et al. (2023) put forth that engaging, interactive and inclusive learning environments may foster students' motivations to learn and engagements to the teaching processes.

The students with high self-control and self-management willingly attend the courses, and mostly have intrinsic motivation for the tasks they should overcome (Duckworth et al., 2019; Kenneth & Reed, 2009). The fact that self-management can be learnt results in the thought that individuals' performance is developed through self-management training (Frayne & Geringer, 2000). Self-regulated learning strategies may play catalyzer role in this relationship according to the findings of this study. Hence, the stakeholders in education are suggested to be aware of the role of self-control and self-management skills and self-regulated strategies in academic development of the individuals especially in this period which revealed the importance of these skills in distance education as well as face-to-face education. Accordingly, necessary arrangements can be made in teachers' professional development processes and pre-service teacher training.

References

Adam, N. L., Alzahri, F. B., Cik Soh, S., Abu Bakar, N., & Mohamad Kamal, N. A. (2017, November). Self-regulated learning and online learning: a systematic review. In *International Visual Informatics Conference* (pp. 143-154). Springer.

Artino, A. R. (2008). A conceptual model of self-regulation online. *Academic Exchange Quarterly*, *12*(4), 21-27.

Barlovits, S., Jablonski, S., Lázaro, C., Ludwig, M., & Recio, T. (2021). Teaching from a Distance—Math Lessons during COVID-19 in Germany and Spain. *Education Sciences*, *11*(8), 406.

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.

Bates, T. (2018). The 2017 national survey of online learning in Canadian post-secondary education: methodology and results. *International Journal of Educational Technology in Higher Education*, *15*(1), 1-17.

Baumeister, R. F., & Vohs, K. D. (2007). Self-regulation, ego depletion and motivation. *Social and Personality Psychology Compass, 1*(1), 115 – 128.

Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology, 74*(5), 1252-1265.

Cambridge Information Literacy Network. (2020). *Finding and using resources: Taking notes.* Retrieved from https://libguides.cam.ac.uk/camguides/findingandusingresources/notetaking

Chen, K. Z., & Li, S. C. (2021). Sequential, typological, and academic dynamics of self-regulated learners: Learning analytics of an undergraduate chemistry online course. *Computers and Education: Artificial Intelligence*, *2*, 100024.

Claro, S., & Loeb, S. (2019). Self-management skills and student achievement gains: Evidence from California's CORE districts. *EdWorking Paper*, *19*(138), 1-35.

Costa, R. D., Souza, G. F., Valentim, R. A., & Castro, T. B. (2020). The theory of learning styles applied to distance learning. *Cognitive Systems Research*, *64*, 134-145.

Duckworth, A. L., & Kern, M. L. (2011). A meta-analysis of the convergent validity of self-control measures. *Journal of Research in Personality*, *45*(3), 259-268.

Duckworth, A. L., Quinn, P. D., & Tsukayama, E. (2012). What No Child Left Behind leaves behind: The roles of IQ and self-control in predicting standardized achievement test scores and report card grades. *Journal of Educational Psychology*, *104*(2), 439.

Duckworth, A. L., Taxer, J. L., Eskreis-Winkler, L., Galla, B. M., & Gross, J. J. (2019). Self-control and academic achievement. *Annual Review of Psychology*, *70*(1), 373-399.

Duckworth, A. L., Tsukayama, E., & May, H. (2010). Establishing causality using longitudinal hierarchical linear modeling: An illustration predicting achievement from self-control. *Social Psychological and Personality Science*, *1*(4), 311-317.

Ebby, C.B. (2000). Learning to teach mathematics differently: The interaction between coursework and fieldwork for preservice teachers. *Journal of Mathematics Teacher Education, 3*, 69-97.

El-Adl, A., & Alkharusi, H. (2020). Relationships between self-regulated learning strategies, learning motivation and mathematics achievement. *Cypriot Journal of Educational Sciences*, *15*(1), 104-111.

Epstein, R. (1997). Skinner as a self-manager. *Journal of Applied Behavior Analysis, 30*(3), 545-568.

Fox, N. & Calkins, S. (2003). The development of self-control of Emotion. *Motivation and Emotion, 27*(1), 7-26.

Frayne, C. A., & Geringer, J. M. (2000). Self-management training for improving job performance: A field experiment involving salespeople. *Journal of Applied Psychology, 85*(3), 361–372.

Galla, B. M., & Duckworth, A. L. (2015). More than resisting temptation: Beneficial habits mediate the relationship between self-control and positive life outcomes. *Journal of Personality and Social Psychology*, *109*(3), 508.

Galla, B. M., Shulman, E. P., Plummer, B. D., Gardner, M., Hutt, S. J., Goyer, J. P., . . . Duckworth, A. L. (2019). Why high school grades are better predictors of on-time college graduation than are admissions test scores: The roles of self-regulation and cognitive ability. *American Educational Research Journal, 56*(6), 2077-2115. doi:10.3102/0002831219843292.

Goldstein, P. A. (1994). *Student aggression: prevention, management, and replacement training*. Guilford Press.

Goulão, M. D. F., & Cerezo Menendez, R. (2015, June). The role of self-monitoring in adult learning in online context. In *1ST Internatıonal Conference on Hıgher Educatıon Advances (HEAD'15)* (pp. 18-25). Editorial Universitat Politècnica de València. https://doi.org/10.4995/HEAd15.2015.416

Gürel, R., Bozkurt, E., Yıldız, P., & Yetkin Özdemir, İ. E. (2022). An investigation on self-regulation activities of novice middle school mathematics teachers. *Journal of Pedagogical Research, 6*(4), 168-189.

Halford, W. (2003). *Brief therapy for couples*. Guilford.

Halif, M. M., Hassan, N., Sumardi, N. A., Omar, A. S., Ali, S., Aziz, R. A., ... & Salleh, N. F. (2020). Moderating effects of student motivation on the relationship between learning styles and student engagement. *Asian Journal of University Education*, *16*(2), 93-103.

Hofer, M., Kuhnle, C., Kilian, B., & Fries, S. (2012). Cognitive ability and personality variables as predictors of school grades and test scores in adolescents. *Learning and Instruction*, *22*(5), 368-375. http://dx.doi.org/10.1016/B978-0-08-097086-8.26060-1

Hudley, C. (1999). *Problem behavior in middle childhood: understanding risk status and protective factors*. Paper Presented at the Annual Meeting of American Educational research Association, California.

Hsu, Y.-C., Ching, Y.-H., Mathews, J. P., & Carr-Chellman, A. A. (2009). Undergraduate students' self-regulated learning in web-based learning environments. *Quarterly Review of Distance Education, 10*(2), 109-122.

Hwang, G. J., Wang, S. Y., & Lai, C. L. (2021). Effects of a social regulation-based online learning framework on students' learning achievements and behaviors in mathematics. *Computers & Education*, *160*, 104031.

Jeynes, W. H. (2008). A meta-analysis of the relationship between phonics instruction and minority elementary school student academic achievement. *Education and Urban Society, 40*(2), 151-166.

Karoly, P. (1993). Mechanisms of self-regulation: A system view. *Annual Review of Psychology, 44*, 23- 52.

Kennett, D. J. (1994). Academic self-management counselling: preliminary evidence for the importance of learned resourcefulness on program success. *Studies on Higher Education, 19*(3), 295-307.

Kennett, D. J., & Keefer, K. (2006). Impact of learned resourcefulness and theories of intelligence on academic achievement of university students: An integrated approach. *Educational Psychology, 26*, 441–457.

Kennett, D. J., & Reed, M. J. (2009). Factors influencing academic success and retention following a 1st-year postsecondary success course. *Educational Research and Evaluation, 15*, 153–166.

Kremer-Hayon, L, & Tillema, H. H. (1999). Self-regulated learning in the context of teacher education. *Teaching and Teacher Education, 15,* 507-522.

Kulusaklı, E. (2022). Exploring self-regulated online learning skills of EFL learners in distance education. *Turkish Online Journal of Distance Education, 23*(1), 86-96. https://dergipark.org.tr/en/pub/tojde/issue/67387/1050356

Landrum, B. (2020). Examining Students' Confidence to Learn Online, Self-Regulation Skills and Perceptions of Satisfaction and Usefulness of Online Classes. *Online Learning*, *24*(3), 128-146.

Lindner, C., Nagy, G., & Retelsdorf, J. (2018). The need for self-control in achievement tests: changes in students' state self-control capacity and effort investment. *Social Psychology of Education*, *21*(5), 1113-1131.

Manning, L., Murray, F., Hall Lang, E., Munsey, B., & Wigington, T. (2023). Learning experiences within helping disciplines: Faculty and student observations. *Journal of Pedagogical Sociology and Psychology, 5*(1), 31-43. https://doi.org/10.33902/jpsp.202315517

Massachusetts Institute of Technology. (2020). *MIT open course ware*. Retrieved from https://ocw.mit.edu/.

McClelland, M. M., & Cameron, C. E. (2011). Self-regulation and academic achievement in elementary school children. *New directions for child and adolescent development*, *2011*(133), 29-44.

Mezo, P. G. (2009). The self-control and self-management scale (SCMS): Development of an adaptive self-regulatory coping skills instrument. *Journal of Psychopathology and Behavioral Assessment, 31*(2), 83–93.

Mezo, P. G., & Heiby, E. M. (2011). Proposed cut-off scores for self-management questionnaires. *Clinical Psychologist, 15*(2), 78–84.

Mischel, W, Shoda, Y, & Peake, P. K. (1988). The nature of adolescent competencies predicted by preschool delay of gratification. *Journal of Personality and Social Psychology, 54,* 687-69.

Mischel, W. (2014). *The Marshmallow Test: Mastering self-control.* New York: Little, Brown

National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematics success for all.* Reston, VA: Author.

Organisation for Economic Cooperation and Development [OECD]. (2016). *PISA 2015 results: excellence and equity in education*. Paris: Author.

Paris, S. G., & Winograd, P. (2001). *The role of self-regulated learning in contextual teaching: Principles and practices for teacher preparation* (ERIC Document Reproduction Service No. ED479 905). U.S. Department of Education.

Petillion, R. J., & McNeil, W. S. (2020). Student experiences of emergency remote teaching: Impacts of instructor practice on student learning, engagement, and well-being. *Journal of Chemical Education*, *97*(9), 2486-2493.

Pintrich, P. R. (2000). Issues in self-regulation theory and research. *The Journal of Mind and Behavior*, 213-219. https://www.jstor.org/stable/43853917#metadata_info_tab_contents

Rascón-Hernán, C., Fullana-Noell, J., Fuentes-Pumarola, C., Romero-Collado, A., Vila-Vidal, D., & Ballester-Ferrando, D. (2019). Measuring self-directed learning readiness in health science undergraduates: A cross-sectional study. *Nurse education today*, *83*, 104201.

Rutherford, T., Karamarkovich, S. M., Xu, D., Tate, T. P., Sato, B., Baker, R. B., & Warschauer, M. (2021). Profiles of instructor responses to emergency distance learning. *Online Learning*, *25*(1), 86-114.

Sahidin, L. & Jamil, D. (2013). Pengaruh motivasi berprestasi persepsi siswa tentang cara guru mengajar terhadap hasil belajar matematika. *Jurnal Pendidikan Matematika, 4*(2), 213-223. http://ojs.uho.ac.id/index.php/JPM/article/view/2034/pdf

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* (2nd ed., pp. 153–189). Hillsdale, NJ: Erlbaum

Stanford (2020). *My Stanford connection*. Retrieved from https://online.stanford.edu/.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality and Social Psychology, 72*(2), 271-324.

Todd, A. W., Horner, R. H., & Sugai, G. (1999). Self-monitoring and self-recruited praise: Effects on problem behavior, academic engagement, and work completion in a typical classroom. *Journal of Positive Behavior Interventions, 1*(2), 66–76.

Usher, E. L., & Pajares, F. (2009). Sources of self-efficacy in mathematics: A validation study. *Contemporary educational psychology*, *34*(1), 89-101.

Verstege, S., Pijeira-Díaz, H. J., Noroozi, O., Biemans, H. & Diederen, J. (2019). Relations between students' perceived levels of self-regulation and their corresponding learning behavior and outcomes in a virtual experiment environment. *Computers in Human Behavior, 100,* 325-334. https://doi.org/10.1016/j.chb.2019.02.020

Yavuzalp, N., & Özdemir, Y. (2020). Adaptation of the Self-Regulated Online Learning Questionnaire (SOL-Q). *Journal of Higher Education, 10*(3), 269–278. https://doi.org/10.2399/yod.19.512415

Weinstein, C. S. (1998). "I want to be nice, but I have to be mean": Exploring prospective teachers' conceptions of caring and order. *Teaching and teacher education*, *14*(2), 153-163.

Zanting, A., Verloop, N., & Vermunt, J. D. (2001). Student teachers' beliefs about mentoring and learning to teach during teaching practice. *British Journal of Educational Psychology, 71,* 57-80.

Zimmerman, B. J. (2015). Self-Regulated Learning: Theories, Measures, and Outcomes. In J. D. Wright (Ed.), *International Encyclopedia of the Social & Behavioral Sciences* (pp. 541-546). Oxford: Elsevier.