Research article/Araştırma makalesi

Development and Validation Study of a General Self-Efficacy Scale

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Abstract

Self-efficacy measures might be used for different purposes. However, self-efficacy scales rely on their respective cultural values. For that reason, aim of this study was to create a new self-efficacy scale (SES). The Self-Efficacy Scale (SES) was prepared with 27 items. Prepared SES consisted items with likert type. Sample of the study consisted of 271 university students. Principal axis factoring with orthogonal rotation (varimax) was used for exploratory factor analysis. Parallel analysis was used to determine the number of factors. Items with low reliability coefficient and low factor loading values were omitted from the SES. Factor analysis with same procedure was reconducted and SES emerged with one factor and had 14 items along with Cronbach's alpha =.908 reliability value. A confirmatory factor (CFA) analysis was carried out with data which was obtained from a different sample (N=198). Thus total sample of the study was 469. SES model was approved by most common fit indice values. Finalized SES consisted of 21 items with seven (7) filler and nine (9) reverse coded items. It was decided that created SES might be used for cultures which have similar values.

Keywords: Self-efficacy, scale construction, scale development, students, teachers.

1. Introduction

Self-efficacy is defined as someone's belief in her/himself on being capable of doing or engaging tasks. Thus self-efficacy plays an important role in future oriented perspectives/aims (Karwowski and Kaufman, 2017). Since social sciences include human behaviors, researchers heavily use questionnaires to collect data and understand human psychological attributes which might be understood clearly through the items representing domain of interest (Gözüm and Aksayan, 1999;

Hinkin, 1998; Wong and Lian, 2003). So, using and creating effective measures for educational purposes becomes essential (Hinkin, 1998; Hinkin, Tracey and Enz, 1997).

Students, who have high self-efficacy, may take responsibilities of their own learning, can regulate their long and short term aims, and develop learning strategies. However, teachers play important role for students in developing those skills since students do not have much experience on structuring their efforts in proper ways. Most effective teachers are the ones who model positive perspectives of self learning regulations for each student they interact. This may be done through class discussions, giving the feeling of self respect and self worth. Activities to increase self-efficacy are not only limited to those listed. For example a cooperative writing activity not only enhances learning but also increases self-efficacy of the students (Troia, Harbaugh, Shankland, Wolbers and Lawrence, 2013; Zimmerman, Bonner and Kovach, 1996). Consequently it should be noted that teachers are not only supposed to know and apply the instruction methods and techniques but also exhibit the positive attitudes and feelings. Teachers should know supportive ways and education faculties should also focus on training teacher candidates (students) and on teaching by how to have and exhibit supportive ways. (Larry and Iris, 1990). Through that, hopefully, teachers will know how to have their own source of efficacy and then will create supportive environment for their students. Studies point out that, teachers who have high self-efficacy values are eager to try different and new techniques in the classroom and are eager to learn different approaches. On the other hand, teachers with low self-efficacy values tend to avoid using new approaches or techniques and keen to use traditional approaches where they can also avoid taking responsibilities (i.e avoid risks) (Berg and Smith, 2016; Bursal, 2010; Karabatak and Turhan, 2017). For that reason, teachers should master their students' time management by helping them to create their own learning strategies. However, lack of improvement of self-efficacy or making students to believe that they will have immediate results may have catastrophic effects on self-confidence. (Zimmerman et al., 1996). Thus, teachers should be aware of the fact that they will not always have solid data on the increase of self-efficacy since the progress itself may take a while to reveal itself (Köseoğlu, 2010). Even motivation itself may have direct effect on achievement and have impact on self-belief (Lovelace and Brickman, 2013) where quantitative measures are used as a representation of abstract construct (Hinkin, 1998).

Self-efficacy beliefs may vary across cultures which include both personal and interpersonal experiences such as beliefs, faiths, socioeconomic status and school achievement. Then it is obvious to indicate that each self-efficacy scale is a reflection of its applied culture (Bandura, 2006; Berg and Smith, 2016). As a consequence, self-efficacy scales must have derive upon its applied culture (Karwowski and Kaufman, 2017) since it will give information on one's psychological position on a specific subject (Brinkman, 2009). However, most developed scales are based on eigenvalues in order

to determine factor structures. This procedure may cause problems and researchers may extract too many or too few factors. Parallel analysis offers better solutions to extract the factors since it is more robust to sampling errors and more easy to interpret when compared to scree plot analysis (Crawford et. al., 2010; Field, 2013; Franklin, Gibson, Robertson, Pohlmann and Fralish, 1995; Hayton, Allen and Scarpello, 2004; Johnson and Morgan, 2016; Ledesma and Valero-Mora, 2007; Turner, 1998). Taking a glance upon the developed and validated self-efficacy scales published since 2019 through Google Scholar for the first four pages for developed self-efficacy scale examples indicate; self-efficacy for farmers' mastitis prevention in dairy cows (Lind, Hansson and Lagerkvist, 2019), problem posing self-efficacy scale (Özgen and Bayram, 2019), the computer programming self-efficacy scale for computer literacy education (Tsai, Wang and Hsu, 2019), COVID-19 prevention, recognition and home-management self-efficacy scale (Hernandez-Padilla et.al, 2020), implementation self-efficacy for EBP (ISE4EBP) scale (Tucker, Zadvinskis and Connor, 2020) had no parallel analysis information. On the other hand, internet literacy self-efficacy scale for pre-service teachers (Yasan Ak, 2020) and life roles self-efficacy scale for young adults in school-to-work transition (Kot, Roznowski and Ertelt, 2020) factor structures were checked with parallel analysis. Finally, psychologist and counsellor self-efficacy scale was checked with respect to Rasch Analysis (Watt, et.al., 2019). Literature research validates the argument proposed in this article. Most self-efficacy scales were developed without conforming the factor structures with parallel analysis.

Consequently, developed scales might not have true factor structures. For that reason, purpose of this study is to create a general self-efficacy scale proper to its applied culture through parallel analysis. By this, it is believed that the developed self-efficacy scale might be used for general purposes or/and in educational settings.

2. Method

2.1. Creating new self-efficacy scale

To achieve the purpose of the study, literature research was done for different self-efficacy scales and the obtained scales were analyzed. To create a new scale some guide lines were determined. The created guideline was based on suggestions acquired from literature (Bandura, 2006; Brinkman, 2009; Gözüm and Aksayan, 1999; Hinkin, 1998; Hinkin et.al., 1997; Johanson and Brooks, 2010; Kato, 2013; Larry and Iris, 1990; Muris, 2001; 2002; Schwarzer and Jerusalem, 1995; Wong and Lian 2003; Yeşilay, Schwarzer and Jerusalem, 1996). Those guidelines are;

a) Language should be clear and appropriate to respondents

b) Not to cause any bias, content must be familiar with students' culture (schemes)

c) Items must include a single topic and asses a single behavior or response

d) Items must not sound abstract or vague so that they could not be interpreted in different ways.

e) Leading questions should be avoided

f) Language and expected knowledge should be familiar for the target group

g) Sensitive questions or sentences, double negative questions should be avoided

h) Intervals between the questions should not remind the respondents their previous answers (i.e control questions should not awake the feeling for the respondents that their answers are being/will be checked)

Thus maximum information would have been gathered with minimum cost. Although a qualitative study might reveal more in depth idea regarding the students' ideas and attitudes. A quantitative study might reveal a direct result and might be completed in much shorter time since it ensures easy compilation and generalize the scale to population. Obtained scales were analyzed for their harmony with Turkish culture and a new scale was created based on guidelines. For the best practice for analysis and interpretation of data some measures were taken account such as different scale preparation advisements, regarding but not limited to assessing values, beliefs, cultural values of students, possible different instructor effects, instructional methods used for education, number of questions asked, appropriateness to common usage, item degree, respond type and lengthy design. (Brinkman, 2009; Johanson and Brooks, 2010; Lovelace and Brickman, 2013). So, among Thurstone's method of equal-appearing intervals, Likert scale, Semantic differential scales it was determined that a likert type scale would be more beneficial for the purpose of the study.

Candidate pool of items were selected for the scale and then maximum number of items was determined so that respondents would not bored and respond the scale within attention time to ensure content adequacy. Item degree was determined to ensure that respondents will not make grading like from 1 to 10 but instead place themselves in a position. For that purpose sentences "I completely agree" or "I completely disagree" were given at the beginning of the scale as information but scale itself marked those sentences from 1 to 5. 5 was the strongest confirmation signal while 1 was the least confirmation signal. By placing 5 level of response for an item it was ensured that internal consistency reliability was increased and sufficient variances were obtained since at least a four (4) point value provides enough variance for the purpose. Hinkin (1998) points out that most respondents tend to choose options at the edges thus reversed coded sentences were appropriately used to trigger vigilance of respondents (Brinkman, 2009; Hinkin et al., 1997; Hinkin, 1998; Lovelace and Brickman, 2013). Thus created scale is a Likert type scale since it is regarded as most useful in behavioral research and suitable for factor analysis (Hinkin, 1998; Hinkin et al., 1997).

2.2. Created self-efficacy scale

Prepared scale was analyzed by instructors and educators with the experience of teaching and having researches on related issues since specialists could value the prepared scale on content domain (Hinkin et al., 1997). Ethical approvement was provided by Scientific Research and Publication Ethics Committee on 25/03/2020 with E.4757 file number. In order to ensure anonymity no personal information was asked from the participants. After that, scale was applied to a small group of teacher candidates for pilot study. Four participants were studying at elementary science education program, four participants were studying at classroom teaching department and three participants were studying at early childhood education program. Thus, eleven participants were included in the pilot study. Response rate of the created scale (items) was determined (i.e questions whose meanings asked by the respondents were immediately omitted from the scale since it was determined that those sentences were vague or abstract to respondents). After determining the items, their number and its content, scale was finalized. Created Self-Efficacy Scale (SES) consisted of 27 items. A possible value of high number of the items was included in the scale to ensure that the scale catches its purpose. Benefit of increasing the questions is that the reliability increases with the number of questions. However it should be noted that it has been also tried to ensure that respondents would not have the feeling of replying same/similar questions directed to them in different sentences. By doing so, it was ensured that respondents would not bore and reply the questions willingly (Brinkman, 2009). SES consisted of 8 filler questions and 10 reverse coded questions. Filler questions were SES1, SES6, SES7, SES13, SES20, SES22, SES25 and SES26. Reverse coded questions were SES3, SES5, SES8, SES9, SES11, SES12, SES17, SES19, SES21 and SES27.

2.3. Determining the sample size and sampling

Finalized scale was applied to university students who are studying at Education Faculty which is suitable for the purpose (Hinkin, 1998). Since nature of the sample has the largest impact on accuracy of parameter estimates in order to avoid measurement errors, it is important to choose adequate sampling, by doing this unrepresentative sample would not be used in the study. Through that, it was concluded that sample represents the population of interest for larger study (Hinkin, 1998; Johanson and Brooks, 2010). In order to ensure the anonymity, (i.e. avoiding conflict of interest) no personal information was required from the students. After applying the scale, control questions were run and students' scales whose responses did not fit in the control questions' range were omitted from the study thus leaving 271 data of students. Purpose of running control questions was to reduce/eliminate the chance factor caused by someone who gives wrong answer about his/her idea on

the subject/topic. For that reason, sample of the study consisted of 271 students studied at Mus Alparslan University Education Faculty.

Choosing a sample size is controversial through literature. Some researchers argue about arbitrary sampling which presents high communalities without cross loadings. So, sampling may be determined by nature of data i.e stronger the data smaller the sampling, while others argue on item-ratio. Debate on item-ratio suggests proportion from 1:2 to 1:10 for item and sampling (Anthoine, Moret, Regnault, Sébille and Hardouin, 2014; Hinkin, 1998; Hinkin, Tracey and Enz, 1997). For example, Johanson and Brooks (2010) point out that literature on social researches suggest N between 10 and 30 for creating scales and pilot studies which might be useful with benefits such as simplicity, easy calculation and the ability to test hypotheses. In addition, researchers also point out that N=100 for sampling is also suggested in literature. For a comprehensive item analysis N=100 to 200 also should be conducted since (suggested) standard errors for Cronbach's alpha increases as the sample size decreases. However, it is also noted that regardless the number of items (might be even two items), mean inter-item correlation is nominal between N= 30 to 200. Yet, researchers conclude in their study that N=30 would be reasonable enough for pilot studies when the purpose is preliminary survey or scale development. Additionally, Hinkin (1998) and Hinkin et al., (1997) suggest N=150 to obtain sufficient data for exploratory factor analysis as long as item inter-correlations are reasonably strong and for confirmatory factor analysis N=100 is recommended. However, researchers also mention that the difference between statistical and practical significance must be noted since, attaining statistical difference increases as the sample size increases. Larger samples are in fact useful to detect small fluctuations. However as sample size increases practical meaning of the results may distort so, decision on sample size must be taken with caution. Having 1:14 item-ratio and with number of participants (271), it was decided that sample of the study was adequate for the research.

2.4. Reliability analysis

Johnson and Morgan (2016) recommend analyzing the internal consistency of the scale items and omitting the items which have the internal consistency values below the desired value of .200 for the scale development studies. Thus, Cronbach's alpha internal consistency was run for the scale to detect the items which have the internal consistency value below the desired point. An internal consistency for 19 items was run and items which had the corrected – item total correlation values below .200 were omitted from the scale. Thus SES10, SES16 and SES23 were excluded from the scale due to having low scores below the desired values. Final version of the SES has Cronbach's α value of .900 with 16 items.

2.5. Data analysis for normality

Prior the exploratory factor analysis a normality check was done through Kolmogorov-Smirnov test on the obtained data and result of normality test was given in Table 1.

Table 1. Normality check.

	Kolmogorov-Smirnov test		
	Statistic	df	Significance
Distribution	,092	271	,000

Data in Table 1 indicated data is non-normally distributed. Thus, for a detailed analysis kurtosis and skewness values are obtained. Skewness value is -,546 with standard error ,148 and kurtosis value is -,455 with standard error ,295. These results indicated that kurtosis exhibited normality but skewness did not exhibit normality within %5 of significance (Kalaycı, 2010; Rose, Spinks and Canhoto, 2014). For that reason, Bartlett's test of sphericity was checked and found as $x2(120) = 1801.562$, $p = .00 < .05$ which also implied that data had multivariate normal distribution (Büyüköztürk, 2012). For that reason, procedure for exploratory factor analysis (EFA) was carried out.

2.6. Exploratory factor analysis (EFA)

Principal axis factoring was conducted on the 16 items with orthogonal rotation. Since "*Varimax attempts to maximize the dispersion of loadings within factors. Therefore, it tries to load a smaller number of variables highly on each factor, resulting in more interpretable clusters of factors*" (Field, 2013), it was run through SPSS program to reveal the factors within the created scale. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis as KMO= .919 ("marvelous" according to Kalaycı, 2010) which was above the acceptable limit of .5 and Bartlett's test of sphericity ($x2(120) = 1801.562$, $p = .00 < .05$) was found to be significant. An initial analysis was run to obtain eigenvalues for each factor in the data. Three factors emerged having eigenvalues over Kaiser's criterion of 1 and in combination explained %45,443 of the variance. Obtained eigenvalues were 6,654; 1,216 and 1,000 in respective order. Since parallel analyses is recommended for conforming the obtained eigenvalues (Field, 2013; Johnson and Morgan, 2016), a Monte Carlo PCA for parallel analysis with 1000 replications was run (Watkins, 2000) and obtained eigenvalues were 1,4424; 1,3452 and 1,2727. Consequently, parallel analysis indicated that last two eigenvalues were not significant then; factor analysis was rerun with one factor solution. One factor solution had the eigenvalue of 6,654 and

explained %38,122 of the variance. The scree plot was obtained and given in Figure 1.
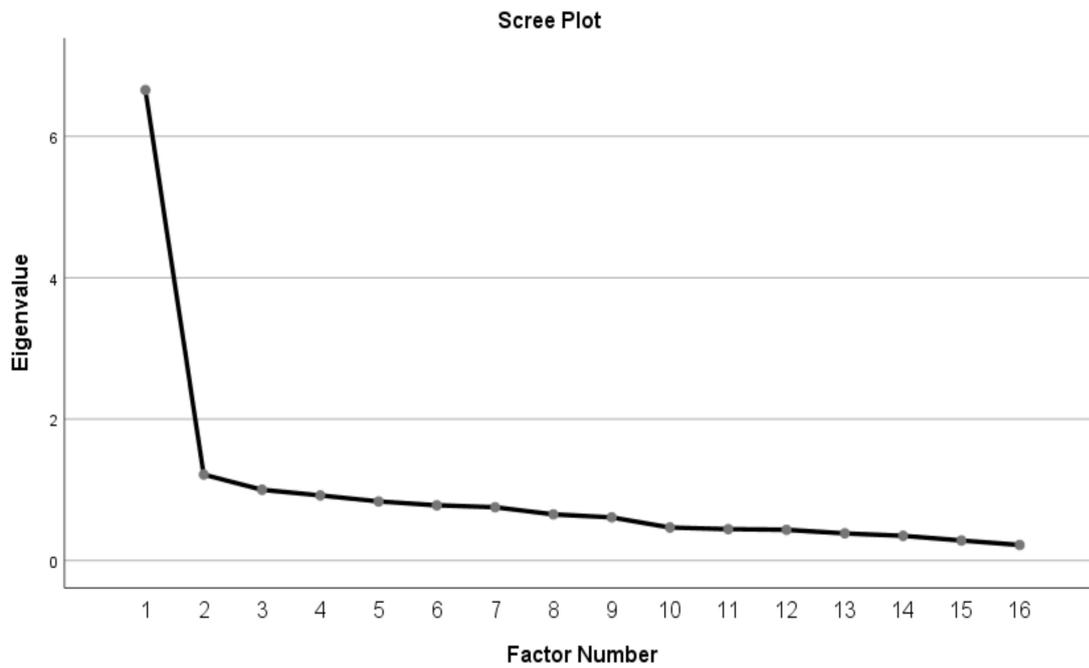

Figure 1. Scree plot.

Extracted communalities and factor loadings after rotation were given in Table 2.

Table 2. Extracted communalities and factor loadings.

	h^2	Factor loading
SES2	,365	,604
SES3	,090	
SES4	,572	,756
SES5	,304	,551
SES8	,320	,566
SES9	,419	,647
SES11	,394	,628
SES12	,471	,686
SES14	,322	,567
SES15	,672	,820
SES17	,386	,621
SES18	,098	
SES19	,242	,492
SES21	,648	,805
SES24	,480	,693
SES27	,317	,563

* Factors loadings below .4 are not shown

Step 1: Since SES3 and SES18 factor loadings were below .4 and traditional methods recommend keeping the factor values .4 or above (Field, 2013; Johnson and Morgan, 2016), those two items were excluded from the SES. Consequently an EFA procedure was run again.

Step 2: A principal axis was conducted on the 14 items with orthogonal rotation (varimax) through SPSS program to reveal the factors within the created scale. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis as KMO=.924 ("marvelous" according to Kalaycı, 2010) which was above the acceptable limit of .5 and Bartlett's test of sphericity (x^2(91) = 1714.366, p = .00 < .05) was found significant. An initial analysis was run to obtain eigenvalues for each factor in the data. Two factors emerged having eigenvalues over Kaiser's criterion of 1 and in combination explained %47,288 of the variance. Eigenvalues obtained were 6,455 and 1,162 in respective order. Since parallel analyses was recommended for conforming the obtained eigenvalues (Field, 2013; Johnson and Morgan, 2016), a Monte Carlo PCA for parallel analysis with 1000 replications was run (Watkins, 2000) and obtained eigenvalues were 1,4026 and 1,3075. Since parallel analysis indicated that second eigenvalue was not significant then, factor analysis was rerun with one factor solution. One factor solution has the eigenvalue of 6,455 and explained %42,231 of the variance. The scree plot is obtained and given in Figure 2.

Figure 2. Final scree plot.

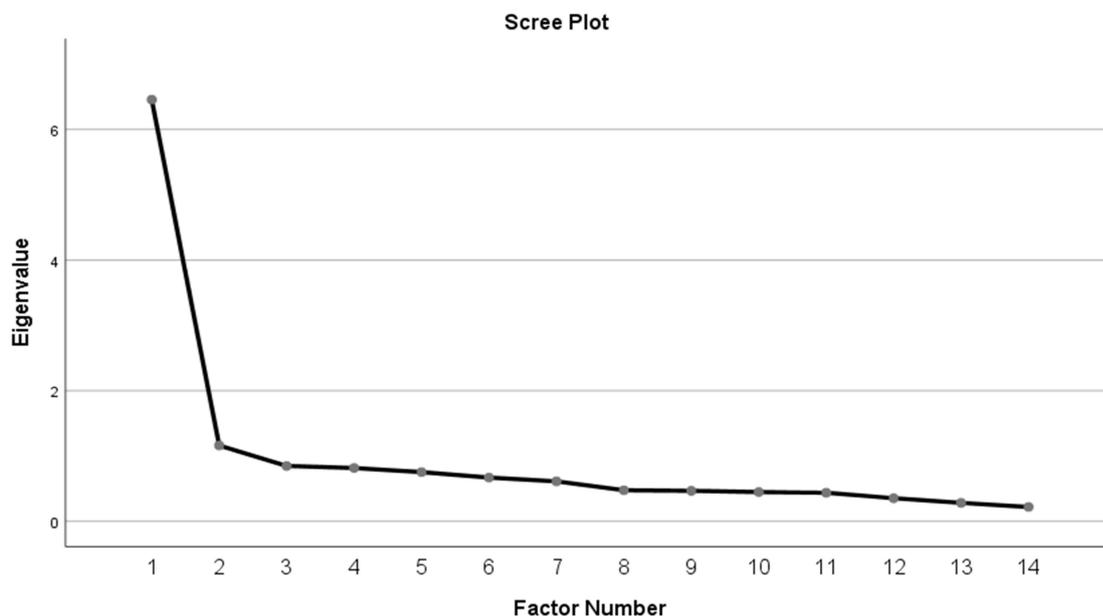Extracted communalities and factor loadings after rotation were given in Table 3.

Table 3. Extracted communalities and factor loadings.

	h^2	Factor loading
SES2	,361	,601
SES4	,573	,757
SES5	,309	,556
SES8	,316	,562
SES9	,413	,643
SES11	,399	,632
SES12	,471	,686
SES14	,316	,562
SES15	,678	,823
SES17	,382	,618
SES19	,250	,500
SES21	,642	,801
SES24	,490	,700
SES27	,313	,560

Since none of the items' factor loadings were below .400 (Table 3) validation of scale's internal consistency reliability coefficient was made as suggested (Field, 2013; Francis et. al., 2004; Johnson and Morgan, 2016). Cronbach's α value was found "highly reliable" as =.908 (Kalaycı, 2010).

Step 3: For detailed analysis an independent t samples test was run for each item for the %27 up and down groups since it was advised to examine items' discrimination efficiency (Moore and Foy, 1997). Item-total correlation and $t_{up-down(\%27)}$ results were shown in Table 4.

Table 4. Item-total correlation and $t_{up-down(\%27)}$ results.

| Old item code	New item code	Mean	Standard Deviation	Corrected-item total correlation	$t_{up-down(\%27)}$
SES2	SES2	3,33	1,244	,568	11,588*
SES4	SES3	3,66	1,411	,706	16,881*
SES5	SES4	3,36	1,523	,540	12,024*
SES8	SES7	3,44	1,359	,537	11,465*
SES9	SES8	3,55	1,464	,606	14,510*
SES11	SES9	3,53	1,467	,605	15,705*
SES12	SES10	3,58	1,409	,654	17,510*
SES14	SES12	3,38	1,384	,523	13,239*
SES15	SES13	3,73	1,451	,774	24,505*
SES17	SES14	3,44	1,398	,594	14,074*
SES19	SES15	3,29	1,458	,488	10,528*
SES21	SES17	3,63	1,474	,758	23,321*
SES24	SES19	3,52	1,316	,666	15,111*
SES27	SES21	3,29	1,290	,535	10,438*

* p < .05

Since SES validated itself as a reliable scale thus, it was concluded that it might be used. Consequently, filler questions were replaced between questions with respect to pilot scale order. SES consisted of seven (7) filler and nine (9) reverse coded items thus finalized scale consisted of 21 items (Appendix A). Filler questions are SES1, SES5, SES6, SES11, SES16, SES18 and SES20. Reversed coded items are SES4, SES7, SES8, SES9, SES10, SES14, SES15, SES17 and SES21. For international readers an English version of SES is also given in the Appendix B. Translation was provided by the researcher and opinion of 2 professors ,who have proficiency in English language, were taken account for translation accuracy. A discussion is provided in Discussion section. Not to confuse readers, discussion is based on new item codings.

2.7. Confirmatory factor analysis

For confirmatory factor analysis, data were collected from a different sample. The sample consisted of 198 university students studying at elementary science education, elementary education, and pedagogical education program. Confirmatory factor analyses were run through Amos 24.0 software. Initial analysis results were given below in Table 5 and Figure 3.

Table 5. Initial fit indice values of CFA.

	\chi2/DF	RMSEA	GFI	CFI	SRMR	NFI	AGFI	IFI	PNFI	NNFI (TLI)
					Fit indices					
Values	4,221	.128	.773	.843	.0693	.806	690	0.845	.682	.815
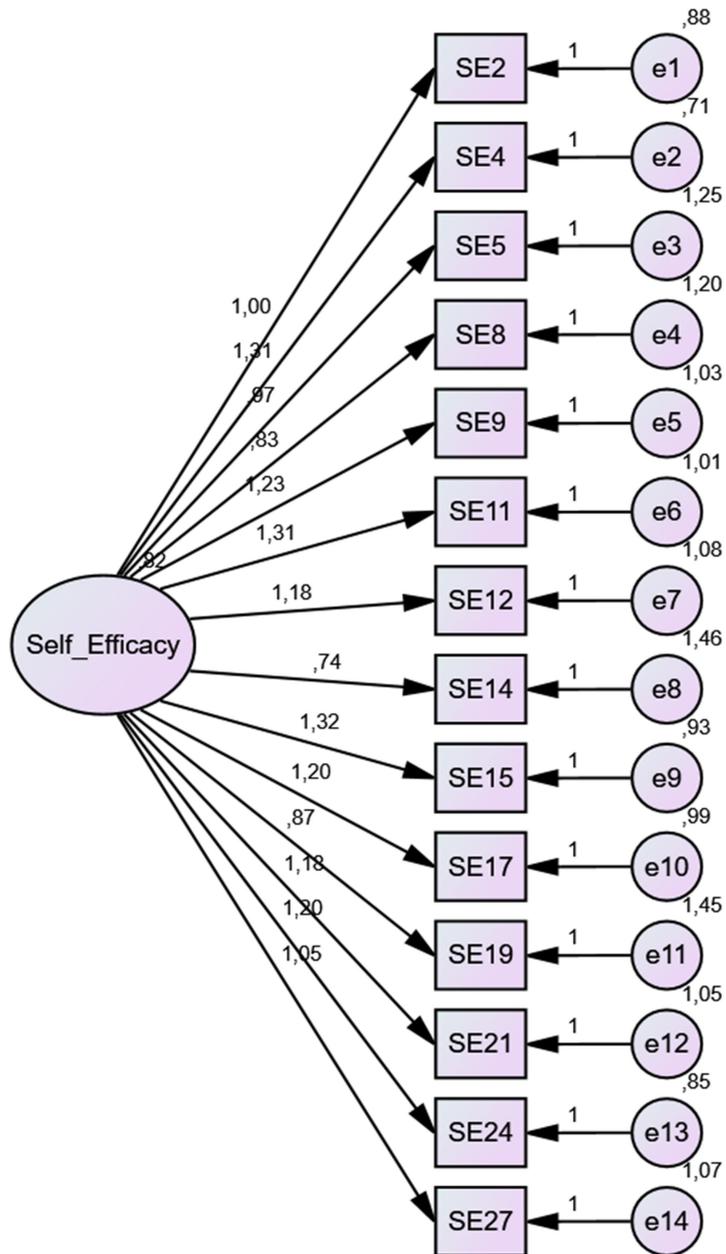
Figure 3. Initial confirmatory factor analysis results.

Due to low values of indices, it was decided to examine the error terms and to covariate items. Covariated error terms were e2-e9; e9-e10; e3-e11; e5-e7; e6-e7 and e4-e8. After covariance obtained values were; $\chi2/DF$ ratio was 2,522; SRMR value was .0565; GFI value was .872; AGFI value was .810;

NFI value was .893; IFI value was .933; NNFI (TLI) value was .913; CFI value was .932 and RMSEA value was .088. Six items were covariated and confirmatory factor analysis results were shown in Fig 4.
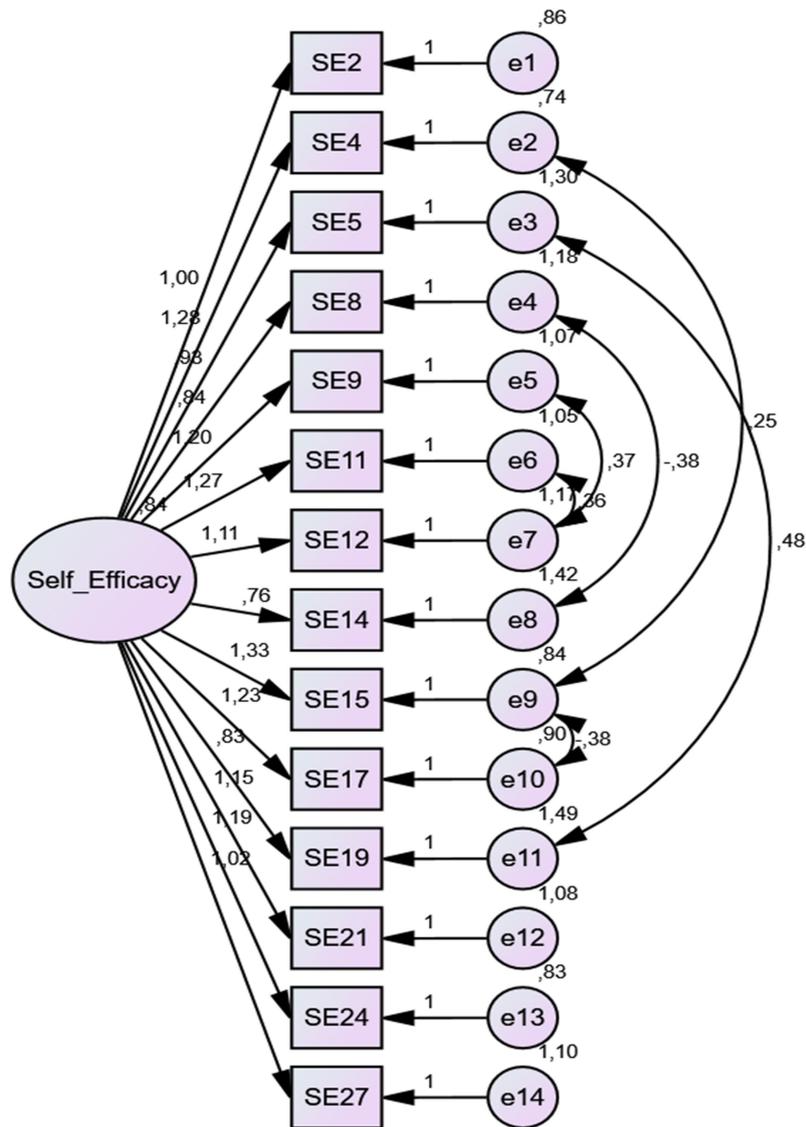
Figure 4. Confirmatory factor analysis results.

Obtained χ2/DF ratio was 2,522 and Yıldırım and Selvi (2015) indicate that if χ2/DF ratio is smaller than 3 than the model has a good fit. Thus, model was approved by χ2/DF ratio. SRMR value was .0565 and model has a good since SRMR value was below .08 (Hooper, Coughlan, and Mullen,

2008; Hu and Bentler, 1999). GFI value was .872 and model showed a good fit since GFI value was above .850 (Kline, 2011 cited in; Kaya and Altinkurt, 2018; Vassallo and Saba, 2015), AGFI value was .810 and it indicated model had a good fit since AGFI value was above .80 (Sica and Ghisi, 2007), NFI value was .893 and model had a good fit since value was above .80 (Byrne and Campbell, 1999 as cited in Nayir, 2013) and it was very close to .90, IFI value was .933 and model had a good fit since value was above .80 (Browne and Cudeck, 1993; Garson, 2006 as cited in Chinda, Techapreechawong and Teeraprasert, 2012), NNFI (TLI) value was .913 and above .90 thus model had a good fit (Carlback and Wong, 2018; Shadfar and Malekmohammadi, 2013), CFI value was .932 and very close to .95 (Hooper, Coughlan, and Mullen, 2008; Hu and Bentler, 1999) and, RMSEA value was .088 and below .100 thus model had adequate fit with respect to indicated value (Carlback and Wong, 2018; Shadfar and Malekmohammadi, 2013).

3. Discussion

Created SES has one factor structure and assesses a general self-efficacy attitude. Detailed analysis upon the t values of %27$_{up-down}$ will reveal more insight. Lowest t value obtained from SES7 (t = 11,465) which is "I hardly accomplish my my goals when I set them" and SES21 (10,438) "I trouble to overcome obstacles that I encounter in life". Low t values of SES7 and SES20 imply that individuals who can set goals and accomplish them may overcome obstacles they encounter. In another aspect it may be also said that individuals who are having troubles in overcoming obstacles also are having difficulties in achieving set aims. In fact, SES7 targets "action planning" where SES20 targets "coping planning" and studies demonstrates that although action planning is effective in long term behavioral change, "coping planning" is a hidden and strong factor which is effected by experience and hence effective on action planning (Snieehotta, Schwarzer, Scholz and Schuz, 2005). Effect of experience on cognitive skill development is already accepted by many researchers thus cooperation among the students are encouraged at every opportunities (Hesse, Care, Buder, Sassenberg and Griffin, 2015). For example, cooperative learning model encourages learning groups and creates heterogeneous groups in which students encounter difficulties, different ideas and obstacles. However, through experience it is aimed that every single student will learn how to overcome obstacles and establish long term planning. It should also be noted that instructors play a key role in dramatic increase of experience and problem solving skills (Crouch and Mazur, 2001; Hakkinen, Jarvela, Makitalo-Siegl, Ahonen, Naykki and Valtonen, 2017).

The highest t values obtained from SES13 (t= 24,505) and SES17 (23,321) already confirms the argument stated above. SES17 shows that students with lower low self-efficacy values "give up trying/learning" if they fail to accomplish the task. In other words, students with high self-efficacy values

do not easily give up and focus on the task. This case, is approved in t value of SES13 which is "If I decide to do something, I focus on it" and show that students with high self-efficacy values also do not easily give up. Both SES13 and SES17 confirm and validate each other. Self-efficacy is one's believe in his/her capability of doing something and it is shaped by past experience. Thus, learning/knowing what to do and how to do is an essential component in self-efficacy (Nguyen, Johnson, Collins and Parker, 2017). In fact, several researches already indicate that self-efficacy values are related with past experiences (Nissen and Shemwell, 2016; Robnet, Chemers and Zurbriggen, 2015).

4. Conclusion

Clark and Watson (1995) report that a good scale through factor analysis should reflect unidimensionality. Created SES having both one factor structure and high internal consistency (α=.908) proves itself a powerful scale for the purpose. As a result of analyzes, it is concluded that created self-efficacy scale will be helpful to researchers and educators who want to use it in educational and social purposes. For that purpose created SES is given in the Appendix A. For further analysis SES might be used in different region of Turkey and neighborhood regions/states which have similar cultural context. Thus, SES with different samples is also welcome to compare results and to validate its purpose. However, reliability and factor structure of the scale should be restudied. Thus, SES with different international samples is also welcome to compare results and to validate its purpose. For that purpose an English version of created SES is given in the Appendix B.

Conflict of interest
The author declares that there is no conflict of interests

References

Anthoine, E., Moret, L., Regnault, A., Sébille, V. & Hardouin, J.-B. (2014). Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. *Health and Quality of Life Outcomes, 12,* 2. DOI: 10.1186/s12955-014-0176-2

Bandura, A. (2006). Guide for constructing self-efficacy scales. *Self-efficacy beliefs of adolescents,* 5, 307-337. Urdan, T. & Pajares, F. (Eds.). Greenwich, CT: IAP.

Berg, D. A. G. & Smith, L. F. (2016). *Preservice teacher self-efficacy beliefs: An opportunity to generate "good research" in the asia-pacific region.* In S.G Editor & D. P. Editor (Eds.), Asia-Pacific Perspectives on Teacher Self-Efficacy (1-17). Rotterdam: Sense Publishers

Brinkman, W-P. (2009). *Design of a questionnaire instrument, handbook of mobile technology research methods.* ISBN 978-1-60692-767-0, pp. 31-57 Netherlands: Nova Publisher

Bursal, M. (2010). Turkish preservice elementary teachers' self-efficacy beliefs regarding mathematics and science teaching. *International Journal of Science and Mathematics Education, 8,* 649-666.

Büyüköztürk, Ş. (2012). *Sosyal bilimler için veri analizi el kitabı.* Ankara: Pegem Akademi Yayıncılık.

Clark, L. A. & Watson, D. (1995). *Constructing validity: Basic issues in objective scale development. Psychological Assessment, 7* (3), 309-319.

Crawford, A. V., Green, S. B., Levy, R., Lo, W.-J., Scott, L., Svetina, D. & Thompson, M. S. (2010). Evaluation of parallel analysis methods for determining the number of factors. *Educational and Psychological Measurement, 70* (6), 885–901. DOI: 10.1177/0013164410379332

Crouch, C. H. & Mazur, E. (2001). Peer Instruction: Ten years of experience and results. *American Journal of Physics, 69* (9), 970–977. DOI: 10.1119/1.1374249

Field, A. (2013). *Discovering statistics using IBM SPSS statistics (4th Edition).* London: SAGE

Franklin, S. B., Gibson, D. J., Robertson, P. A., Pohlmann, J. T. & Fralish, J. S. (1995). Parallel analysis: a method for determining significant principal components. *Journal of Vegetation Science, 6* (1), 99-106. DOI: 10.2307/3236261

Gözüm, S. & Aksayan, S. (1999). Öz-etkilik-yeterlik ölçeği'nin Türkçe formunun güvenirlik ve geçerliliği. *Atatürk Üniversitesi Hemşirelik Yüksekokul Dergisi, 2* (1), 21-34.

Hakkinen, P., Jarvela, S., Makitalo-Siegl, K., Ahonen, A., Naykki, P. & Valtonen, T. (2017). Preparing teacher-students for twenty-first-century learning practices (PREP21): A framework for enhancing collaborative problem-solving and strategic learning skills. *Teachers and Teaching, 23* (1), 25-41. DOI: 10.1080/13540602.2016.1203772

Hayton, J. C., Allen, D. G. & Scarpello, V. (2004). Factor Retention Decisions in Exploratory Factor Analysis: a Tutorial on Parallel Analysis. *Organizational Research Methods, 7* (2), 191–205. DOI: 10.1177/1094428104263675

Hernandez-Padilla, J. M., Granero-Molina, J., Ruiz-Fernandez, M. D., Dobarrio-Sanz, I., Lopez-Rodriguez, M. M., Fernandez-Medina, I. M., Correa-Casado, M. & Fernandez-Sola, C. (2020). Design and psychometric analysis of the covid-19 prevention, recognition and home-management self-efficacy scale. *International Journal of Environmental Research and Public Health, 17,* 4653. DOI: 10.3390/ijerph17134653

Hesse F., Care E., Buder J., Sassenberg K., Griffin P. (2015) *A Framework for Teachable Collaborative Problem Solving Skills.* In: Griffin P., Care E. (eds) Assessment and teaching of 21st century skills. Educational Assessment in an Information Age. Springer, Dordrecht.

Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods, 2* (1), 104-121. DOI: 10.1177/109442819800100106

Hinkin, T. R., Tracey, J. B. & Enz, C. A. (1997). Scale construction: Developing reliable and valid measurement instruments. *Journal of Hospitality & Tourism Research, 21*(1), 100-120. DOI: 10.1177/109634809702100108

Johanson, G. A. & Brooks, G. P. (2010). Initial scale development: Sample size for pilot studies. *Educational and Psychological Measurement, 70* (3), 394-400. DOI: 10.1177/0013164409355692

Johnson, R. L. & Morgan, G. B. (2016). *Survey scales: Investigating scale quality.* New York, NY: The Guilford Press.

Kalaycı, Ş. (2010). *SPSS uygulamalı çok değişkenli istatistik teknikleri. (5. Baskı) [SPSS applied various statistical techniques (5th Edition)].* Ankara: Asil Yayın Dağıtım Ltd. Şti.

Karabatak, S. & Turhan, M. (2017). Effect of web-based problem learning on school administrators' self-efficacy beliefs and attitudes towards principalship profession. *Education and Science, 42* (191), 1-29. DOI: 10.15390/EB.2017.7105

Karwowski, M. & Kaufman, J. C. (Eds.). (2017). The Creative Self. San Diego, CA: Academic Press.

Kato, P.M. (2013). *How do you measure self-efficacy? The answer may surprise you.* https://pamkato.com/2013/03/14/how-do-you-measure-self-efficacy-the-answer-may-surprise-you/ Retrieved: June 2014.

Kot, P., Roznowski, B. & Ertelt, B. J. (2020). Construction and validation of the life roles self-efficacy scale for young adults in school-to-work transition. *Current Psychology,* DOI: 10.1007/s12144-020-01083-7

Köseoğlu, P. (2010). The influence of jigsaw technique-based teaching on academic achievement, self-efficacy and attitudes in biology education. *Hacettepe University Journal of Education, 39*, 244-254.

Larry G, E. & Iris M, R. (1990). *Further development of an elementary science teaching efficacy belief instrument: a preservice elementary scale.* Paper presented at the annual meeting of the national association for research in science teaching (63rd, Atlanta, GA, April 8-11). ED319601

Ledesma, R. D. & Valero-Mora, P. (2007). Determining the Number of Factors to Retain in EFA: An easy-to-use computer program for carrying out Parallel Analysis. *Practical Assessment, Research, and Evaluation, 12* (2). DOI: 10.7275/wjnc-nm63

Lind, N., Hansson, H. & Lagerkvist, C. J. (2019). Development and validation of a measurement scale for self-efficacy for farmers' mastitis prevention in dairy cows. *Preventive Veterinary Medicine, 167* (1), 53-60. DOI:10.1016/j.prevetmed.2019.03.025

Lovelace, M. & Brickman, P. (2013). Best practices for measuring students' attitudes toward learning science. *CBE-Life Sciences Education, 12* (4), 606-617. DOI: 10.1187/cbe.12-11-0197

Moore, R. W. & Foy, R. L. H. (1997). The scientific attitude inventory: A revision (SAI II). *Journal of Research in Science Teaching, 34* (4), 327-336.

Muris, P. (2001). A brief questionnaire for measuring self-efficacy in youths. *Journal of Psychopathology and Behavioral Assessment, 23*, 145-149.

Muris, P. (2002). Relationships between self-efficacy and symptoms of anxiety disorders and depression in a normal adolescent sample. *Personality and Individual Differences, 32,* 337-348

Nguyen, H., Johnson, A., Collins, C. & Parker, S. K. (2017). Confidence matters: Self-efficacy moderates the credit that supervisors give to adaptive and proactive role behaviors. *British Journal of Management, 28*, 315-330. DOI: 10.1111/1467-8551.12149

Nissen, J. M. & Shemwell, J. T. (2016). Gender, experience and self-efficacy in introductory physics. *Physical Review Physics Education Research, 12* (2), 1-16. DOI: 10.1103/PhysRevPhysEducRes.12.020105

Özgen, K. & Bayram, B. (2019). Developing Problem Posing Self-Efficacy Scale. *Elementary Education, 18* (2), 663-680. DOI: 10.17051/ilkonline.2019.562029

Robnett, R. D., Chemers, M. M. & Zurbriggen, E. L. (2015). Longitudinal associations among undergraduates' research experience, self-efficacy and identity. *Journal of Research in Science Teaching, 52* (6), 847-867. DOI: 10.1002/tea.21221

Rose, S., Spinks, N. & Canhoto, A. (2014). *Management research: Applying the principles. (1st edition).* London: Routledge

Schwarzer, R. & Jerusalem, M. (1995). *Generalized Self-Efficacy scale.* In: Weinman, J., Wright, S. & Johnston, M., Measures in health psychology: A user's portfolio. Causal and control beliefs (pp. 35-37). Windsor, UK: NFER-NELSON.

Snieehotta, F. F., Schwarzer, R., Scholz, U. & Schuz, B. (2005). Action planning and coping planning for long-term lifestyle change: Theory and assessment. *European Journal of Social Psychology, 35,* 565-576. DOI: 10.1002/ejsp.258

Troia, G. A., Harbaugh, A. G., Shankland, R. K., Wolbers, K. A. & Lawrence, A. M. (2013). Relationship between writing motivation, writing activity, and performance: Effects of grade, sex and ability. *Reading and Writing, 26* (1), 17-44. DOI: 10.1007/s11145-012-9379-2

Tsai, M.-J., Wang, C.-Y. & Hsu, P.-F. (2019). Developing the computer programming self-efficacy scale for computer literacy education. *Journal of Educational Computing Research, 56* (8), 1345–1360. DOI: 10.1177/0735633117746747

Tucker, S., Zadvinskis, I. M. & Connor, L. (2020). Development and Psychometric Testing of the Implementation Self-efficacy for EBP (ISE4EBP) Scale. *Western Journal of Nursing Research, 43* (1), 45–52. DOI: 10.1177/0193945920925032

Turner, N. E. (1998). The Effect of Common Variance and Structure Pattern on Random Data Eigenvalues: Implications for the Accuracy of Parallel Analysis. *Educational and Psychological Measurement, 58* (4), 541–568. DOI: 10.1177/0013164498058004001

Watt, H. M. G., Ehrich, J., Stewart, S. E., Snell, T., Bucich, M., Jacobs, N., Furlonger, B. & English, D. (2019). Development of the psychologist and counsellor self-efficacy scale. *Higher Education, Skills and Work-Based Learning, 9* (3), 485-509. DOI: 10.1108/HESWBL-07-2018-0069

Wong., M. & Lian, S. (2003). *Development of a self-efficacy scale for assessing secondary school students' science self-efficacy beliefs.*
http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.472.8479, Retrieved October 2014.

Yasan Ak, N., (2020). Development of Internet literacy self-efficacy scale for pre-service teachers. *Turkish Journal of Education, 9* (2), 179-204. DOI: 10.19128/turje.664706

Yeşilay, A., Schwarzer, R. & Jerusalem, M. (1995). *Genelleştirilmiş öz-yetki beklentisi.* http://userpage.fu-berlin.de/~health/turk.htm, Retrieved: October 2014.

Zimmerman, B. J., Bonner, S. & Kovach, R. (1996). *Developing self-regulated learners: Beyond achievement to self-efficacy.* American psychological association, Washington, DC.

Appendix A: Self-efficacy scale Turkish version.

	Öz-yeterlik ölçeği				
		Kesinlikle Katılmıyorum	Katılmıyorum	Fikrim Yok /Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1	Kendi meyve/sebzemi yetiştirmek isterim	1	2	3	4	5
2	Plan kurduğum zaman, uygulayabileceğimden eminim	1	2	3	4	5
3	Eğer bir işi ilk seferde yapamazsam, yapmak için tekrar tekrar uğraşırım	1	2	3	4	5
4	Yeni arkadaşlıklar edinmekte zorlanırım	1	2	3	4	5
5	Genetik/kalıtım bir kişinin karakter yapısını etkiler	1	2	3	4	5
6	Yemek pişirmekten hoşlanırım	1	2	3	4	5
7	Kendime bir hedef kurduğumda onları nadiren gerçekleştirebilirim	1	2	3	4	5
8	Bir şeyleri tamamlamadan yarım bırakırım	1	2	3	4	5
9	Zorluklarla yüzleşmekten kaçınırım	1	2	3	4	5
10	Eğer bir şey çok karışık görünüyorsa, çözmek için çaba harcamam	1	2	3	4	5
11	Herkes özünde iyidir	1	2	3	4	5
12	Hoşuma gitmeyen bir işle	1	2	3	4	5

	karşılaşırsam, o işi halletmek için tüm gayretimle çalışırım					
13	Bir şeyi yapmaya karar verirsem, o iş üzerine yoğunlaşırım	1	2	3	4	5
14	Yeteneklerime olan güvenim azdır	1	2	3	4	5
15	Kolayca sosyalleşemem	1	2	3	4	5
16	Araba sürmekten hoşlanırım	1	2	3	4	5
17	Yeni bir şey öğrenmeye başladığımda, eğer ilk başta öğrenemezsem, çalışmaktan/öğrenmekten vazgeçerim	1	2	3	4	5
18	Akvaryumda balık beslemek isterim	1	2	3	4	5
19	Kendime güvenim yüksektir	1	2	3	4	5
20	Ressam olsaydım çocukların resmini çizmek isterdim	1	2	3	4	5
21	Hayatta karşılaştığım problemlerin üstesinden gelmekte zorlanırım	1	2	3	4	5

Appendix B: Self-efficacy scale.

	Self-efficacy					
		Strongly disagree	Disagree	Neutral /No idea	Agree	Strongly agree
1	I would like to grow my own vegetables/fruits	1	2	3	4	5
2	I am sure that I am capable of executing my plans	1	2	3	4	5
3	If I can't do something first time, I try over and over	1	2	3	4	5
4	I hardly establish new friendship	1	2	3	4	5
5	Genetics/heredity affects the character	1	2	3	4	5
6	I like to cook	1	2	3	4	5
7	I hardly accomplish my goals when I set them	1	2	3	4	5
8	I leave things uncompleted	1	2	3	4	5
9	I avoid to encounter the obstacles	1	2	3	4	5
10	I don't spend effort if it seems very complicated	1	2	3	4	5
11	Everyone is essentially good	1	2	3	4	5
12	If I encounter an obstacle which I don't like, I try to overcome it with all my efforts	1	2	3	4	5
13	If I decide to do something, I focus on it	1	2	3	4	5
14	I hardly believe in my capability	1	2	3	4	5
15	I can't socialize easily	1	2	3	4	5
16	I like driving	1	2	3	4	5
17	When I start to learn something new and can't learn at first then I give up studying/try learning	1	2	3	4	5
18	I would like to have fish as pet	1	2	3	4	5
19	My self confidence is high	1	2	3	4	5
20	If I was an artist then I would want to paint picture of children	1	2	3	4	5
21	I trouble to overcome obstacles that I encounter in life	1	2	3	4	5