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Developing the Perceived Self-Regulation Skills Scale for Fourth Grade Students

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Abstract

This paper presents the development process of the Perceived Self-Regulation Skills Scale for primary fourth grade students. The 34-item trial form of the scale consists of 4-point Likert-type items that range from 1 to 4 as follows: 1 – Never, 2 – Sometimes, 3 – Often, and 4 - Always. It was administered to 585 fourth grade students in six primary schools. The total variance explained by three factors found as a result of Exploratory Factor Analysis (EFA) was calculated as 39.61%. The scale consists of 26 items - 12 items with factor load value varying between .32 and .74 in the first dimension; 4 items with factor load value varying between .51 and .67 in the second dimension, and 10 items with factor load value varying between .32 and .56 in the third dimension. The dimensions were named as follows: the first dimension is "Planning the Learning Process", the second dimension is "Implementation of the Learning Plan" and the third dimension is "Focusing on the Target and Learning Task". The validity study was carried out for 529 fourth grade students attending 11 primary schools. The goodness-of-fit index (GFI) which was calculated as a result of Confirmatory Factor Analysis (CFA) shows that the items of the Perceived Self-Regulation Skills Scale are in good or perfect accordance.

Keywords: *primary education; primary school students; self-regulated learning*

Introduction

There are many cognitive, behavioural, emotional and social factors affecting learning. One of the necessary and significant skills during lifelong learning process is self-regulation. As Bandura (2001) and Zimmerman (1990) pointed out, self-regulation is an affective skill for people to adapt to changes. Bayındır and Ural (2016) state that primary school students start to use mental strategies so as to express themselves by

understanding their emotions and thoughts, to behave in accordance with social and moral values, to control their own thoughts and behaviors by reaching determined goals and meeting the expectations of others. The development of self-regulation skills at an early age - preschool and primary school periods - confers responsibilities to educational institutions and families. Therefore, it is considered that there is a need for program studies and research to be conducted at primary school period for the development of self-regulation.

The common elements of self-regulation of an individual are: determining the learning goals, arranging a motivational level, and choosing and effectively demonstrating cognitive and metacognitive behaviors to reach goals (Bandura, 1991; Pintrich, 2004; Zimmerman, 1989). According to Zimmerman (2002, p. 65), self-regulation is not a mental ability or academic performance; it is a developing process in which learners transform their mental abilities into academic skills. In this process, learners are expected to be active before learning and to take future precautions (Bandura, 2008; Zimmerman, 2002). Self-regulation also requires learners to adapt their behaviors according to learning tasks or context (Garcia & Pintrich, 1995). These characteristics of students are also called self-regulation, self-regulation strategies and self-regulation skills. In this study, the concept of self-regulation skills is preferred due to focusing on measurement of primary school students' concrete behaviors in learning activities.

According to Zimmerman (2002), the acquisition and development of self-regulatory learning skills play an important role in increasing students' academic success. Studies reveal that self-regulation skills significantly predict students' academic achievement in Mathematics (Adams et al., 2015; Alçı, 2007; Budak, 2016; Ocak & Yamaç, 2013; Üredi & Üredi, 2005), English (Özdinç-Delbesoğlugil, 2013) and Science and Technology (Karabacak, 2014) courses; in fact, the achievement score in the Transition from Basic Education to Secondary Education (TEOG) exam in all courses in Turkey (Süer & Altun, 2015). Self-regulation skills, which were defined as independent variables in experimental research, were found to have a significant effect on students' academic achievement (Arsal, 2009; Gülay, 2012; Kadıoğlu, 2014; Zimmerman & Ringle, 1981), perception of self-efficacy in Mathematics (Ataş, 2009), Chemistry self-efficacy perception (Kadioglu, 2014), achievement and self-efficacy in Science (İsrael, 2007), reading (Birgisdóttir et al., 2015; Kılıç, 2016; Uyar, 2015) and writing (Kılıç, 2016).

Studies have shown that students use self-regulation skills at a limited level in classes where they have the responsibility of learning and even where effective learning opportunities are provided (Arslantaş, 2015; Cabı, 2015; Demirel et al., 2014; Güdücübaş, 2012; Ocak & Yamaç, 2013; Özen, 2016). Therefore, research is needed in order to develop self-regulation skills. Moreover, given the studies on this field, it is seen that studies on the self-regulation skills of children in primary school are scarce (e.g., Arsal, 2009; Ataş, 2009; Budak, 2016; Ferreira & Simão, 2012; Gülay, 2012; Gündoğdu, 2006; Pratt et al., 2016; Uygun, 2012). According to Arsal's (2009) experimental study which was carried

out with fourth grade students, it was revealed that an educational program aiming to improve self-regulation skills has provided a significant increase in students' academic achievement in Mathematics. However, in another study, it was found that a similar educational program didn't create a significant difference in Mathematics achievement (Ataş, 2009). Budak (2016) found that self-regulation skills of fourth grade students did not show a significant difference according to gender, pre-school education background and educational level of parents. Considering these studies, it is beneficial to increase the number of studies on the self-regulation skills of primary school students.

One of the important elements in increasing the quantity and quality of self-regulation studies conducted at primary level is to develop valid and reliable scales. This study started as a result of the pursuit in developing a scale different from the limited ones in literature, with regard to measurement of self-regulation skills of primary school students.

Scale development studies for self-regulation skills in Turkey

In international literature, there are numerous studies on developing of a scale for measuring self-regulation skills (e.g**.,** Garcia & Pintrich, 1995; Gavora et al., 2015; Magno, 2010; Nausheen, 2016; Pintrich et al., 1993; Vandevelde et al., 2013; Velayutham et al., 2011; Zimmerman & Martinez-Pons, 1988). Some scale development studies have been conducted to construct self-regulation skills scales fit for Turkish children. These studies were conducted with a large study population from preschool to higher education. It is obvious that there were attempts to develop separate scales for each formal education level. Some of the studies are summarized below.

Fındık-Tanrıbuyurdu and Güler-Yıldız (2014) adapted Preschool Self-Regulation Scale to the Turkish context, which was developed by Smith-Donald et al. (2007). As a result of the Exploratory Factor Analysis (EFA), the scale was found to have a two-factor structure and these factors accounted for 52% of total variance. Confirmatory factor analysis (CFA) results showed that the fit indices of this construct were acceptable (χ^2/df = 2.51, CFI = .90, NNFI = .88, IFI = .90, RMSEA = .11, GFI = .79, AGFI = .72). They found that the internal consistency coefficient (α) was .88 for "Attention/Impulse Control" dimension, .80 for "Positive Emotion" dimension and .83 for the whole scale. There are 16 items in this scale which must be filled with expert or teacher observation.

Bayındır and Ural (2016) developed Self-Regulation Skills Scale by collecting data from 447 children in Istanbul, aged between 48 and 72 months. They calculated the validity index of the scale as .78. The EFA results showed that the scale had a two-factor structure and these factors accounted for 55.71% of total variance. The first factor with 21 items that have factor loadings ranging from .60 to .80 was named "Regulatory Skills", while the second factor with 12 items that have factor loading values ranging from .58 to .82 was named "Control Skills". The internal consistency coefficient (α) was found to be .96 for the first factor, .93 for the second factor, and .96 for the whole scale. The Pearson correlation coefficient for the test-retest reliability had two factors, and it was

.99 for the whole scale. In addition, the scores between Preschool Self-Regulation Scale, which Fındık-Tanrıbuyurdu and Güler-Yıldız (2014) adapted to the Turkish context, and this scale were found to be significant (r = .69, p = .000).

Doğan (2015) adapted the Children's Perceived Use of Self-Regulated Learning Inventory, which was developed by Vandevelde et al. (2013), to the Turkish context. The pilot study of the inventory was conducted with 469 fourth grade students in primary school in Istanbul. As a result of EFA based on the data, it was found that the inventory had a three-factor structure, and these factors accounted for 63.31% of total variance. According to CFA results, it was concluded that the fit indices of the inventory indicated a perfect fit (χ^2/df = 1.72, p = .00, CFI = .99, NNFI = .99, IFI = .99, RMSEA = .04, GFI = .91, AGFI = .90). The internal consistency coefficient (α) of the inventory consisting of 32 items was calculated as .97 for the first factor; .84 for the second factor; .79 for the third factor; and .97 for the whole inventory. The Pearson correlation coefficient was calculated as .999 in the test-retest application performed with 106 students of the sample 12 weeks later. However, it is noteworthy that the factors of the inventory were not named.

Güdücübaş (2012) re-applied the validity and reliability analyses of the Self-Regulation Skill Scale, which was developed by Arslan A. (2008), with 474 fifth grade students in Ankara. As a result of CFA, it was determined that the scale did not have the original factor structure (χ2 = 4507.4, df = 170, p = .01, CFI = .49, RMSEA = .06, GFI = .71, AGFI = .69). As a result of EFA by Varimax vertical axis rotation technique, the scale was found to have a three-factor structure. The factor loadings of 20 scale items varied between .47 and .95. The internal consistency coefficient (α) of the scale was calculated for all three factors, namely "Cognitive Regulations", "Regulation of Effort" and "Regulation of Time and Work" and the whole scale, as .88, .79, .55 and .89, respectively.

İsrael (2007) developed the Self-Regulation Scale for secondary school students. EFA results of the data collected on the sample of 587 sixth grade students in Izmir showed that the scale had an eight-factor structure and indicated that these factors accounted for 55.21% of total variance. These factors were named "Working on Comprehension", "Regulation of Studying", "Regulation of the Follow-up Lesson", "Controlling the Results", "Self-Assessment", "Focusing on Success", "Maintaining Study" and "Implementing Additional Studying". The internal consistency coefficient (α) of sub dimensions of the scale ranged from .69 to .81.

In another study, in which the Self-Regulation Scale for secondary school students was developed, EFA was administered on the data of 207 seventh grade students. As a result, it was found that the scale had a one-factor structure and the variance explained by this factor was 31 %. The internal consistency coefficient of the 20-item scale with factor loadings ranging from .41 to .69 was found to be .87 (Arslan, 2008).

Arslan (2014) conducted the validity and reliability analyses of the Perceived Self-Regulation Scale on the data collected on the sample of 604 secondary school students. EFA results revealed that the scale had two factors and these factors accounted for 54.3 %

of total variance. The fit indices calculated by CFA (χ^2/df = 1.55, CFI = .99, IFI = .99, RMSEA = .04, GFI = .94, AGFI = .92) also indicated the perfect structure fit of the scale. The load values of the 8-item first factor named "Being Open" ranged between .56 and .75; the load values of the 8-item second factor named "Pursuit" ranged between .55 and .75. The internal consistency coefficient (α) of the scale was calculated as .80 for the "Being Open" factor; .85 for the "Pursuit" factor and .90 for the whole scale.

The Self-Regulatory Learning Strategies Scale development study for high school students was carried out by Kadıoğlu et al. (2011). EFA results based on the pilot study data of 422 high school students showed that the scale had an eight-factor structure. These eight factors accounted for 62% of total variance. CFA results found by re-applying the scale to 616 high school students confirmed the eight-factor structure (AGFI = .84, RMSEA = .06, NNFI = .89, CFI = .91, RMR = .06, SRMR = .06). These factors are "Motivation Regulation", "Effort Regulation", "Planning", "Attention Focusing", "Summary Strategy", "Highlighting Strategy", "Self-Instruction" and "Using Additional Resources". The internal consistency coefficient (α) of the factors was between .68 and .82.

The subscales of Self-Regulation Scale for Learning developed by Erdoğan (2012) for undergraduate level are "Self-Regulatory Learning Skills" and "Motivation". Self-Regulatory Learning Skills subscale included different strategies in three sub-dimensions before, during and after the study. The scale was applied on a sample of 872 students. As a result of EFA, four dimensions and a structure with 18 factors were found. CFA results confirmed a four-dimension and 17-factor structure in the corrected model. These 17 factors accounted for 64.48% of total variance. The internal consistency coefficient (α) of the final scale form was .91.

Another study at undergraduate level was adapted to the Turkish context from the English version of the Self-Regulation Scale (Diehl et al., 2006), which was originally developed in German language. According to EFA results based on the data of 389 undergraduate students, it was found that the scale had a single factor (explained variance = 51.43%). Fit indices found by CFA (χ^2/df = 2.85, p = .000, CFI = .99, RMSEA = .07, NNFI = .98) indicated acceptable and/or perfect fit. The internal consistency coefficient (α) of the 7-item scale was calculated as .84; test-retest reliability coefficient was calculated as .67 (Demiraslan et al., 2015).

There are additional adaptation studies where self-regulation is a subscale or a dimension (Büyüköztürk et al., 2004; Karadeniz et al., 2008; Üredi, 2005). For instance, Üredi (2005) adapted the Motivational Strategies Scale for Learning, which was developed by Pintrich and De Groot (1990) and has a subscale called "Self-Regulatory Learning Strategies". The validity and reliability analyses of the scale were performed on the data of 100 students at undergraduate level. As a result, the variance explained by the Self-Regulatory Learning Strategies Scale was calculated as 41.82 %. The internal consistency coefficient (α) was .82 for the "Use of Cognitive Strategy" subdimension and .84 for the "Self-Regulation" subdimension.

As shown above, the scale development studies that can be used to assess self-regulation skills in the Turkish context were carried out either through adaptation or were developed entirely. It is noteworthy that the scale dimensions developed for secondary and upper levels increased in number. It draws attention to the fact that subdimensions of the scales in these studies were mostly named based on the self-regulation models of Pintrich and De Droot (1990) and Zimmerman (2002). When the items of the inventory adapted by Doğan (2015) for primary school students were examined, it was observed that learning strategies were widely included. CFA results of the scale adapted by Güdücübaş (2012) do not seem satisfactory. In this study we aim to discuss self-regulation more extensively than is the case with other studies in the literature.

Purpose of the study

The aim of this study was to develop a highly valid and reliable scale that can be used to measure the perceptions of primary school students' self-regulation skills. For this purpose, it is considered that measuring the self-regulation skills of primary school students is important in terms of revealing their perceptions. In addition, based upon Zimmerman's (2002) claim that development of self-regulation skills at an early age increases academic achievement of students, it is expected that this scale, which was developed for primary school students, contributes to studies on the subject and beyond this field.

Method

Sample

The sample of the study consisted of fourth grade students enrolled in primary schools in Izmir. Two data collection procedures are required for the pilot and validation study. Therefore, two different samples were selected in the study. Three primary schools for the pilot study and 11 primary schools for validation study were selected through easily accessible sampling method. In the pilot study, the data were collected from six primary schools (n = 585) in three districts of İzmir, Turkey. The validation study was carried out on 529 fourth grade students of 11 primary schools in five districts of İzmir province. In both samples participation in the study was voluntary.

The development of the scale

In order to develop the Perceived Self-Regulation Skills Scale, the studies and measurement instruments related to self-regulation concept were examined. Considering Zimmerman's (2002) classification, a 40-item draft which is thought to be appropriate for the developmental characteristics of fourth grade students was developed by researchers. Eight experienced classroom teachers examined this draft form first and then this form was used to determine the comprehensibility of the items for fourth grade students. The teachers implemented the procedure and the students were tested, also ensuring that the students understand each item. In accordance with the suggestions from the teachers, five items in the draft form were removed because they were not suitable for the students' developmental characteristics or were incomprehensible. After these procedures the draft form was reduced to 35 items.

The 35-item draft form was examined by four experts in the fields of measurement and evaluation, curriculum and instruction, psychological counseling and guidance and classroom teaching. The experts suggested that some items should be verbalized more adequately to match the developmental characteristics of the students, more motivation items should be added to the scale, "learning" concept should be used instead of "studying", and the number of negative expressions should be reduced. After receiving feedback from the experts, two items were removed from the scale, whereas one new item was added. In addition, some of the items were written more clearly and some negative items were changed to positive items. The final version of the draft form included 34 items, out of which 6 were negative and 28 were positive. Items were formatted on a four-point Likert-type scale and the scale was as follows: 1 = Never, 2 = Sometimes, 3 = Often and 4 = Always.

The scale was administered by researchers and three graduate students. Before administering the scale, the data collection team had organized meetings about the scale administration process and they reached an agreement. These processes were written in a document and distributed to all members of the data collection team. A researcher and a master's student collected initial data by going to school together in order to provide unity in the implementation of the scale. Then, each school's data was collected by a different researcher or a master's student.

Detailed information about the purpose of the scale, the number of items and how to answer them was given to primary school students before administering the scale. Each student was given sufficient time to complete the scale. It took 15-25 minutes to fill in the scale.

Data analysis

EFA was used to analyze the data gathered from the pilot study for exploring the underlying dimensions of the Perceived Self-Regulation Skills Scale. In the data obtained from the pilot study, the negative items (4, 10, 21, 23, 25 and 27) were reverse coded and computerized. The data were checked and it was determined that there were not any missing data. In order to determine the suitability of this dataset to apply EFA, the chi-square statistics were found to be significant ($\chi^2 = 4948.99$; $p = .000$) and the Kaiser-Meyer-Olkin (KMO) coefficient was calculated as .93. The KMO coefficient is required to be greater than .60 and Barlett's test must be significant for the data to be suitable for factor analysis (Büyüköztürk, 2010). In addition, Comrey and Lee (1992) described the 585-individual sample size reached in this study as very good for EFA (cited in Pearson & Mundform, 2010). For these reasons, the dataset was found to be suitable for EFA. In the EFA process, the Principal Components Analysis and Direct Oblimin rotation method were employed, respectively.

The correlation coefficient between the factors determined by EFA and the total score was calculated. The compliance of the structure as a result of EFA was tested by applying the single-level CFA using LISREL 8.80 on the data obtained from the experimental

(actual) implementation of the scale. For CFA, a three-factor structural model was designed based on the items to be included in the scale as a result of EFA and theoretical classification in the literature, particularly self-regulation dimensions described by Zimmerman (1998). Path analysis was performed for this model and compliance indices were calculated. Kline (2005) stated that path analysis can be described as "large" when sample size is greater than 200. This study was considered appropriate for Path analysis due to 529-individual sample of CFA.

The validity of the final version of the scale was also tested based on internal criteria. For this procedure, upper and lower 27% subgroups were determined based on the total scale scores of 529-individual dataset by CFA. The total scores of 143 students were included in both groups. The significant difference between total scores of upper and lower groups was tested by applying t-test for independent groups on these scores. The internal consistency reliability level related to the scale and its dimensions was determined by calculating the Cronbach's Alpha reliability coefficient.

Findings

The results of the pilot study and validation study of Perceived Self-Regulation Skills Scale are presented below.

Findings of the pilot study

As a result of EFA applied to the pilot study data of the scale, 10 factors were determined with eigenvalues greater than 1 criterion. However, when evaluated with Scree Plot, it was observed that the graph followed a horizontal line after the third factor. Scree Plot obtained by the EFA result is given in Figure 1.

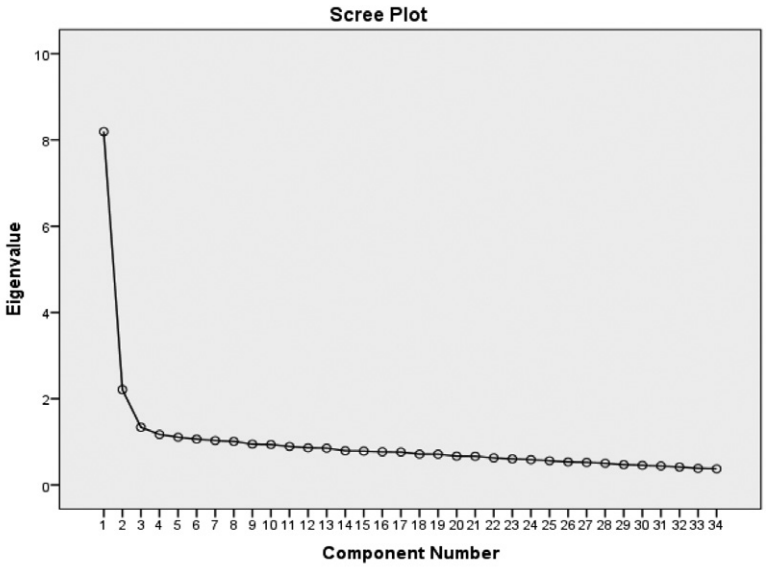

Figure 1. Scree plot

Based on the Scree Plot and the literature in the study, the Perceived Self-Regulation Skills Scale was determined as three-factor. After the factor analysis was reapplied as three-factor, the items with the factor load value below .317 were detected. 8 items (4, 20, 22, 25, 26, 30, 34 and 18) which were cyclical with low factor loadings were omitted from the dataset one by one and the analysis was repeated. As a result of the factor analysis using Direct Oblimin rotation method, the total variance explained by three factors was calculated as 39.61%. The total variance explained by each factor was 27.49%, 7.06% and 5.06%, respectively. Factor loadings of the items are given in Table 1.

Table 1

Factor loadings of the items scores

	Items	Factor Loadings		
		1	2	3
1	I make a daily to-do list.	.74		
6	I make a schedule for my learning tasks.	.70		
14	I take notes to remember my learning tasks and responsibilities.	.70		
7	Before I start studying, I plan how.	.65		
24	I check if I do my learning tasks properly.	.60		
28	I make a review of subjects even if I do not have homework.	.59		
29	I check if I do the tasks that I plan about my lessons.	.52		
11	I think about how to study a subject/lesson to learn better.	.42		
3	I would like to learn new things.	.38		
18	I concentrate on what I study at that moment.	.38		
12	Regardless of the school subject, I always find a way to learn.	.34		
17	I create an environment in which I can study at school, at home or elsewhere (required course materials, sound and light preference, etc.)	.32		
21	If my teacher or someone else does not like my work, I stop studying.		.67	
27	I forget to do my homework.		.60	
23	I hurry to finish my study as soon as possible.		.52	
10	If it's too hard for me to learn, I stop studying.		.51	
13	I change my way of working if I am not able to learn a subject.			.56
2	I aim to be good at my courses/lessons.			.55
31	After studying a subject, I think about if I have learned it or not.			.55
33	If I am not able to learn a subject, I think about the reasons.			.54
32	I realize when I can't learn about a subject/lesson.			.52
16	When my teacher asks me to do a study in class, I do it on my own.			.49
15	I use different study methods for different subjects/topics.			.44
19	I complete my assignments at home/school on time.			.44
5	I set some learning goals for each course.			.43
8	I bring the necessary tools (book, notebook, crayons, ruler, etc.) to school.			.32

As seen in Table 1, 12 items (1, 6, 14, 7, 24, 28, 29, 11, 3, 18, 12 and 17) were loaded on the first factor; 4 items (21, 27, 23, and 10) on the second factor; 10 items (13, 2, 31, 33, 32, 16, 15, 19, 5 and 8) on the third factor. These factors show the dimensions of the scale. The first dimension consists of 12 items with factor loadings ranging between .32 and .74; the second dimension consists of 4 items with factor loadings ranging between .51 and .67; the third dimension consists of 10 items with factor loadings ranging between .32 and .56.

When the items in the first dimension of the scale are examined, it is evident that they include the statements showing that students make plans for any learning material, that they plan in general and start the learning process by themselves. This dimension was named "Planning the Learning Process". The second dimension was named "Implementation of the Learning Plan" and it includes students' commitment to a learning plan and behaviors of pressing ahead the learning process while engaging in the learning activities. The last dimension, which was named "Focusing on the Target and Learning Task", consists of items that show students setting their learning goals, choosing and applying appropriate strategies to achieve these goals, performing the tasks given by the teacher and evaluating if they have achieved their goals.

The correlation coefficients calculated among the factors identified by EFA results indicated a significant relationship between the "Planning Learning Process" factor and the "Focusing on the Target and Learning Task" factor ($r = .92$, $p = 0.02$) at .05 level. However, it was determined that there was no significant relationship between the "Planning the Learning Process" factor and the "Implementation of the Learning Plan" factor ($r = .57$, $p = 0.05$); and the "Implementation of the Learning Plan" factor and the "Focusing on the Target and Learning Task" factor ($r = .57$, $p = 0.05$). Besides, it can be interpreted that there is an acceptable relationship among the subscales of the scale as *p* values are at .05 level.

Findings of the validation study

Maximum likelihood, squared multiple correlation (R2) and t-values, which were calculated as a result of CFA applied in order to confirm the compatibility of the three-factor structure created by EFA, are given in Table 2.

Table 2

Confirmatory factor analysis results (n = 529)

Item number	Parameter Estimates	R^2	*t*-value
1	0.55	0.34	13.90
2	0.23	0.19	9.68
3	0.19	0.13	7.94
4	0.51	0.32	13.11
5	0.58	0.29	12.61
6	0.67	0.43	16.20
7	0.26	0.16	8.96

Item number	Parameter Estimates	R^2	*t*-value
8	0.39	0.29	10.37
9	0.46	0.37	14.66
10	0.35	0.33	13.74
11	0.38	0.12	7.55
12	0.43	0.22	10.76
13	0.47	0.21	10.39
14	0.26	0.06	5.09
15	0.43	0.20	10.20
16	0.32	0.27	12.16
17	0.36	0.26	11.58
18	0.38	0.31	10.84
19	0.38	0.13	6.92
20	0.54	0.42	15.91
21	0.38	0.32	10.97
22	0.63	0.46	16.82
23	0.55	0.38	14.99
24	0.49	0.30	12.65
25	0.39	0.19	9.80
26	0.50	0.30	12.66

As seen in Table 2, t-values of the scale items vary between 5.09 and 16.82. Duncan (1975) stated that t-value is significant at .05 level if it exceeds 1.96 and at .01 if it exceeds 2.56. Accordingly, it is significant that all of the t-values in Table 2 are greater than 2. The CFA model is presented in Figure 2.

In the context of CFA, the fit indices of the model [Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Comparative Fit Index (CFI), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI)] and "χ2/df" value obtained by dividing "χ2" value by degrees of freedom were calculated.

The fit indices created in this study and the values regarding their acceptance limits in the literature (Anderson & Gerbing, 1984; Bentler, 1990; Cheung & Rensvold, 2000; Hu & Bentler, 1998; Schermelleh-Engel et al., 2003) are presented in Table 3.

As seen in Table 3, the chi-square value as a result of CFA was found to be significant at .01 level. This finding indicates that there is no compatibility; however, as the sample increases in number, the chi-square value might become significant (Schermelleh-Engel et al., 2003). Therefore, the value of 2.35 obtained from the chi-square divided by the degree of freedom implies a perfect fit. Other fit indices were in good fit range [RMSEA = .05, SRMR = .05, GFI = .91, AGFI = .89, CFI = .96, NFI = .93, NNFI = .96]. When the goodness of fit indices are evaluated in general, it can be said that the items of the Perceived Self-Regulatory Skills Scale fit perfectly.

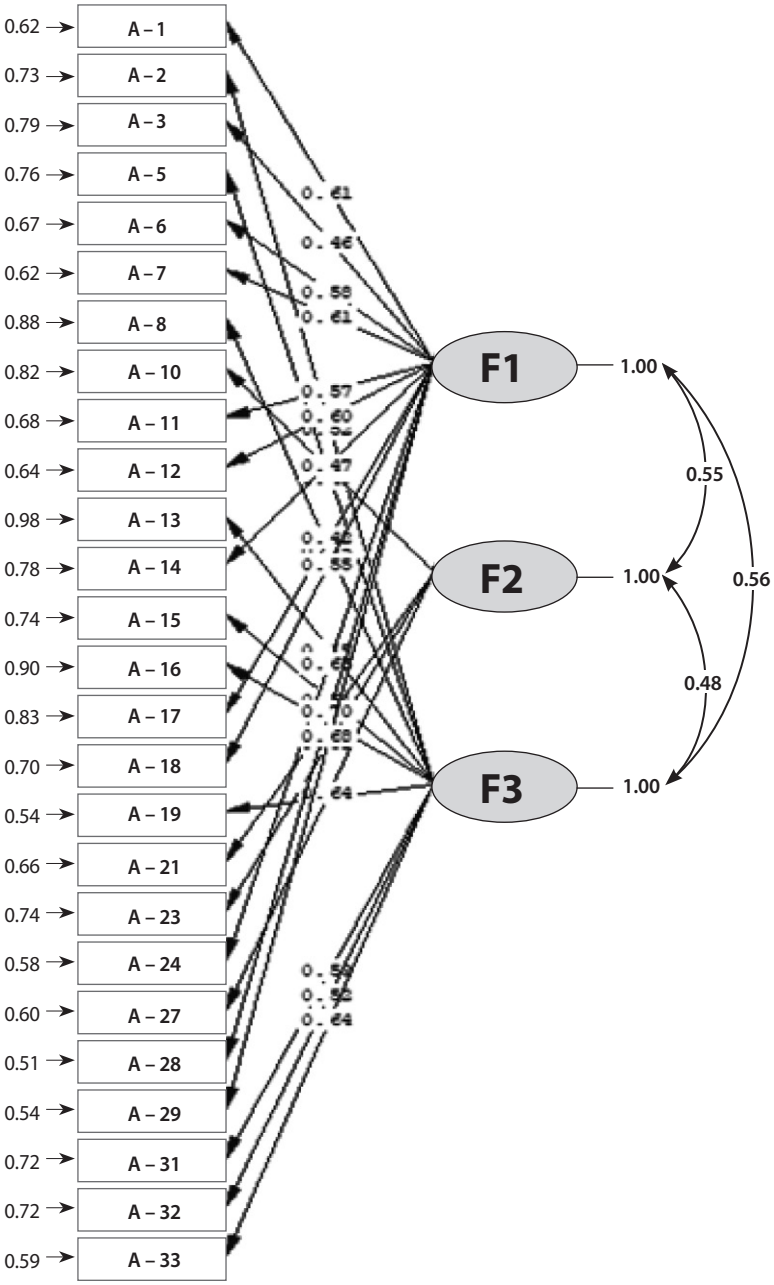

Figure 2. CFA Model (F1: Planning the Learning Process, F2: Implementation of the Learning Plan, F3: Focusing on the Target and Learning Task)

Table 3

Goodness of fit indices of the Perceived Self-Regulatory Skills Scale items

Goodness of Fit Indices	Value	Excellent	Good
χ^2	698.35		
df	296		
p	.000		
χ^2/df	2.35	χ^2/df ≤ 3.00	3.00 < χ^2/df ≤ 8.00
RMSEA	.05	0 ≤ RMSEA ≤ .05	.05 < RMSEA ≤ .08
RMSEA (.90 GA)	.05-.06		
SRMR	.05	0 ≤ SRMR ≤ .05	.05 < SRMR ≤ .10
GFI	.91	.95 ≤ GFI ≤ 1.00	.90 ≤ GFI < .95
AGFI	.89	.90 ≤ AGFI ≤ 1.00	.85 ≤ AGFI < .90
CFI	.96	.97 ≤ CFI ≤ 1.00	.95 ≤ CFI < .97
NFI	.93	.95 ≤ NFI ≤ 1.00	.90 ≤ NFI < .95
NNFI	.96	.97 ≤ NNFI ≤ 1.00	.95 ≤ NNFI < .97

In the light of these findings, it was concluded that the structure discovered by EFA was confirmed by the results of CFA; therefore, it was appropriate to include all items in the scale. In addition, as a result of *t*-test validity of the scale, a significant difference was found between the total scores of the upper and lower 27% groups (t (177.03) = 41.77, p <0.01).

Findings about reliability of the scale

Cronbach's alpha coefficients were calculated to determine the reliability level relating to the whole scale and its dimensions. As a result, the reliability coefficient (α) obtained for the whole scale was found to be 0.88. The reliability coefficients (α) for the dimensions of the scale were: 0.85 for the "Planning the Learning Process" dimension; 0.60 for the "Implementation of the Learning Plan" dimension, and 0.73 for the "Focus on the Target and Learning Task" dimension. The reliability coefficients obtained in the calculation were found to be quite high, except for the second dimension. All these findings can be considered as an indicator that the scale is a reliable measurement instrument for measuring the perceptions of primary school students of self-regulation skills.

Discussion, conclusion and recommendations

This study presents an attempt to develop a reliable and valid instrument for assessing primary students' perceived self-regulation skills. As a result of EFA applied to the data obtained by the pilot study, 26 items of the 34-item scale were distributed to three factors. Factor loading values of the scale items were found between .32 and .74. The first dimension of 12 items was named "Planning the Learning Process", the second dimension of 4 items was named "Implementation of the Learning Plan" and the third dimension of 10 items was named "Focusing on the Target and Learning Task".

Although self-regulation theory has been beneficial in the nomenclature of sub-dimensions of the related scales (e.g., Bandura, 1991; Garcia & Pintrich, 1995; Pintrich

& De Groot, 1990; Zimmerman, 1990, 2002), some differences have been observed. For instance, Güdücübaş (2012) named the dimensions of the self-regulation scale as "Cognitive Regulations", "Regulation of Effort" and "Regulation of Time and Work". In this study, "Planning the Learning Process" and "Implementation of the Learning Plan" dimensions of the scale were named based on the stages of the learning process. "Focusing on the Target and Learning Task" covers the behaviors of self-regulation, which determine individual learning objectives and taking responsibilities for one's own tasks.

On the other hand, it has been a debatable and problematic process to denominate the dimensions of the scale. Preparation to learn (analysis of the learning task and motivational beliefs), performance (self-control and self-observation) and self-reflection (self-judgment and self-reaction) stages (Zimmerman, 1989; 2002) were taken into consideration while drafting the scale. The learning traits/behaviors that could be related to these stages for 4th grade students were concretely described. During this process, primary teachers' opinions were very helpful in description of items. Students' questions with regard to the items were answered in the implementation process of the scale. However, it has been revealed that distribution of items into factors as a result of EFA wasn't enough for these efforts in the self-regulation stage. The items that were designed for the self-reflection stage, such as "I realize when I can't learn about a subject/lesson.", were distributed in the first and the second factors. In conclusion, the names considered to represent whole items in every factor of the scale were identified.

Other self-regulation scale development studies which were carried out with primary school students in Turkey seem to have undergone a similar process regarding the distribution of scale items to factors (Doğan, 2015; Güdücübaş, 2012). In fact, it is expected to experience difficulties in the scale development for primary school students with regard to self-regulation as an abstract concept which covers many psychological and cognitive concepts and skills, due to the fact that primary school fourth grade students in Turkey are 9-10 years old. At this age, it is expected that children begin to gain, but cannot fully acquire abstract thinking skills, (Marchand, 2012). Nevertheless, it is pointed out that some self-reflection skills as inferred in the statement "I check if I do my homework properly", can be gained to some extent at this stage of development. Thus, the scales developed by Doğan (2015) and Güdücübaş (2012) also include items related to self-reflection.

In the literature there are similarities between scale items developed to assess self-regulation skills of primary school students as well (Doğan, 2015; Güdücübaş, 2012). This situation could be seen as natural, since similar theoretical principles were taken into consideration in the scale development process. Unlike the scales in the literature, this study started with a view that extends self-regulation beyond schools and courses. Therefore, while creating the draft scale, items were carefully written in a way that didn't include the words of learning strategies, school, classes and school subject. However, primary school teachers, when consulted to present their views, suggested the use of words like classes and school subject for primary students' better understanding of the

scale items. These views, and especially the suggestions of one of the experts, in broadly dealing with self-regulation were discussed by the study team. In conclusion, both suggestions were taken into consideration. Yet, understanding of the scale items was given particular importance. Hence, it is seen that the limitations about classes and the school subject could not be entirely averted. At least, positive descriptions could be used to avoid the words such as "exam" etc., which might indicate external control, though.

It was revealed that the structure determined by EFA was compatible with the results of CFA based on the experimental data of the Perceived Self-Regulation Skills Scale. Most of the fit indices of the scale were found to be at a good level. This result has been accepted as an indication of compatibility; that is, the validity of the scale is in line with self-regulation theory. Besides, basically, fit indices are preferred at a perfect level. However, when the scale development studies for self-regulation in Turkey are examined, it is evident that when the target group is younger, fit indices become lower (e.g., Fındık-Tanrıbuyurdu & Güler-Yıldız, 2014; Güdücübaş, 2012). During the data collection period for this study, it was observed that primary school students had no or little experience in filling in the data collection instrument assessing perceptions. Therefore, even if the scale items were explained, there was a possibility that the students couldn't gain a clear understanding of the theory. In spite of these possibilities, it is significant to acquire self-regulation skills at an early age. Objective scales are needed in parents' and educators' support of children regarding this issue, so that the effect of this support could be determined. The scale developed in this study can be a resource about self-regulation skills even though obtained by students' perception.

In the data for validity of the Perceived Self-Regulation Skills Scale, the calculated significant difference between total scores of 27% high group and 27% low group shows that the scale is distinctive for students having high and low perceived self-regulation skills. Thus, additionally, students with high and low total scores, their teachers and one member of each family were individually interviewed in the context of the project in which this scale was used. The impression was obtained during these interviews that views about students were consistent with total scale scores. In summary, the scale can give an idea in terms of primary school fourth grade students' self-regulation skills to a certain extent.

The Cronbach's alpha (α) reliability coefficient obtained from the overall scale was calculated as .88 and the reliability coefficients (α) for the sub-dimensions were .85, .60 and .73, respectively. According to Kline (2005), the coefficient of α can be defined as "perfect" around .90, "very good" around .80 and "acceptable" around .70. Accordingly, the reliability coefficient is "very good" for the overall scale and the "Planning the Learning Process" dimension; it is "acceptable" for the "Focusing on the Target and Learning Task" dimension. The reliability coefficient of the "Implementing the Learning Plan" dimension is at a lower level based on these definitions. Due to the small number of items in this dimension, it is assumed that the reliability coefficient may be lower than other dimensions. In summary, it can be interpreted that the overall scale and its dimensions can make consistent assessments in their own contexts.

Consequently, the findings on validity and reliability of the Perceived Self-Regulation Skills Scale developed in this study indicate that the scale is applicable in studies to determine self-regulation skills of primary school students. During the implementation process of the scale, detailed explanations of researchers who have comprehensive knowledge of self-regulation can be beneficial for students in order to increase the validity of data. Besides, in studies in which this scale is used, it could be another suggestion to compare findings obtained by other data collection instruments.

It is also thought that scale development studies should be carried out for different samples and/or using different scale items to determine self-regulation skills of primary school students. In this type of studies, it is of great importance to take characteristics of primary school children's development into consideration in writing scale items. Additionally, self-regulation can be conceptualized as a basic life skill and developing scales in this direction can disseminate the effects of studies and implementations regarding this subject.

References

Adams, C. M., Forsyth, P. B., Dollarhide, E., Miskell, R., & Ware, J. (2015). Self-regulatory climate: A social resource for student regulation and achievement. *Teachers College Record, 117*(2), 1-28.

Alçı, B. (2007). *Yıldız Teknik* Üniversitesi öğrencilerinin *Matematik başarıları ile algıladıkları problem* çözme *becerileri,* özyeterlik *algıları, bilişüstü* özdüzenleme *stratejileri ve ÖSS sayısal puanları arasındaki açıklayıcı ve yordayıcı ilişkiler* örüntüsü. (Doctoral dissertation). İstanbul: Yıldız Teknik Üniversitesi.

Anderson, J. C., & Gerbing D. W. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika, 49*, 155-173. https://doi.org/10.1007/BF02294170

Arsal, Z. (2009). Öz-düzenleme öğretiminin ilköğretim öğrencilerinin matematik başarısına ve tutumuna etkisi. *Eğitim ve Bilim, 24*(152), 3-14.

Arslan, A. (2008). İşbirliğine dayalı öğrenmenin erişiye, kalıcılığa, öz yeterlik inancına ve öz düzenleme becerisine etkisi. (Doctoral dissertation). Ankara: Hacettepe Üniversitesi.

Arslan, S. (2014). Üstbilişsel öğretim *stratejilerinin Fen ve Teknoloji dersinde* öğrencilerin üstbilişi *yönetme,* öz *düzenleme becerilerine ve akademik başarılarına etkisi*. (Doctoral dissertation). Ankara: Gazi Üniversitesi.

Arslantaş, S. (2015). İlköğretim*, beşinci sınıf sosyal bilgiler dersinde kullanılan kendini izleme stratejilerinin,* öğrencilerin *kendini izleme,* öz *düzenleme ve akademik başarı düzeylerine etkisi*. (Doctoral dissertation). Konya: Necmettin Erbakan Üniversitesi.

Ataş, İ. (2009). Öz *düzenleyici* öğrenme *stratejilerinin kullanımının ilköğretim okulu dördüncü sınıf* öğrencilerinin *matematik dersindeki* öz *yeterlik algısına ve başarısına etkisi*. (Master's thesis). Ankara: Gazi Üniversitesi.

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Process, 50*, 248- 287. https://doi.org/10.1016/0749-5978(91)90022-L

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52*, 1-26. https://doi.org/10.1146/annurev.psych.52.1.1

Bandura, A. (2008). The reconstrual of "free will" from the perspective of social cognitive theory. In J. Baer, J. C. Kaufman & R. F. Baumeister (Eds.), *Are we free? Psychology and free will.* (pp. 86-127). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195189636.003.0006

Bayındır, D., & Ural, O. (2016). Öz Düzenleme Becerileri Ölçeği'nin geliştirilmesi. *International Online Journal of Educational Sciences, 8*(4), 119-132. https://doi.org/10.15345/iojes.2016.04.011

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238-246. https://doi.org/10.1037/0033-2909.107.2.238

Birgisdóttir, F., Gestsdóttir, S., & Thorsdóttir, F. (2015). The role of behavioral self-regulation in learning to read: A 2-year longitudinal study of Icelandic preschool children. *Early Education and Development, 26*(5-6), 807-828. https://doi.org/10.1080/10409289.2015.1003505

Budak, H. (2016). İlkokul *dördüncü sınıf* öğrencilerinin öz *düzenleme, motivasyon, biliş* üstü *becerileri ve matematik dersi başarılarının belirlenmesi*. (Master's thesis). Çanakkale: Onsekiz Mart Üniversitesi.

Büyüköztürk, Ş. (2010). *Sosyal bilimler için veri analizi el kitabı:* İstatistik*, araştırma deseni, SPSS uygulamaları ve yorum*. Pegem Akademi.

Büyüköztürk, Ş., Akgün, Ö. E., Özkahveci, Ö., & Demirel, F. (2004). The validity and reliability study of the Turkish version of the Motivated Strategies for Learning Questionnaire. *Educational Sciences: Theory & Practice, 4*(2), 207-239.

Cabı, E. (2015). Öğretmen adaylarının öz-düzenleme stratejileri ve akademik başarısı: Boylamsal bir araştırma. *Gazi Eğitim Fakültesi Dergisi, 35*(3), 489-506.

Cheung, G. W., & Rensvold, R. B. (2000). Assessing extreme and acquiescence response sets in cross-cultural research using structural equation modeling. *Journal of Cross-Cultural Psychology, 31,* 187–212. https://doi.org/10.1177/0022022100031002003

Demiraslan-Çevik, Y., Haşlaman, T., Kuşkaya-Mumcu, F., & Gökçearslan, Ş. (2015). Özdüzenlemenin dikkat kontrolü boyutu: Bir ölçek uyarlama çalışması. *Başkent University Journal of Education, 2*(2), 229-238.

Demirel, M., Erdoğan, Ö., & Aydın, Ö. (2014). Öğretmen adaylarının öz-düzenleyici öğrenme stratejilerini kullanma düzeylerinin incelenmesi. *Uluslararası Eğitim Programları ve Öğretim Çalışmaları Dergisi, 4*(8), 69-84.

Diehl, M., Semegon, A. B., & Schwarzer, R. (2006). Assessing attention control in goal pursuit: A component of dispositional self-regulation. *Journal of Personality Assessment, 86*(3), 306-317. https://doi.org/10.1207/s15327752jpa8603_06

Doğan, M. F. (2015). Çocukların Öz-düzenlemeli Öğrenmeyi *Kullanımı Envanteri'nin Türkçeye uyarlama, geçerlik ve güvenirlik* çalışması. (Master's thesis). Çanakkale: Çanakkale Onsekiz Mart Üniversitesi.

Duncan, O. D. (1975). *Introduction to structural equation models.* Academic Press.

Erdoğan, T. (2012). *Probleme dayalı* öğrenmenin *erişiye ve* özdüzenleme *becerilerine etkisi*. (Doctoral dissertation). Ankara: Hacettepe Üniversitesi.

Ferreira, P. C., & Simão, A. M. V. (2012). Teaching practices that foster self-regulated learning: a case study. *Educational Research e-journal, 1*(1), 1-16. https://doi.org/10.5838/erej.2012.11.01

Fındık-Tanrıbuyurdu, E., & Güler-Yıldız, T. (2014). Preschool self-regulation assessment (PSRA): Adaptation study for Turkey. *Education and Science, 39*(176), 317-328. https://doi.org/10.15390/EB.2014.3647

Garcia, T., & Pintrich, P. R. (1995). Assessing students' motivation and learning strategies: The Motivated Strategies for Learning Questionnaire (MSLQ). In ERIC Document Reproduction Service No: ED 383770, *Annual Meeting of the American Educational Research Association*, San Francisco, CA. https://doi.org/10.1007/978-94-011-0657-3_12

Gavora, P., Jakešová, J., & Kalenda, J. (2015). The Czech validation of the Self-Regulation Questionnaire. *Procedia - Social and Behavioral Sciences, 171*, 222-230. https://doi.org/10.1016/j.sbspro.2015.01.113

Güdücübaş, Ö. (2012). Öz-düzenleme *becerisi ve yapılandırmacı düşünme:* İlköğretim öğrencileri *kapsamında bir yapısal eşitlik modelleme* çalışması. (Master's thesis). Eskişehir: Eskişehir Osmangazi Üniversitesi.

Gülay, A. (2012). Öz *düzenleyici* öğrenmenin *5. sınıf* öğrencilerinin *akademik başarısına ve bilimsel süreç becerilerine etkisi*. (Master's thesis). Rize: Recep Tayyip Erdoğan Üniversitesi

Gündoğdu, K. (2006). A case study: Promoting self-regulated learning in early elementary grades. *Kastamonu Education Journal, 14*(1), 47-60.

Hu, L. T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3,* 424-453. https://doi.org/10.1037/1082-989X.3.4.424

İsrael, E. (2007). Özdüzenleme *eğitimi, fen başarısı ve* özyeterlilik. (Doctoral dissertation). İzmir: Dokuz Eylül Üniversitesi.

Kadıoğlu, C. (2014). *Implementation of self-regulatory instruction based on guided inquiry approach to promote students' achievement in solubility equilibrium and acids and bases, motivation, and learning strategies*. (Doctoral dissertation). Ankara: Middle East Technical University.

Kadıoğlu, C., Uzuntiryaki, E., & Çapa-Aydın, Y. (2011). Development of Self-Regulatory Strategies Scale (SRSS). *Education and Science, 36*(160), 11-23.

Karabacak, Ü. (2014). Özdüzenleme *ve ilköğretim ikinci kademe* öğrencilerinin *fen başarısının incelenmesi.* (Master's thesis). Balıkesir: Balıkesir Üniversitesi.

Karadeniz, Ş., Büyüköztürk, Ş., Akgün, A. Ö., Kılıç-Çakmak, E., & Demirel, F. (2008). The Turkish adaptation study of Motivated Strategies for Learning Questionnaire (MSLQ) for 12–18 year old children: results of confirmatory factor analysis. *The Turkish Online Journal of Educational Technology, 7* (4). www.tojet.net/articles/7412.pdf

Kılıç, Ş. (2016). İngilizce *okuma ve yazma becerilerinin geliştirilmesinde* öz-düzenlemeye *dayalı* öğretimin *etkililiği*. (Doctoral dissertation). Bolu: Abant İzzet Baysal Üniversitesi.

Kline, R. B. (2005). *Principles and practice of structural equation modeling*. Guilford Press.

Magno, C. (2010). Assessing academic self-regulated learning among Filipino College students: The factor structure and item fit. *The International Journal of Educational and Psychological Assessment, 5*, 61-76.

Marchand, H. (2012). Contributions of Piagetian and post-Piagetian theories to education. *Educational Research Review, 7*, 165-176. https://doi.org/10.1016/j.edurev.2012.04.002

Nausheen, M. (2016). An adaptation of the Motivated Strategies for Learning Questionnaire (MSLQ) for postgraduate students in Pakistan: Results of an exploratory factor analysis. *Bulletin of Education and Research, 38*(1), 1-16.

Ocak, G., & Yamaç, A. (2013). İlköğretim beşinci sınıf öğrencilerinin öz-düzenleyici öğrenme stratejileri, motivasyonel inançları, matematiğe yönelik tutum ve başarıları arasındaki ilişkilerin incelenmesi. *Kuram ve Uygulamada Eğitim Bilimleri Dergisi, 13*(1), 369- 387.

Özdinç-Delbesoğlugil, A. B. (2013). *As predictors of academic success in EFL classrooms, self-regulation, self-esteem and attitude (A case study)*. (Master's thesis). Gaziantep: Gaziantep University.

Özen, Ö. E. (2016). *Lise son sınıf* öğrencilerinin öz-düzenleme *becerileri ile sınav kaygıları arasındaki ilişkinin incelenmesi*. (Doctoral dissertation). Çanakkale: Onsekiz Mart Üniversitesi.

Pearson, R. H., & Mundform, D. J. (2010). Recommended sample size for conducting exploratory factor analysis on dichotomous data. *Journal of Modern Applied Statistical Methods, 9*(2), 359-368. https://doi.org/10.22237/jmasm/1288584240

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

Pintrich, P. R., & De Groot, E. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*(1), 33-40. https://doi.org/10.1037/0022-0663.82.1.33

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement, 53*, 801-813. https://doi.org/10.1177/0013164493053003024

Pratt, M. E., McClelland, M. M., Swanson, J., & Lipscomb, S. T. (2016). Family risk profiles and school readiness: A person-centered approach. *Early Childhood Research Quarterly, 36*, 462-474. https://doi.org/10.1016/j.ecresq.2016.01.017

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

Smith-Donald, R., Raver, C. C., Hayes, T., & Richardson, B. (2007). Preliminary construct and concurrent validity of preschool self-regulation assessment (PSRA) for field-based research. *Early Childhood Research Quarterly, 22*, 173-187. https://doi.org/10.1016/j.ecresq.2007.01.002

Süer, N., & Altun, S. (2015). The effects of self-regulation skills on TEOG exam. *Social and Behavioral Sciences, 174*, 2191-2199. https://doi.org/10.1016/j.sbspro.2015.02.020

Uyar, Y. (2015). Öz *düzenlemeye dayalı okuma becerisinin geliştirilmesi ve anlamaya etkisi*. (Doctoral dissertation). Ankara: Gazi Üniversitesi.

Uygun, M. (2012). Öz *düzenleme stratejisi gelişimi* öğretiminin *yazılı anlatıma, yazmaya yönelik* öz *düzenleme becerisine, kalıcılığa ve tutuma etkisi.* (Doctoral dissertation). Ankara: Hacettepe Üniversitesi.

Üredi, I. (2005). *Algılanan anne baba tutumlarının ilköğretim 8. sınıf* öğrencilerinin öz-düzenleyici öğrenme *stratejileri ve motivasyonel inançları* üzerindeki *etkisi.* (Doctoral dissertation). İstanbul: Yıldız Teknik Üniversitesi.

Üredi, I., & Üredi, L. (2005). İlköğretim 8. sınıf öğrencilerinin öz-düzenleme stratejileri ve motivasyonel inançlarının matematik başarısını yordama gücü. *Mersin* Üniversitesi *Eğitim Fakültesi Dergisi, 1*(2), 250-260.

Vandevelde, S., Van Keer, H., & Rosseel, Y. (2013). Measuring the complexity of upper primary school children's self-regulated learning: A multi-component approach. *Contemporary Educational Psychology, 38*, 407-425. https://doi.org/10.1016/j.cedpsych.2013.09.002

Velayutham, S., Aldridge, J., & Fraser, B. (2011) Development and validation of an instrument to measure students' motivation and self-regulation in science learning. *International Journal of* Science Education, 33(15), 2159-2179. https://doi.org/10.1080/09500693.2010.541529

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

Zimmerman, B. J. (1989). Self-regulating academic learning and achievement: The emergence of cognitive perspective. *Educational Psychology Review, 2*(2), 329-339. https://doi.org/10.1037/0022-0663.81.3.329

Zimmerman, B. J. (1990). Self-regulating academic learning and achievement: the emergence of a social cognitive perspective. *Educational Psychology Review, 2*(2), 173-201. https://doi.org/10.1007/BF01322178

Zimmerman, B. J. (1998). Academic studying and the development of personal skill: A self-regulatory perspective. *Educational Psychologist, 33*, 73-86. https://doi.org/10.1080/00461520.1998.9653292

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

Zimmerman, B. J., & Ringle, J. (1981). Effects of model persistence and statements of confidence on children's efficacy and problem solving. *Journal of Educational Psychology, 73*(4), 485-493. https://doi.org/10.1037/0022-0663.73.4.485

Zimmerman, B. J., & Martinez-Pons, M. (1988). Construct validation of a strategy model of student self-regulated learning. *Journal of Educational Psychology, 80*(3), 284-290. https://doi.org/10.1037/0022-0663.80.3.284

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Izrada Skale percipiranih samoregulacijskih vještina za učenike četvrtoga razreda osnovne škole

Sažetak

U ovom radu prikazuje se postupak izrade Skale percipiranih samoregulacijskih vještina za učenike četvrtoga razreda osnovne škole. Probna verzija skale Likertova tipa od četiri stupnja sastoji se od 34 tvrdnje, a stupnjevi su sljedeći: 1 – nikada, 2 – ponekad, 3 – često i 4 – uvijek. Skala je testirana na 585 učenika četvrtoga razreda u šest osnovnih škola. Izračunato je da je ukupna varijanca koju kao rezultat eksploratorne faktorske analize objašnjavaju tri faktora 39,61 %. Skala se sastoji od 26 tvrdnji – 12 tvrdnji s vrijednošću faktorskoga opterećenja između 0,32 i 0,74 u prvoj dimenziji; 4 tvrdnje s vrijednošću faktorskoga opterećenja između 0,51 i 0,67 u drugoj dimenziji te 10 tvrdnji s vrijednošću faktorskoga opterećenja između 0,32 i 0,56 u trećoj dimenziji. Dimenzije su bile sljedeće: prva dimenzija „planiranje procesa učenja", druga je „provedba plana učenja", a treća je nazvana „fokusiranje na cilj i zadatak učenja". Provedeno je ispitivanje valjanosti za 529 učenika četvrtoga razreda iz 11 osnovnih škola. Indeks prikladnosti koji je izračunat kao rezultat konfirmatorne faktorske analize pokazuje da su tvrdnje na Skali percipiranih samoregulacijskih vještina u dobrom ili savršenom skladu.

Ključne riječi: *osnovnoškolsko obrazovanje; samoregulirano učenje; učenici osnovne škole*

Uvod

Postoji puno kognitivnih, biheviorstičkih, emocionalnih i socijalnih faktora koji utječu na učenje. Jedna od neophodnih i značajnih vještina tijekom cjeloživotnoga učenja je samoregulacija. Kako su naglasili Bandura (2001) i Zimmerman (1990), samoregulacija je afektivna vještina koja omogućava ljudima prilagodbu na promjene. Bayındır i Ural (2016) navode da osnovnoškolci počinju koristiti mentalne strategije kako bi izrazili i razumjeli vlastite emocije i razmišljanja, kako bi se ponašali u skladu s društvenim i moralnim vrijednostima te kako bi kontrolirali vlastite misli i ponašanja tako što ostvaruju postavljene ciljeve i žive u skladu s očekivanjima koja drugi ljudi imaju od njih. Odgovornost za razvoj samoregulacijskih vještina u ranoj dobi – predškolskoj i

osnovnoškolskoj – prebačena je na obrazovne institucije i obitelj. Stoga se smatra da postoji potreba za provedbom programa i istraživanja u osnovnoj školi s ciljem razvoja samoregulacije.

Elementi samoregulacije svakoga pojedinca su: određivanje ciljeva učenja, određivanje motivacijske razine te odabir i uspješna demonstracija kognitivnih i metakognitivnih obrazaca ponašanja usmjerenih na postizanje ciljeva (Bandura, 1991; Pintrich, 2004; Zimmerman, 1989). Prema Zimmermanu (2002, str.65), samoregulacija nije mentalna sposobnost niti akademski uspjeh, ona je napredan proces u kojemu učenici svoje mentalne sposobnosti pretvaraju u akademske vještine. Tijekom toga procesa od učenika se očekuje da budu aktivni i prije samog učenja te da vode računa o budućnosti (Bandura, 2008; Zimmerman, 2002). Samoregulacija kod učenika također podrazumijeva prilagodbu ponašanja zadatcima za učenje i kontekstu (Garcia i Pintrich, 1995). Takve karakteristike učenika nazivaju se samoregulacijom, samoregulacijskim strategijama i samoregulacijskim vještinama. U ovome istraživanju preferira se pojam samoregulacijskih vještina jer je težište stavljeno na mjerenje konkretnoga ponašanja osnovnoškolaca u aktivnostima učenja.

Prema Zimmermanu (2002), usvajanje i razvoj samoregulacijskih vještina učenja ima važnu ulogu u poboljšanju akademskoga uspjeha učenika. Istraživanja pokazuju da samoregulacijske vještine značajno predviđaju akademski uspjeh učenika u predmetima kao što je Matematika (Adams, Forsyth, Dollarhide, Miskell i Ware, 2015; Alçı, 2007; Budak, 2016; Ocak i Yamaç, 2013; Üredi i Üredi, 2005), Engleski jezik (Özdinç-Delbesoğlugil, 2013) te Znanost i tehnologija (Karabacak, 2014), tj. uspjeh na ispitu Prijelaz iz osnovnoga u srednjoškolsko obrazovanje u svim predmetima u Turskoj (Süer i Altun, 2015). Pokazalo se da samoregulacijske vještine, koje su definirane kao nezavisne varijable u eksperimentalnim istraživanjima, imaju značajan utjecaj na akademska postignuća učenika (Arsal, 2009; Gülay, 2012; Kadıoğlu, 2014; Zimmerman i Ringle, 1981), percepciju samoučinkovitosti u Matematici (Ataş, 2009) i Kemiji (Kadioglu, 2014), postignuća i samoučinkovitost u prirodoslovnim predmetima (İsrael, 2007), čitanju (Birgisdóttir, Gestsdóttir i Thorsdóttir, 2015; Kılıç, 2016; Uyar, 2015) i pisanju (Kılıç, 2016).

Istraživanja su pokazala da učenici malo koriste samoregulacijske vještine u nastavi predmeta u kojima moraju preuzeti odgovornost za učenje, a čak i u slučajevima gdje im se pružaju učinkovite mogućnosti učenja (Arslantaş, 2015; Cabı, 2015; Demirel, Erdoğan i Aydın, 2014; Güdücübaş, 2012; Ocak i Yamaç, 2013; Özen, 2016). Stoga je potrebno provesti istraživanja kako bi se razvijale samoregulacijske vještine. Nadalje, na temelju postojećih istraživanja u ovome području, može se uočiti da postoji malo istraživanja o samoregulacijskim vještinama osnovnoškolaca (npr. Arsal, 2009; Ataş, 2009; Budak, 2016; Ferreira i Simão, 2012; Gülay, 2012; Gündoğdu, 2006; Pratt, McClelland, Swanson i Lipscomb, 2016; Uygun, 2012). Prema eksperimentalnom istraživanju koje je proveo Arsal (2009) na uzorku učenika četvrtoga razreda, pokazalo se da je obrazovni program koji je imao za cilj razviti samoregulacijske vještine doveo do značajnoga poboljšanja akademskoga uspjeh učenika u Matematici. Međutim, u drugom istraživanju pokazalo

se da sličan obrazovni program nije doveo do značajne razlike u postignućima iz Matematike (Ataş, 2009). Budak (2016) je došao do saznanja da samoregulacijske vještine učenika četvrtoga razreda nisu pokazale značajne razlike s obzirom na spol, predškolsko obrazovanje i stručnu spremu roditelja. Uzimajući ta istraživanja u obzir, čini se korisnim povećati broj istraživanja u kojima se ispituju samoregulacijske vještine osnovnoškolaca.

Jedan od važnih elemenata u povećanju kvantitete i kvalitete istraživanja o samoregulaciji koja se provode na osnovnoškolskoj razini jest razviti valjane i pouzdane skale. Ovo je istraživanje počelo kao rezultat pokušaja izrade skale koja se razlikuje od skala koje se obično mogu pronaći u literaturi, a koje imaju ograničenja s obzirom na mjerenje samoregulacijskih vještina osnovnoškolaca.

Istraživanja o izradi Skale samoregulacijskih vještina u Turskoj

U međunarodnoj literaturi postoje brojna istraživanja o izradi skale za mjerenje samoregulacijskih vještina (npr. Garcia i Pintrich, 1995; Gavora, Jakešová i Kalenda, 2015; Magno, 2010; Nausheen, 2016; Pintrich, Smith, Garcia i McKeachie, 1993; Vandevelde, Van Keer i Rosseel, 2013; Velayutham, Aldridge i Fraser, 2011; Zimmerman i Martinez-Pons, 1988). Neka od njih provedena su kako bi se izradile skale samoregulacijskih vještina namijenjene za djecu u Turskoj. Takva su istraživanja provedena na velikom uzorku, od predškolske do fakultetske dobi. Može se uočiti da je bilo pokušaja izrade zasebne skale za svaku formalnu razinu obrazovanja. Sažetci nekih istraživanja prikazani su u daljnjem tekstu.

Fındık-Tanrıbuyurdu i Güler-Yıldız (2014) su turskom kontekstu prilagodili Skalu samoregulacije u predškolskoj dobi koju su izradili Smith-Donald, Raver, Hayes i Richardson (2007). Eksploratorna faktorska analiza pokazala je da ta skala ima dvofaktorsku strukturu i da ti faktori objašnjavaju 52 % ukupne varijance. Konfirmatorna faktorska analiza pokazala je da su indeksi prikladnosti ovoga konstrukta prihvatljivi ($\chi 2/df = 2,51$, CFI = 0,90, NNFI = 0,88, IFI = 0,90, RMSEA = 0,11, GFI = 0,79, AGFI = 0,72). Pokazalo se da koeficijent unutarnje konzistencije (α) iznosi 0,88 za dimenziju „pažnja/kontroliranje impulsa", 0,80 za dimenziju „pozitivna emocija" te 0,83 za cijelu skalu. Skala sadrži 16 tvrdnji na koje moraju odgovoriti stručnjaci ili nastavnici.

Bayındır i Ural (2016) izradili su Skalu za procjenu samoregulacijskih vještina tako što su prikupili podatke od 447 djece u Istambulu. Dob djece bila je u rasponu između 48 i 72 mjeseca. Izračunali su da je indeks valjanosti skale 0,78. Rezultati eksploratorne faktorske analize pokazali su da skala ima dvofaktorsku strukturu i da ta dva faktora objašnjavaju 55,71 % ukupne varijance. Prvi faktor, koji se sastojao se od 21 tvrdnje s faktorskim opterećenjima u rasponu između 0,60 i 0,80, nazvan je „regulatorne vještine", dok je drugi faktor, s 12 tvrdnji s vrijednostima faktorskih opterećenja u rasponu između 0,58 i 0,82, bio nazvan „vještine kontrole". Koeficijent unutarnje konzistencije (α) iznosio je 0,96 za prvi faktor, 0,93 za drugi faktor te 0,96 za cijelu skalu. Izračunato je da je Pearsonov koeficijent korelacije za pouzdanost testa-retesta imao dva faktora i vrijednost 0,99 za cijelu skalu. K tomu, razlika između rezultata Skale samoregulacije u

predškolskoj dobi, koju su Fındık-Tanrıbuyurdu i Güler-Yıldız (2014) prilagodili turskom kontekstu, i ove skale, bila je značajna ($r = 0,69$, $p = 0,000$).

Doğan (2015) je turskom kontekstu prilagodio inventar za procjenu načina na koji djeca percipiraju primjenu samoreguliranoga učenja, a koji su izradili Vandevelde i suradnici (2013). Pilot istraživanje inventara provedeno je na uzorku od 469 učenika četvrtoga razreda osnovne škole u Istambulu. Kao rezultat eksploratorne faktorske analize na dostupnim podatcima, uočeno je da inventar ima trofaktorsku strukturu i da ti faktori objašnjavaju 63,31 % ukupne varijance. Na temelju rezultata konfirmatorne faktorske analize zaključeno je da su indeksi prikladnosti inventara pokazali savršenu prikladnost ($\chi 2/df = 1,72$, $p = 0,00$, CFI = 0,99, NNFI = 0,99, IFI = 0,99, RMSEA = 0,04, GFI = 0,91, AGFI = 0,90). Koeficijent unutarnje konzistencije (α) inventara sastojao se od 32 tvrdnje, a izračunato je da je njegova vrijednost 0,97 za prvi faktor, 0,84 za drugi faktor, 0,79 za treći faktor te 0,97 za cijeli inventar. Izračunat je Pearsonov koeficijent korelacije od 0,999 primjenom testa-retesta na uzorku od 106 učenika nakon 12 tjedana. Međutim, bitno je napomenuti da faktori inventara nisu imenovani.

Güdücübaş (2012) ponovno je primijenio analize valjanosti i pouzdanosti Skale samoregulacijskih vještina, koju je izrado Arslan A. (2008), i to na uzorku od 474 učenika petoga razreda u Ankari. Rezultati konfirmatorne faktorske analize pokazali su da skala nije imala originalnu faktorsku strukturu ($\chi 2 = 4507,4$, $df = 170$, $p = 0,01$, CFI = 0,49, RMSEA = 0,06, GFI = 0,71, AGFI = 0,69). Rezultati eksploratorne faktorske analize pomoću tehnike varimax rotacije oko vertikalne osi pokazali su da skala ima trofaktorsku strukturu. Faktorska opterećenja 20 tvrdnji na skali varirala su između 0,47 i 0,95. Izračunat je koeficijent unutarnje konzistencije (α) skale za sva tri faktora, „kognitivnu regulaciju", „regulaciju truda" i „regulaciju vremena i rada" i cijelu skalu, od 0,88, 0,79, 0,55 i 0,89 za svaku zasebno.

İsrael (2007) je izradio Skalu za samoregulaciju za učenike srednje škole. Eksploratorna faktorska analiza provedena na podatcima prikupljenima na uzorku od 587 učenika šestoga razreda u Izmiru pokazala je da skala ima strukturu koja se sastoji od osam faktora te da ti faktori objašnjavaju 55,21% ukupne varijance. Faktori su nazvani „rad na razumijevanju", „regulacija učenja", „kontrola rezultata", „samoocjenjivanje", „fokusiranje na uspjeh", „održavanje tempa učenja" i „provedba dodatnoga učenja". Koeficijent unutarnje konzistencije (α) poddimenzija skale bio je u rasponu između 0,69 i 0,81.

U drugom istraživanju, u kojemu je također izrađena Skala za samoregulaciju za učenike srednje škole, provedena je eksploratorna faktorska analiza na temelju podataka dobivenih od 207 učenika sedmoga razreda. Rezultati su pokazali da je skala imala jednofaktorsku strukturu, a taj je faktor objašnjavao 31 % ukupne varijance. Koeficijent unutarnje konzistencije skale koja je sadržavala 20 tvrdnji s faktorskim opterećenjima između 0,41 i 0,69 bio je 0,87 (Arslan A., 2008).

Arslan S. (2014) proveo je analize valjanosti i pouzdanosti Skale percipirane samoregulacije na podatcima dobivenima na uzorku od 604 učenika srednje škole. Rezultati eksploratorne faktorske analize pokazali su da skala ima dva faktora koja su objašnjavala 54,3 % ukupne

varijance. Indeksi prikladnosti izračunati pomoću konfirmatorne faktorske analize ($\chi 2/df = 1,55$, CFI = 0,99, IFI = 0,99, RMSEA = 0,04, GFI = 0,94, AGFI = 0,92) također upućuju na savršenu prikladnost strukture skale. Vrijednosti opterećenja za prvi faktor od osam tvrdnji, koji je nazvan „biti otvoren", varirali su između 0,56 i 0,75; vrijednosti opterećenja za drugi faktor od osam tvrdnji, koji je nazvan „ostvarenje" varirale su između 0,55 i 0,75. Izračunat je koeficijent unutarnje konzistencije (α) skale od 0,80 za faktor „biti otvoren", 0,85 za faktor „ostvarenje" te 0,90 za cijelu skalu.

Istraživanje provedeno o izradi Skale strategija samoreguliranoga učenja za srednjoškolce proveli su Kadıoğlu, Uzuntiryaki i Çapa-Aydın (2011). Rezultati eksploratorne faktorske analize provedene na temelju podataka dobivenih iz pilot-istraživanja na uzorku od 422 srednjoškolca pokazali su da skala ima strukturu od osam faktora. Tih osam faktora objašnjava 62 % ukupne varijance. Rezultati konfirmatorne faktorske analize koji su dobiveni nakon ponovne primjene skale na uzorku od 616 srednjoškolaca potvrdili su strukturu od osam faktora (AGFI = 0,84, RMSEA = 0,06, NNFI = 0,89, CFI = 0,91, RMR = 0,06, SRMR = 0,06). Ti su faktori: „regulacija motivacije", „regulacija truda", „planiranje", „fokusiranje pažnje", „strategija sažimanja", „strategija označavanja bitnoga", „nastava koju provodi učenik sam za sebe" te „korištenje dodatnih izvora". Koeficijent unutarnje konzistencije (α) faktora kretao se u rasponu između 0,68 i 0,82.

Podskale Skale za samoregulaciju učenja koju je izradio za Erdoğan (2012) za preddiplomsku razinu obrazovanja su „vještine samoreguliranog učenja" i „motivacija". Podskala Vještine samoreguliranoga učenja obuhvaća različite strategije u trima poddimenzijama prije, tijekom i nakon istraživanja. Skala je primijenjena na uzorku od 872 studenta. Rezultati eksploratorne faktorske analize pokazali su četiri dimenzije i strukturu od 18 faktora. Rezultati konfirmatorne faktorske analize potvrdili su četiri dimenzije i strukturu od 17 faktora u korigiranom modelu. Ovih 17 faktora objašnjava 64,48 % ukupne varijance. Koeficijent unutarnje konzistencije (α) finalne verzije skale bio je 0,91.

U još jednom istraživanju na istoj razini obrazovanja, Skala samoregulacije (Diehl, Semegon i Schwarzer, 2006) s engleskog jezika prilagođena je turskom, a prvotno je izrađena na njemačkom jeziku. Rezultati eksploratorne faktorske analize provedene na temelju podataka dobivenih od 389 studenata na preddiplomskoj razini obrazovanja pokazali su da se skala sastoji od jednog faktora (koji je objašnjavao 51,43 % varijance). Indeksi prikladnosti utvrđeni konfirmatornom faktorskom analizom ($\chi 2/sd = 2,85$, $p = 0,000$, CF I= 0,99, RMSEA = 0,07, NNFI = 0,98) upućuju na prihvatljivu i/ili savršenu prikladnost. Izračunato je da je koeficijent unutarnje konzistencije (α) skale sa sedam tvrdnji 0,84, a da je koeficijent pouzdanosti na testu-retestu 0,67 (Demiraslan-Çevik, Haşlaman, Kuşkaya-Mumcu i Gökçearslan, 2015).

Provedena su i razna istraživanja pomoću dodatnih prilagodbi u kojima je samoregulacija podskala ili dimenzija (Büyüköztürk, Akgün, Özkahveci i Demirel, 2004; Karadeniz, Büyüköztürk, Akgün, Çakmak i Demirel, 2008; Üredi, 2005). Na primjer, Üredi (2005) je prilagodio Skalu motivacijskih strategija učenja koju su izradili Pintrich i De Groot (1990), a koja sadrži podskalu Strategije samoregulacijskog učenja. Analize valjanosti i

pouzdanosti skale provedene su na podatcima uzorka od 100 studenata na preddiplomskoj razini obrazovanja. Rezultat je pokazao da varijanca koju objašnjava Skala motivacijskih strategija učenja iznosi 41,82 %. Koeficijent unutarnje konzistencije (α) iznosio je 0,82 za poddimenziju „upotreba kognitivne strategije" i 0,84 za poddimenziju „samoregulacija".

Kako je u prikazano u tekstu iznad, istraživanja o izradi skale koja se mogu koristiti za procjenu samoregulacijskih vještina na turskom jeziku provedena su ili kao prilagodbe postojećih istraživanja, ili su osmišljena u potpunosti. Potrebno je napomenuti da se broj dimenzija u skalama povećao na razinama srednjoškolskoga i višega obrazovanja. To skreće pažnju na činjenicu da su poddimenzije skala u tim istraživanjima uglavnom imenovane po uzoru na modele samoregulacije koje su izradili Pintrich i De Droot (1990) i Zimmerman (2002). Kada su se ispitivale tvrdnje u inventaru kojega je Doğan (2015) prilagodio za osnovnoškolce, uočeno je da su u velikom broju uključene strategije učenja. Rezultati konfirmatorne faktorske analize skale koju je prilagodio Güdücübaş (2012) nisu zadovoljavajući. U ovom istraživanju nam je cilj nam je raspravljati o samoregulaciji puno opširnije nego je to slučaj u drugim istraživanjima koja se spominju u literaturi.

Svrha istraživanja

Cilj je ovoga istraživanja izraditi potpuno valjanu i pouzdanu skalu koja se može koristiti za mjerenje percepcija osnovnoškolaca o vlastitim samoregulacijskim vještinama. S tim u skladu smatra se da je mjerenje samoregulacijskih vještina osnovnoškolaca važno u smislu otkrivanja njihovih percepcija. K tomu, na temelju Zimmermanove (2002) tvrdnje da razvoj samoregulacijskih vještina u ranoj dobi poboljšava akademski uspjeh učenika, očekuje se da će ova skala, izrađena za učenike osnovnih škola, doprinijeti daljnjim istraživanjima o ovoj tematici i šire.

Metoda

Uzorak

Uzorak na kojemu se provodilo ovo istraživanje sastojao se od učenika četvrtoga razreda koji su pohađali osnovne škole u Izmiru. Za pilot-istraživanje i validaciju potrebne su dvije procedure prikupljanja podataka. Iz tog razloga za istraživanje su odabrana dva različita uzorka. Tri osnovne škole za pilot-istraživanje i 11 osnovnih škola za validacijsko istraživanje odabrano je pomoću lako dostupne metode uzorkovanja. U pilot-istraživanju podatci su prikupljeni iz šest osnovnih škola (n = 585) u tri okruga u Izmiru, u Turskoj. Validacijsko istraživanje provedeno je na uzorku od 529 učenika četvrtoga razreda iz 11 osnovnih škola u pet okruga u provinciji Izmir. U oba uzorka sudjelovanje u istraživanju bilo je dobrovoljno.

Izrada skale

Kako bi se izradila Skala percipiranih samoregulacijskih vještina, ispitana su istraživanja i mjerni instrumenti povezani s pojmom samoregulacije. Uzimajući u obzir Zimmermanovu (2002) klasifikaciju, autori su izradili koncept s 40 tvrdnji za koje su smatrali da su

prikladne za razvojne karakteristike učenika četvrtog razreda. Prvo je osam iskusnih učitelja razredne nastave pregledalo koncept, a zatim je on korišten za određivanje razumljivosti tvrdnji za učenike četvrtoga razreda. Ovaj postupak proveli su učitelji tih učenika, a ispitano je razumiju li učenici svaku tvrdnju. U skladu sa sugestijama učitelja, pet tvrdnji je uklonjeno iz koncepta jer nisu odgovarale razvojnim karakteristikama učenika ili im nisu bile razumljive. Nakon tog postupka koncept je sveden na 35 tvrdnji.

Zatim je koncept skale s 35 tvrdnji analiziralo četvero stručnjaka u područjima mjerenja i evaluacije, kurikula i nastave, psihološkoga savjetovanja te razredne nastave. Stručnjaci su sugerirali da bi neke tvrdnje trebale biti adekvatnije sročene kako bi odgovarale razvojnim karakteristikama učenika, da bi u skalu trebalo uvrstiti više motivacijskih tvrdnji, da bi se pojam „naučiti" trebao koristiti umjesto pojma „učiti" te da bi trebalo smanjiti broj niječnih izraza. Nakon što je dobiveno stručno mišljenje, dvije su tvrdnje uklonjene sa skale, dok je dodana jedna nova tvrdnja. Uz to, neke su tvrdnje preformulirane kako bi bile što jasnije, a niječne tvrdnje promijenjene su u potvrdne. Završna verzija koncepta sastojala se od 34 tvrdnje, od kojih je 6 bilo niječnih, a 28 potvrdnih. Tvrdnje su imale oblik Likertove skale od četiri stupnja: 1 – nikada, 2 – ponekad, 3 – često i 4 – uvijek.

Skalu su učenicima podijelili istraživači i troje apsolvenata. Prije nego što je skala uručena učenicima, tim zadužen za prikupljanje podataka organizirao je sastanke o procesu primjene skale te je postignut dogovor. Sve je zapisano u dokumentu koji je uručen svim članovima tima za prikupljanje podataka. Istraživač i student magistarskoga studija omogućili su jedinstvenu primjenu skale tako što su u školu otišli zajedno i prikupili inicijalne podatke. Zatim je podatke prikupljene u svakoj školi preuzeo drugi istraživač ili student magistarskoga studija.

Učenicima osnovne škole prije primjene skale pružene su detaljne informacije o namjeni skale, broju tvrdnji i načinu na koji će na njih odgovoriti. Svaki je učenik imao dovoljno vremena da dovrši skalu, za što je bilo potrebno oko 15 do 20 minuta.

Analiza podataka

Za analizu podataka prikupljenih tijekom pilot-istraživanja korištena je eksploratorna faktorska analiza, kako bi se ispitale skrivene dimenzije Skale percipiranih samoregulacijskih vještina. U podatcima dobivenima u pilot-istraživanju, negativne tvrdnje (4, 10, 21, 23, 25 i 27) kodirane su unatrag i prebačene u digitalni oblik. Podatci su provjereni i potvrđeno je da nema podataka koji nedostaju. Kako bi se potvrdila prikladnost ovoga seta podataka za provedbu eksploratorne faktorske analize, hi-kvadrat veličina bila je značajna ($\chi 2$ = 4948,99; p = 0,000), a Kaiser-Meyer-Olkinova mjera bila je 0,93. Kako bi podtaci bili prikladni za faktorsku analizu, potrebno je da Kaiser-Meyer-Olkinova mjera bude veća od 0,60, a Bartlettov test mora biti značajan (Büyüköztürk, 2010). Osim toga, Comrey i Lee (1992) opisali su veličinu uzorka od 585 pojedinaca kao vrlo dobrom za primjenu eksploratorne faktorske analize (citirano u Pearson i Mundform, 2010). Zbog tih razloga ovaj je set podataka bio pogodan za eksploratornu faktorsku analizu, tijekom koje su korištene metode analize glavnih komponenti i direktna oblimin rotacija.

Izračunat je koeficijent korelacije između faktora određenih eksploratornom faktorskom analizom i ukupnoga rezultata. Sukladnost strukture, kao rezultat eksploratorne faktorske analize, testirana je primjenom jednostavne konfirmatorne faktorske analize provedene pomoću LISREL-a 8.80 na podatcima prikupljenima eksperimentalnom primjenom skale. Za konfirmatornu faktorsku analizu izrađen je strukturalni model od tri faktora na temelju tvrdnji koje će se uvrstiti u skalu kao rezultat eskploratorne faktorske analize i teorijske klasifikacije u literaturi, posebno uzimajući u obzir dimenzije samoregulacije koje je opisao Zimmerman (1998). Na modelu je provedena analiza putanje te su izračunati indeksi sukladnosti. Kline (2005) je naveo da se analiza putanje može opisati kao „velika" kada je veličina uzorka veća od 200. Ovo je istraživanje, dakle, prikladno za analizu putanje jer je veličina uzorka u konfirmatornoj faktorskoj analizi 529.

Testirana je i valjanost finalne verzije skale na temelju unutarnjih kriterija. Za taj je postupak diskriminacijskom faktorskom analizom određeno 27 % gornjih i donjih podgrupa na temelju rezultata ukupne skale za set podataka od 529 ispitanika. Ukupni rezultati 143 učenika uključeni su u obje skupine. Značajna razlika između ukupnih rezultata gornje i donje skupine ispitana je pomoću t-testa za nezavisne grupe. Razina pouzdanosti unutarnje konzistencije skale i njezinih dimenzija izračunata je pomoću Cronbachova alfa koeficijenta pouzdanosti.

Rezultati

Rezultati pilot-istraživanja i istraživanja valjanosti Skale percipiranih samoregulacijskih vještina prikazani su u daljnjem tekstu.

Rezultati pilot istraživanja

Pomoću eksploratorne faktorske analize primijenjene u pilot-istraživanju skale izdvojeno je 10 faktora sa svojstvenom vrijednošću većom od jednoga kriterija. Međutim, kada je skala testirana pomoću *Scree Plota*, na grafu se može vidjeti horizontalna linija nakon trećega faktora. *Scree Plot* dobiven pomoću rezultata eksploratorne faktorske analize prikazan je na Slici 1.

Slika 1.

Na temelju *Scree Plota* i literature korištene u ovom istraživanju, utvrđeno je da Skala percipiranih samoregulacijskih vještina sadrži tri faktora. Nakon što je faktorska analiza ponovno primijenjena kao trofaktorska, uočene su tvrdnje s faktorskim opterećenjem ispod 0,317. 8 tvrdnji (4, 20, 22, 25, 26, 30, 34 i 18) koje su bile ciklične i s malim faktorskim opterećenjem uklonjene su iz seta podataka jedna po jedna te je analiza ponovljena. Kao rezultat faktorske analize pomoću metode direktne oblimin rotacije izračunato je da ukupna varijanca koju objašnjavaju tri faktora ima vrijednost 39,61 %. Ukupna varijanca koju objašnjava svaki faktor pojedinačno bila je 27,49 %, 7,06 % i 5,06 %. Faktorska opterećenja ovih tvrdnji prikazana su u Tablici 1.

Tablica 1.

Kako se može vidjeti u Tablici 1, 12 tvrdnji (1, 6, 14, 7, 24, 28, 29, 11, 3, 18, 12 i 17) imalo je opterećenje na prvom faktoru, 4 tvrdnje (21, 27, 23 i 10) imale su opterećenje na drugom faktoru, a 10 tvrdnji (13, 2, 31, 33, 32, 16, 15, 19, 5 i 8) imalo je opterećenje na trećem faktoru. Ovi faktori pokazuju dimenzije skale. Prva dimenzija sastoji se od 12 tvrdnji s faktorskim opterećenjem u rasponu između 0,32 i 0,74; druga dimenzija sastoji se od 4 tvrdnje s faktorskim opterećenjem u rasponu između 0,51 i 0,67, dok se treća dimenzija sastoji od 10 tvrdnji s faktorskim opterećenjem u rasponu između 0,32 i 0,56.

Kada se ispitaju tvrdnje u prvoj dimenziji skale, može se uočiti da one uključuju izjave koje pokazuju da učenici prave planove za nastavne materijale, da općenito planiraju i da sami započinju proces učenja. Ova dimenzija nazvana je „planiranje procesa učenja". Druga dimenzija dobila je naziv „provedba plana učenja", a uključuje posvećenost učenika planu učenja i ponašanje koje pokazuje napredak u učenju i sudjelovanje u aktivnostima učenja. Posljednja dimenzija, „fokusiranje na cilj i zadatak učenja", sastoji se od tvrdnji koje pokazuju da učenici sami sebi postavljaju ciljeve učenja, biraju i primjenjuju odgovarajuće strategije kako bi te ciljeve postigli, odrađuju zadatke koje im zadaje nastavnik i procjenjuju jesu li ostvarili svoje ciljeve.

Koeficijenti korelacije izračunati među faktorima koji su rezultat eksploratorne faktorske analize pokazali su značajnu vezu između faktora „planiranje procesa učenja" i faktora „fokusiranje na cilj i zadatak učenja" ($r = 0,92$, $p = 0,02$) na razini od 0,05. Međutim, nije utvrđena značajna veza između faktora „planiranje procesa učenja" i faktora „provedba plana učenja" ($r = 0,57$, $p = 0,05$) te faktora „provedba plana učenja" i faktora „fokusiranje na cilj i zadatak učenja" ($r = 0,57$, $p = 0,05$). To se također može protumačiti i tako da postoji prihvatljiva veza između podskala skale jer su p vrijednosti na razini 0,05.

Rezultati istraživanja valjanosti

U Tablici 2 prikazani su najveća vjerodostojnost, kvadrati višestruke korelacije (R2) i t-vrijednosti, koji su izračunati kao rezultat konfirmatorne faktorske analize provedene kako bi se potvrdila kompatibilnost trofaktorske strukture dobivene eksploratornom faktorskom analizom.

Tablica 2.

Kako se može vidjeti u Tablici 2, t-vrijednosti tvrdnji na skali variraju između 5,09 i 16,82. Duncan (1975) je mišljenja da je t-vrijednost značajna na razini 0,05 ako prelazi vrijednost od 1,96 te da je značajna na razini 0,01 ako prelazi vrijednost od 2,56. U skladu s tim, značajno je da su sve t-vrijednosti u Tablici 2 veće od 2. Model diskriminatorne faktorske analize prikazan je na Slici 2.

Slika 2.

U kontekstu konfirmatorne faktorske analize, izračunati su indeksi prikladnosti modela [srednja kvadratna pogreška aproksimacije (RMSEA), korijen srednje kvadratne pogreške (SRMR), indeks prikladnosti (GFI), prilagođeni indeks prikladnosti (AGFI), komparativni indeks prikladnosti (CFI), normirani indeks prikladnosti (NFI), nenormirani indeks

prikladnosti (NNFI)] i "χ2/df" vrijednost dobivena kada je vrijednost "χ2" podijeljena stupnjevima slobode.

Indeksi prikladnosti nastali u ovom istraživanju i vrijednosti koje se odnose na njihovu razinu prihvatljivosti u literaturi (Anderson i Gerbing, 1984; Bentler, 1990; Cheung i Rensvold, 2000; Hu i Bentler, 1998; Schermelleh-Engel, Moosbrugger i Müller, 2003) prikazani su u Tablici 3.

Tablica 3.

Kako se može vidjeti u Tablici 3, hi-kvadrat vrijednost, dobivena konfirmatornom faktorskom analizom, bila je značajna na razini 0,01. Ovaj podatak upućuje na činjenicu da kompatibilnost ne postoji. Međutim, kako uzorak postaje brojniji, hi-kvadrat vrijednost mogla bi postati značajnom (Schermelleh-Engel i sur., 2003). Stoga vrijednost 2,35 dobivena podjelom hi-kvadrata sa stupnjem slobode upućuje na savršenu prikladnost. Ostali indeksi prikladnosti bili su u dobrom rasponu prikladnosti [RMSEA = 0,05, SRMR = 0,05, GFI = 0,91, AGFI = 0,89, CFI = 0,96, NFI = 0,93, NNFI = 0,96]. Kada se indeksi prikladnosti ocjenjuju općenito, može se reći da su tvrdnje na Skali percipiranih samoregulacijskih vještina savršeno prikladne.

S obzirom na ove rezultate zaključeno je da struktura koju je pokazala eksploratorna faktorska analiza potvrđena konfirmatornom faktorskom analizom. Stoga je prikladno uvrstiti sve tvrdnje na skalu. Osim toga, kao rezultat t-testa valjanosti skale, uočena je značajna razlika između ukupnih rezultata gornjih i donjih 27 % grupa (t (177,03) = 41,77, $p < 0,01$).

Rezultati testa pouzdanosti skale

Izračunati su Cronbachov alfa koeficijenti kako bi se odredila razina pouzdanosti cijele skale i njezinih dimenzija. Rezultat je pokazao da koeficijent pouzdanosti (α) dobiven za cijelu skalu iznosi 0,88. Koeficijenti pouzdanosti (α) za dimenzije skale bili su: 0,85 za dimenziju „planiranje procesa učenja", 0,60 za dimenziju „provedba plana učenja" te 0,73 za dimenziju „fokusiranje na cilj i zadatak učenja". Izračunati koeficijenti pouzdanosti bili su prilično visoki, osim kada se radi o drugoj dimenziji. Svi se ovi rezultati mogu smatrati pokazateljima da je skala pouzdan mjerni instrument za mjerenje percepcija osnovnoškolaca o vlastitim samoregulacijskim vještinama.

Rasprava, zaključak i preporuke

Ovo je istraživanje pokušaj da se izradi pouzdan i valjan instrument za procjenu percepcija osnovnoškolaca o vlastitim samoregulacijskim vještinama. Rezultat eksploratorne faktorske analize provedene na podatcima dobivenima u pilot-istraživanju pokazao je da je 26 tvrdnji na skali od ukupno 34 tvrdnje distribuirano na tri faktora. Vrijednosti opterećenja faktora u tvrdnjama koje su uključene u skalu varirale su između 0,32 i 0,74. Prva dimenzija, koja se sastojala od 12 tvrdnji, nazvana je „planiranje procesa učenja", druga je dimenzija sadržavala 4 tvrdnje, a nazvana je „provedba plana učenja", dok se treća dimenzija sastojala od 10 tvrdnji, a nazvana je „fokusiranje na cilj i zadatak učenja".

Iako je teorija samoregulacije korisna u nomenklaturi poddimenzija sličnih skala (Bandura, 1991; Garcia i Pintrich, 1995; Pintrich i De Groot, 1990; Zimmerman, 1990, 2002), uočene su neke razlike. Na primjer, Güdücübaş (2012) je dimenzije samoregulacijske skale nazvao ovako: „kognitivne regulacije", „regulacija truda" i „regulacija vremena i rada". U ovom su istraživanju dimenzije „planiranje procesa učenja" i „provedba plana učenja" imenovane na temelju stupnjeva procesa učenja. Dimenzija „fokusiranje na cilj i zadatak učenja" pokriva različita ponašanja unutar samoregulacije, koja određuju individualne ciljeve učenja i preuzimanje odgovornosti za vlastite zadatke.

S druge strane, puno je rasprave i problema izazvao proces imenovanja dimenzija skale. Priprema za učenje (analiza zadatka i motivacijska uvjerenja), rad (samokontrola i samoopažanje) i samorefleksija (samoprosudba i vlastita reakcija) kao stupnjevi (Zimmerman, 1989; 2002) uzeti su obzir kada se radio nacrt skale. Konkretno su opisane karakteristike učenja/ponašanja koja se mogu povezati s tim stupnjevima kod učenika četvrtoga razreda. U tom su procesu od velike pomoći bila mišljenja nastavnika pri opisivanju tvrdnji. Na pitanja učenika o tvrdnjama odgovoreno je u procesu primjene skale. Međutim, otkriveno je da distribucija tvrdnji u faktore, što je bio rezultat eksploratorne faktorske analize, nije bila dovoljna za ta nastojanja u stupnju samorefleksije. Tvrdnje koje su namijenjene stupnju samorefleksije, kao što je, npr. „Mogu uočiti da nešto ne mogu naučiti o predmetu/lekciji.", distribuirane su u prvi i drugi faktor. Zatim su određena imena za koja se smatralo da predstavljaju cijele tvrdnje u svakom faktoru na skali.

Ostala istraživanja o izradi skala samoregulacije koja su provedena na uzorku osnovnoškolaca u Turskoj prošla su kroz sličan proces, s obzirom na distribuciju tvrdnji na skali u faktore (Doğan, 2015; Güdücübaş, 2012). U stvari, očekivano je naići na poteškoće u izradi skale za osnovnoškolce kada se radi o samoregulaciji jer je to apstraktan pojam koji obuhvaća puno psiholoških i kognitivnih koncepata i vještina i jer su učenici četvrtoga razreda u Turskoj stari 9-10 godina. U toj dobi može se očekivati da djeca počinju shvaćati, ali ne mogu potpuno usvojiti vještine apstraktnoga mišljenja (Marchand, 2012). Ipak, ističe se da neke vještine samorefleksije koje se mogu prepoznati u izjavi „Provjeravam jesam li dobro napisala/napisao zadaću.", mogu biti u određenoj mjeri usvojene i na ovom stupnju razvoja. Stoga skale koje su izradili Doğan (2015) i Güdücübaş (2012) također uključuju tvrdnje povezane sa samorefleksijom.

U literaturi postoje i sličnosti između tvrdnji uvrštenih u skale kojima se procjenjuju samoregulacijske vještine osnovnoškolaca (Doğan, 2015; Güdücübaş, 2012). Ta se situacija može smatrati normalnom jer su slični teorijski principi uzeti u obzir tijekom izrade skale. Za razliku od skala o kojima se može čitati u literaturi, ovo je istraživanje počelo sa stajalištem da samoregulacija nadilazi granice škole i predmeta. Stoga, kada se izrađivao koncept skale, tvrdnje su bile pisane pažljivo, kako se u njih ne bi uključivale riječi povezane sa strategijama učenja, školom, nastavom i školskim predmetima. Međutim, kada su konzultirani učitelji razredne nastave da daju svoje stručno mišljenje, sugerirali su da bi bilo dobro koristiti riječi poput nastave i školskoga predmeta jer učenici na taj način bolje razumiju tvrdnje na skali. O ovim je stajalištima, a pogotovo i o preporukama

jednoga od stručnjaka, raspravljao istraživački tim. Na kraju su oba prijedloga uzeta u obzir. Ipak, posebna je važnost dana razumijevanju tvrdnji na skali. Iz toga se vidi da ograničenja o nastavi i školskim predmetima ne mogu biti lako izbrisana. Ipak, mogli su se barem koristiti pozitivni opisi kako bi se izbjegle neke teže riječi, poput „ispita", koje bi mogle upućivati na vanjsku kontrolu.

Pokazalo se da je struktura određena eksploratornom faktorskom analizom kompatibilna s rezultatima konfirmatorne faktorske analize, na temelju eksperimentalnih podataka dobivenih pomoću Skale percipiranih samoregulacijskih vještina. Većina indeksa prikladnosti skale bila je na dobroj razini. Ovaj je rezultat prihvaćen kao naznaka kompatibilnosti, tj. kao pokazatelj da je valjanost skale u skladu s teorijom samoregulacije. Osim toga, poželjno je da indeksi prikladnosti budu na savršenoj razini. Međutim, kada se analiziraju istraživanja o izradi skale samoregulacije provedena u Turskoj, može se uočiti da kod mlađih ciljnih skupina indeksi prikladnosti postaju slabiji (Fındık-Tanrıbuyurdu i Güler-Yıldız, 2014; Güdücübaş, 2012). Tijekom faze prikupljanja podataka za ovo istraživanje uočeno je da osnovnoškolci ili uopće nemaju ili imaju jako malo iskustva s popunjavanjem instrumenta za prikupljanje podataka kojim se procjenjuju percepcije. Stoga, čak i ako su tvrdnje na skali objašnjene, postojala je mogućnost da učenici ne mogu jasno razumjeti teoriju. Usprkos tim mogućnostima, važno je u ranoj dobi usvojiti samoregulacijske vještine. Potrebne su objektivne skale kao pomoć roditeljima i nastavnicima pri pružanju podrške djeci u ovom području jer se pomoću njih može odrediti njezin učinak. Skala izrađena u ovom istraživanju može biti korisna za učenje o samoregulacijskim vještinama, iako je dobivena kroz percepcije učenika.

U podatcima o valjanosti Skale percipiranih samoregulacijskih vještina, izračunata značajna razlika između ukupnoga rezultata gornjih 27 % grupe i donjih 27 % grupe pokazuje da skala prepoznaje učenike koji imaju visoke i one koji imaju niske percepcije samoregulacijskih vještina. Stoga su učenici s visokim i niskim ukupnim rezultatom, njihovi nastavnici te jedan član svake obitelji intervjuirani pojedinačno u sklopu projekta u kojemu je ova skala korištena. Tijekom intervjua uočeno je da su mišljenja o učenicima bila u skladu s ukupnim rezultatima skale. Ukratko, skala u određenoj mjeri može dati uvid u samoregulacijske vještine učenika četvrtoga razreda osnovne škole.

Izračunat je Cronbachov alfa koeficijent pouzdanosti od 0,88 za ukupnu skalu i koeficijenti pouzdanosti (α) za poddimenzije, i to 0,85, 0,60 i 0,73, za svaku poddimenziju pojedinačno. Prema Klineu (2005), α koeficijent može biti smatran „savršenim" ako mu je vrijednost oko 0,90, „vrlo dobrim" ako mu je vrijednost oko 0,80 te „prihvatljivim" ako mu je vrijednost oko 0,70. Sukladno tome, koeficijent pouzdanost je „vrlo dobar" za cijelu skalu i za dimenziju „planiranje procesa učenja", a „prihvatljiv" za dimenziju „fokusiranje na cilj i zadatak učenja". Koeficijent pouzdanosti za dimenziju „provedba plana učenja" je na nižoj razini, na temelju ovih definicija. Zbog malog broja tvrdnji u ovoj dimenziji smatra se da je koeficijent pouzdanosti niži nego u drugim dimenzijama. Ukratko, može se protumačiti da cjelokupna skala i njezine dimenzije imaju dosljedne ocjene u svojim kontekstima.

Kao posljedica toga, rezultati o valjanosti i pouzdanosti Skale percipiranih samoregulacijskih vještina izrađene u ovom istraživanju upućuju na činjenicu da se skala može koristiti u istraživanjima u kojima se određuju samoregulacijske vještine osnovnoškolaca. Tijekom procesa primjene skale, od velike koristi učenicima mogu biti detaljna objašnjenja istraživača, koji imaju veliko znanje o samoregulaciji. Na taj se način može poboljšati valjanost podataka. Osim toga, u istraživanjima u kojima se ova skala koristi, mogli bi se usporediti podatci dobiveni pomoću drugih instrumenata za prikupljanje podataka.

Također se smatra da bi se istraživanja u kojima se izrađuju skale trebala provoditi na drugačijem uzorku i/ili bi se mogle koristiti različite tvrdnje na skali za određivanje samoregulacijskih vještina osnovnoškolaca. U takvoj vrsti istraživanja od velike je važnosti uzeti u obzir karakteristike djece ove dobi kada se sastavljaju tvrdnje na skali. Uz to, samoregulacija bi se mogla konceptualizirati kao jedna od temeljnih životnih vještina te bi izrada skala s tim na umu mogla diseminirati učinke istraživanja i njihovu primjenu kada se radi o ovoj temi.