

# Create Effective Learning Environment Development of The Self-Efficiency Beliefs Scale (Validity and Reliability Study)

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In this study, it was aimed to develop a scale that will serve to determine the self-efficacy beliefs of pre-service teachers in creating an effective learning environment. The self-efficacy belief scale for creating an effective learning environment was developed in line with the opinions of field experts and education faculty students by scanning the literature. The trial form of the scale consists of 79 items. Content validity, construct validity, reliability, and item-based validity studies of the scale were carried out. For the content validity of the scale, opinions were taken from three field experts and an assessment and evaluation expert, and the content validity was tested in line with the consensus. The analysis of the construct validity of the scale, whose content validity was provided, were made on the data obtained from the third and fourth year students of the faculty of education by the convenient sampling method. 3rd and 4th grades were included in the scope of the application with the thought that they would have a better command of the subject thanks to the lessons taken. Accordingly, the scale was applied to 498 students. Content validity exploratory factor analysis (EFA) was used for the validity of the scale, and confirmatory factor analysis (CFA) was used to test whether it confirmed the existing structure. In order to determine the validity and reliability of the scale, data from Study Group 1 (300 students) for EFA and Study Group 2 (198 students) for CFA were used. The Cronbach Alpha reliability coefficient was used for the reliability of the scale. According to the Cronbach alpha coefficients, the first factor is 0.98, the second factor is 0.98, the third factor was 0.97 and the total scale was 0.99. Thus, it was observed that the values for the reliability of the scale were high. On the other hand, it was determined that the confirmatory factor analysis values of the scale were distributed appropriately within the reference value range shown as the criterion. As a result of the analysis, a five-point Likert-type final scale consisting of 58 items with the necessary psychometric properties was created.

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## INTRODUCTION

Educational institutions and teachers have important duties in adapting to the developing and changing conditions of the world and raising the manpower needed by the country. The educational institution, which is at the forefront of social institutions, needs to play an important role in helping individuals gain a scientific turn of mind, which is one of the indicators of a developed society. It is true that applying science to attitudes and behaviors will improve the quality of social interaction and social life. The role of education and training is undoubtedly very important in this context. Because the knowledge, skills, habits, attitudes, and values gained through education have the potential to solve future problems as well as meet current needs (Özbek, 2004). Since the purpose of education and training is to bring about desired behavioral change in the students in line with the determined goals, the people who provide this are the teachers (Erden, 2008). Regarding the teaching profession, it is very important for teachers to decide which methods and techniques they will provide to improve the academic success of their students (Caprara et al., 2006). However, many factors that affect student success, including education systems, students, teachers, curriculum administrators, education experts, teaching techniques, physical and financial resources, and learning environments, affect the level and focus of the teacher's educational effort (Şişman, 2004).

A teacher's teaching skills play an important role in creating an effective learning environment. The teacher needs knowledge and skills to create an effective learning environment in the classroom, to motivate students, and to carry out the teaching activities to be applied in the classroom in addition to physical conditions and classroom rules (Erden, 2008).

In an effective learning environment, many factors affect the planning and delivery of learning, including educational programs, material quality, the physical environment, and technological infrastructure. The teacher plays an important role in the implementation of these elements. Even if the educational objectives are determined and the teaching methods and techniques are selected and arranged appropriately, the desired educational outcomes cannot be achieved if the teachers do not have the necessary qualifications (Demirel & Kaya, 2006). It is the teacher who will apply the teaching techniques and methods that will be used in the education system to reach the determined goals. The quality of the teacher has strategic importance in terms of transforming decisions regarding education and training activities into action (Barut, 2011).

In the 21st century, the requirements of education, the new meanings attributed to the teacher, the changing needs of the students, and the new approaches to the education of the students all impose new professional and personal responsibilities on the teachers. The teaching profession is seen as one that requires high-level qualifications. This understanding necessitates that teachers be individuals who are open to

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continuous improvement. One of the general competencies of the teaching profession is "prepares healthy and safe learning environments and appropriate teaching materials for all students in creating learning environments where effective learning can take place" (MEB, 2017).

The conceptual foundations of teacher self-efficacy are a concept that emerged in Bandura's (1989) Social Learning Theory and are related to individuals' individual judgments about how well they can do the actions necessary to cope with possible situations (Bıkmaz, 2002). According to this theory, self-efficacy is an individual's perceptions, beliefs, and judgments regarding the ability to cope with various situations and to organize and successfully execute the necessary activities to perform at a certain level (Gürcan, 2005). Evaluation of the concept of self-efficacy from the perspective of the teacher emphasizes the knowledge, skills, and attitudes necessary to fulfill the duties and responsibilities in the classroom. However, in general, teachers' self-efficacy is defined as "a teacher's judgment about whether he or she can create desired outcomes such as commitment and learning in students with the skills he or she has" (Tschannen-Moran & Woolfolk Hoy, 2001). In addition to the fact that individuals' self-efficacy perceptions towards the relevant field are extremely important for them to use their skills effectively in that field, it is seen that individuals with high self-efficacy can be more productive when faced with challenging work, and this has a direct effect on success (Pajares, 2002). From this perspective, beliefs and attitudes are directly or indirectly related to an individual's success.

The belief that success will be at the desired level for individuals and a sense of self-efficacy are necessary for success. Bandura (1989) states that in addition to theoretical knowledge, practices, and skills, individuals' thoughts and beliefs about their skills are just as important in achieving the desired goal and displaying an effective performance, and individuals' self-efficacy beliefs generally affect cognitive functioning. The concept of self-efficacy is expressed as the individual's ability to cope with problems, demonstrate high-level performance, complete tasks successfully, see himself as competent, judge himself, and believe in his direction (Gürcan, 2005). Self-efficacy belief is persuading the individual to think in this direction by becoming aware of his or her abilities. In this context, self-efficacy can be expressed as self-awareness in terms of motivation, cognition, and impact on a particular subject (Akkoyunlu et al., 2005; Yılmaz & Bökeoğlu, 2008).

The self-efficacy belief of the individual to successfully demonstrate his or her current performance is an important factor in teachers' feeling themselves competent as well as reaching the goals of the education system. In this context, teacher self-efficacy is the knowledge, skills, attitudes, and self-belief that one should have in order to fulfill their duties and responsibilities, as well as being aware of their abilities (Çapri & Çelikkaleli, 2008; Demirtaş et al., 2011; Yaman, Koray & Altunçekiç, 2004). In addition, the teacher's self-efficacy belief affects the quality of teaching, the methods and techniques used, the student's participation in learning, and the student's understanding of what is taught, which in turn determines the students' success. Self-efficacy belief affects the individual's behavior in mental, motivational, and emotional aspects (Mısırlı Taşdemir, 2003). Therefore, while the individual's feelings and thoughts about self-efficacy affect the behavior, the individual's beliefs determine the attitudes and shape the general structure (Akgün, 2008; Deryakulu, 2004).

Self-efficacy beliefs of teachers about their knowledge, skills, and attitudes about whether they can fulfill the requirements of their profession in the teaching process are very important in order to raise confident individuals who research, question, and solve problems. As a result, well-trained pre-service teachers must first have high self-efficacy beliefs (Ayra & Kösterelioğlu, 2015; Can & Uluçınar, Sağır, 2018; Üredi & Üredi, 2007).

For this reason, it is of great importance to determine the level of self-efficacy beliefs of pre-service teachers and to predict their behaviors related to their teaching duties and responsibilities (Bandura, 1986).

Achieving educational goals depends on the effectiveness of educational processes, and the effectiveness of educational processes largely depends on teachers and what they achieve in the classroom environment (Açıkgöz, 2005). If we consider the education-teaching environment as the environment where information is exchanged, communication takes place, the student interacts, and educational activities take place, it is a necessity to organize the education-teaching environment according to the teaching-learning activities.

Social, physical, psychological, or cultural factors in a learning environment, teachers' cognitions about teaching, and the environment they create, deeply affect students' learning abilities (Jeyaraj, 2019). Within the scope of an effective learning environment, the physical structure of the classroom, classroom management, behavior management in the classroom, student characteristics, time management, planning of teaching

activities, instructional approaches and strategies, professional competencies of the teacher, personality traits of the teacher, and communication between the teacher and the student are seen as factors that create an effective learning environment and determine the effectiveness of learning.

In this sense, it is very important to determine the self-efficacy beliefs of pre-service teachers about creating an effective learning environment. When the literature is examined, no scale development study directly related to the subject has been found. Therefore, in this study, it was aimed to develop a Likert-type scale to measure the self-efficacy beliefs of pre-service teachers in creating an effective learning environment.

## **METHOD**

### **Research Design**

The study is a survey model with the goal of determining pre-service teachers' self-efficacy beliefs in creating an effective learning environment and examining whether their self-efficacy beliefs change in response to independent variables. In scanning models, the investigated situation, person, or object is described as it is in its own context. It seeks to ascertain participants' opinions, knowledge, skills, abilities, interests, or attitudes toward an existing subject, phenomenon, or event (Büyüköztürk, Çakmak Kılıç, Akgün, Karadeniz, and Demirel, 2018; Karasar, 2020).

### **Study Group**

The universe of the research consists of 3010 students studying in the third and fourth grades of Gazi University Gazi Education Faculty teaching programs in the 2020–2021 academic year. The sample of the study was determined by convenience sampling (Büyüköztürk et al., 2018). Accordingly, 498 students were reached. The 3rd and 4th grades were included in the research with the thought that they would have a better command of the subject thanks to the lessons taken.

### **Development of the Measurement Tool**

The steps followed during the development of the Self-Efficacy Belief Scale for Creating an Effective Learning Environment are explained below (DeVellis, 2003):

- Considering which questions or topics should be evaluated for the scale subject.
- Establishing the Item Pool
- Validity of Scope
- Validity and reliability analyses

The data set for the Self-Efficacy Belief Scale for Creating an Effective Learning Environment was divided into two and its construct validity examined. Furthermore, the validity of the scale item content was determined by soliciting expert opinions. The Cronbach Alpha reliability coefficient was used for the reliability of the scale. There are 79 items in the draft form of the scale. The content validity of the scale was confirmed based on expert feedback. EFA was used to determine the construct validity of the scale. As a result of EFA, 21 items with a factor load value below 0.32 were removed from the scale. Using the Promax rotation method, one of the factor rotation methods, a 3-factor structure of the scale consisting of 58 items was obtained. CFA was applied to the other part of the data set for the 3-factor model to provide additional evidence for construct validity. As a result of CFA, it was seen that the model-data fit was achieved, and the items were good representatives of the structure to be measured. The Cronbach alpha coefficients for the scale's reliability are as follows: the first factor is equal to 0.98; the second factor is equal to 0.98; the third factor is equal to 0.97; and the total scale is equal to 0.99. Thus, the reliability of the scale was found to be high. Getting a high score means adopting the behavior style represented by that dimension. For the validity of the scale, item analyses were performed using the Content Validity Index, EFA, and CFA. For the reliability of the scale, Cronbach's alpha coefficients were calculated both for Study Group 1, where EFA was performed, and for Study Group 2, where CFA was performed. Various and more complex operations-based techniques have been developed to date, from one-dimensional scaling to multidimensional scaling (Tezbaşaran, 2008). The most widely used of these techniques is Rensis Likert's (1932) "scaling with rating sums" model (Judd, Eliot, & Kidder, 1991). Because this model is more economical than other models in terms of scale formation processes (Tezbaşaran, 2008). At the end of this study, a pool of 58 items was created. The scale, which has five-point Likert-type response options, is answered in the range of "(1) I completely agree" to "(5) I strongly disagree."

## Content Validity

In order to prepare an item pool for the Self-Efficacy Belief Scale for Creating an Effective Learning Environment, the relevant literature was scanned in detail, and items in different scales measuring a similar structure were examined. In addition, while writing the items, the components of self-efficacy beliefs about creating an effective learning environment were taken into consideration. After the examinations, a total of 79 items were written. Attention was paid to the fact that each item measures only one feature. Following the creation of the item pool, the content validity of the scale was evaluated by experts. When creating the items, it was important to remember that each item measures only one feature. The created items were then evaluated by an expert from the field of measurement and evaluation, two experts from the field of Turkish, and two experts from the field of educational administration and supervision. Experts were asked to answer the questions of whether each item represented the feature to be measured, whether the item was easily understandable by the target group, whether the item was expressed clearly enough, and whether the item was under the predetermined factor. Accordingly, the experts were asked to place each item in one of the three categories: "suitable," "needs to be corrected," and "not appropriate." In line with the opinions of the experts, the items that were unclear and included more than one judgment were determined, and these items were rearranged. In addition, some items were rewritten as a result of the suggestions received. After the corrections, the scale items were presented to another expert in the field of measurement and evaluation. Consensus was reached on all items. After the final examinations, the scale items were finalized. According to the expert evaluations, it was concluded that the scale provided content validity.

## Analysis of Data

In the study, EFA, CFA, item analyses, and reliability analyses were carried out to prove the validity and reliability of the "Self-Efficacy Belief" scale. SPSS 21.0 and LISREL 8.7 package programs were used in the analysis of the data.

After the data was processed in the SPSS 21.0 program, it was checked to see if there were any missing or incorrectly entered data. It was observed that there was no missing data or incorrectly entered data. After the data set was divided into two for EFA and CFA, two data sets were created as Study Group 1 and Study Group 2. Outliers were detected in both data sets obtained. It was observed that there were no extreme values in both data sets.

For the developed "Self-Efficacy Belief Scale for Creating an Effective Learning Environment", scale total scores were calculated for each factor. Then, the normality of the data was examined over the entire data set. For the assumption of normality of the data, the Kolmogorov-Smirnov Test calculated skewness and kurtosis coefficients with measures of central tendency. In addition, histograms, Q-Q plots, P-P plots, and stem-leaf plots were also examined to determine the normal distribution of the data. For the normality of the data, the Kolmogorov-Smirnov test was performed for the factor and total scores in both scales. Kolmogorov-Smirnov test results are shown in Table 1.

**Table 1. Kolmogorov-Smirnov Test Results Obtained for the Total Scores of the Dimensions**

Scales	Statistics	Sd	P
SEBSFCELE (F1)	,105	498	,000*
SEBSFCELE (F2)	,245	498	,000*
SEBSFCELE (F3)	,152	498	,000*
SEBSFCELE Total	,125	498	,000*

When Table 1 is examined, it is seen that Kolmogorov-Smirnov (K-S) test results regarding the scores obtained for each factor are significant ( $p=0.00<0.05$ ). According to these results, it can be interpreted that each factor score does not exhibit a normal distribution (Büyüköztürk, 2016). In addition, when the histogram graphs for each factor were examined, it was seen that normality was not achieved. When the histogram, Q-Q plot, and P-P plots were examined, it was seen that the data did not exhibit a normal distribution. Since the data did not show a normal distribution, non-parametric statistical methods were used in the analysis.

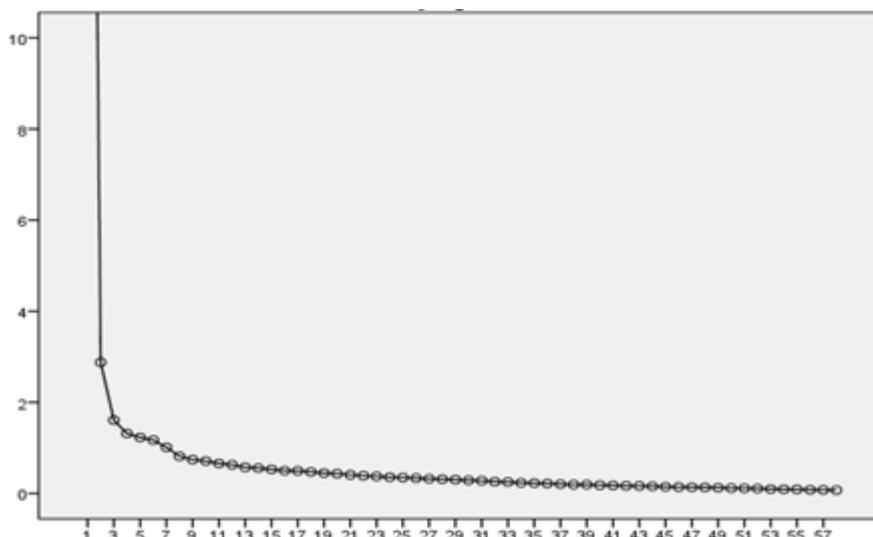
## Findings

In this chapter, the findings related to the validity and reliability study of the Self-Efficacy Belief Scale for Creating an Effective Learning Environment (SEBSFCELE) are given. During the development of the scale, first exploratory and confirmatory factor analyses and then reliability analyses were carried out on the data collected from the participants.

Exploratory Factor Analysis (EFA) after the item pool was created, EFA was conducted to reveal the factor structure of the developed scale. EFA was carried out through Working Group 1, which consisted of 300 people. Before passing the EFA, Kaiser-Meyer Olkin (KMO) and Bartlett Sphericity test values were calculated to test the suitability of the data for factor extraction. As a result of the calculations, the KMO coefficient was found to be 0.975 and the Barlett Test of Sphericity ( $\chi^2=26131.053$ ;  $p<0.00$ ) was found to be significant. In order for the data set to be suitable for factor analysis during the development phase of a scale, the KMO coefficient should be at least 0.50. If the KMO coefficient is poor between 0.50-0.60, poor between 0.60-0.70, moderate between 0.70-0.80, good between 0.80-0.90, and 0.90 and above, the data are considered factor values. It is excellent, according to analysis (Çokluk, Şekercioğlu, & Büyüköztürk, 2012). Accordingly, the obtained KMO=0.976 value showed that the data was at an excellent level for factor analysis. The significance of the Barlett Test of Sphericity indicates that there is a sufficient level of relationship between the variables and that the data come from a multivariate normal distribution (Field, 2009, p.659). Accordingly, it was decided that the sample forming Study Group 1 was suitable for factor analysis.

The item pool consisted of 79 items, and the principal component analysis was applied, which was not rotated without determining any factor number first. As a result of the analysis, it was seen that there were 7 factors with an eigenvalue above 1.00. In order to determine which items will be included in the development phase of the scale, the factor loading values of the items should be examined. The factor loading values calculated for the scale items show the power of those items to represent the relevant structure. In this study, the criterion value for the items was taken as 0.32 during the development phase of the scale, and items with a factor load below this value were excluded from the scale (Tabachnick & Fidell, 2012, p.654). Accordingly, out of a total of 79 items, 21 items (M11, M12, M13, M14, M15, M16, M17, M20, M21, M27, M29, M31, M32, M38, M43, M44, M46, M60, M61, M63, M72) were removed from the scale, and analysis continued with 58 items.

After removing a total of 21 items, EFA was repeated. At this stage, the Promax rotation method, one of the oblique rotation methods, was also used in order to see more clearly under which factor the items were placed. Since the Promax rotation method is used for both oblique-angle rotation and right-angle rotation, which is preferred for large data, it was chosen because it is fast and economical (Çokluk, Şekercioğlu, & Büyüköztürk, 2012). As a result of the re-analysis, a measurement model was formed in which 58 items were placed under three factors. The KMO coefficient was found to be 0.976 with the Promax rotation method, and it was significant as the Barlett Test of Sphericity ( $\chi^2=18354.29$ ;  $p<0.01$ ). In order to determine the factor number of the scale, the slope-slope scree plot was also examined.



**Figure 1. Scree Plot**

When the eigenvalue was taken as 1, according to the scree plot, it was seen that 58 items were gathered under three factors. The factors under which the scale items are included and the variance ratio amounts explained by the eigenvalues of the factors are shown in Table 2.

**Table 2. EFA Results Obtained for the Self-Efficacy Belief Scale of Creating an Effective Learning Environment**

Items	Factor 1	Items	Factor 2	Items	Factor 3
Item39	,966	I3	,977	I78	,896
I41	,934	I2	,965	I76	,862
I40	,910	I1	,942	I79	,816
I49	,840	I4	,847	I77	,775
I70	,810	I7	,750	I57	,729
I47	,810	I25	,697	I58	,728
I45	,779	I8	,674	I59	,728
I67	,759	I26	,671	I55	,710
I48	,726	I36	,651	I53	,615
I64	,702	I5	,650	I62	,577
I65	,685	I35	,636	I75	,568
I42	,669	I6	,626	I74	,553
I68	,663	I22	,592	I56	,551
I66	,658	I9	,590	I73	,514
I69	,607	I10	,584	I51	,512
I71	,547	I23	,577	I52	,507
I54	,488	I33	,566		
I50	,407	I19	,544		
Eigenvalue	33,323		2,876		1,609
Variance	57,453		4,959		2,774
Explained (%)					
Total Variance					65,187
Explained (%)					

When Table 2 is examined, it is seen that a three-factor measurement model with an eigenvalue greater than 1 was obtained. It is seen that the total variance rate explained by the three-factor structure is 65.187%. According to Tavşancıl (2014), total variance rates ranging from 40% to 60% are considered sufficient in analyses performed in the social sciences. Accordingly, it can be said that the 65% variance rate explained by all three factors is very good.

When the factors were analyzed separately, the variance rate explained by the first factor with an eigenvalue of 33,323 was 57.453%, the variance rate explained by the second factor with an eigenvalue of 2.876 was 4.959, and the variance rate explained by the third factor with an eigenvalue of 1.609 was 2.774. According to the factor loading values, the loading values of the first factor consisting of 18 items are between 0.407 and 0.966; the loading values of the items in the second factor consisting of 24 items are between 0.407 and 0.977; and the loading values of the third factor consisting of 16 items are between 0.507 and 0.896. In naming the factors, the first factor was named "creating an emotional learning environment", the second factor was named "managing the learning process", and the third factor was named "behavior management, cooperation, and inclusive education". As a result of EFA, the three factors and the items under the factors are shown in Appendix 1.

**Item-Level Validity**

In the analyses performed at the item level, an item-scale-total correlation was made. For item scale total correlations, the correlation between each item and the factor score in which that item is included was calculated. In addition, the mean scores for each item between the 27% group with the highest score (upper

group) and the 27% group with the lowest score (lower group) were compared with the unrelated samples t-test to determine the discriminative features of each item. The item-scale total correlations and the t-test results of the upper-lower-group unrelated samples are shown in Table 3.

**Table 3. Item Scale Total Correlations and Upper-Lower Group t-Test Results**

Items	Factor 1		Items	Factor 2		Items	Factor 3	
	r	Upper-Lower Group t-Test		r	Upper-Lower Group t-Test		r	Upper-Lower Group t-Test
Item 39	0.84*	12.10*	Item 1	0.78*	18.99*	Item 51	0.76*	15.24*
Item 40	0.84*	13.59*	Item 2	0.73*	17.49*	Item 52	0.82*	16.76*
Item 41	0.81*	12.20*	Item 3	0.74*	16.77*	Item 53	0.82*	17.01*
Item 42	0.81*	14.95*	Item 4	0.74*	16.99*	Item 55	0.82*	18.30*
Item 45	0.86*	15.95*	Item 5	0.76*	14.82*	Item 56	0.81*	16.76*
Item 47	0.86*	17.06*	Item 6	0.71*	13.86*	Item 57	0.59*	13.73*
Item 48	0.86*	17.45*	Item 7	0.75*	15.13*	Item 58	0.83*	19.57*
Item 49	0.90*	17.41*	Item 8	0.73*	16.38*	Item 59	0.83*	17.73*
Item 50	0.79*	18.50*	Item 9	0.76*	13.21*	Item 62	0.83*	17.71*
Item 54	0.84*	18.65*	Item 10	0.63*	11.89*	Item 73	0.81*	15.55*
Item 64	0.84*	15.10*	Item 18	0.73*	14.45*	Item 74	0.84*	16.78*
Item 65	0.75*	17.40*	Item 19	0.72*	14.96*	Item 75	0.86*	19.45*
Item 66	0.85*	18.14*	Item 22	0.81*	16.59*	Item 76	0.83*	19.23*
Item 67	0.85*	15.78*	Item 23	0.84*	17.56*	Item 77	0.85*	18.42*
Item 68	0.79*	13.42*	Item 24	0.80*	18.16*	Item 78	0.82*	20.28*
Item 69	0.75*	15.42*	Item 25	0.85*	20.62*	Item 79	0.84*	18.29*
Item 70	0.86*	15.36*	Item 26	0.84*	19.46*			
Item 71	0.75*	17.28*	Item 28	0.78*	14.06*			
			Item 30	0.78*	15.53*			
			Item 33	0.82*	21.04*			
			Item 34	0.83*	16.26*			
			Item 35	0.80*	16.23*			
			Item 36	0.84*	17.05*			
			Item 37	0.69*	15.11*			

\*  $p \geq 0.01$

When Table 3 is examined and the item and factor total correlations are examined for the first factor, it is seen that the correlation values are significant ( $p < 0.01$ ) and vary between  $r = 0.75$  and  $r = 0.90$ . When the item and factor total correlations in the second factor are examined, it is seen that the correlation values are significant ( $p < 0.01$ ) and vary between  $r = 0.63$  and  $r = 0.85$ . When the item and factor total correlations in the third factor are examined, it is seen that the correlation values are significant ( $p < 0.01$ ) and vary between  $r = 0.59$  and  $r = 0.86$ .

According to Büyüköztürk (2012, p.171), the fact that the item-total correlation coefficients are higher than 0.20 indicates that the scale items are valid. In addition, according to Table 3, in the scale consisting of 58 items, the results of the upper-lower unrelated samples t-test performed to determine the distinctiveness of each item were also found to be significant for all items ( $p < 0.01$ ). Accordingly, the fact that the correlation values between the item factor total scores are significant and that the results of the upper group-subgroup unrelated sample t-test are significant indicate that the items in the developed scale serve the purpose of measuring the feature to be measured.

## Reliability

In order to examine the reliability of the developed scale, Cronbach's alpha coefficients were calculated on the data set for which EFA was performed for the total scale and its factors. The factors in the scale and the reliability coefficients obtained for the total scale are shown in Table 4.

**Table 4. Cronbach Alpha Coefficients Obtained for the Total Scale and Each Factor**

Factor	Item Number	Cronbach's Alpha Consistency Coefficient ( $\alpha$ )
1. Factor (Creating an emotional learning environment)	18	0.97
2. Factor (Managing the learning process)	24	0.97
3. Factor (Behavior management, collaboration and inclusive education)	16	0.96
Total	58	0.99

When Table 4 is examined, it is seen that the reliability coefficient obtained for the first factor is 0.97, 0.97 for the second factor, and 0.96 for the third factor. Finally, it is seen that the reliability coefficient obtained for the total scale is 0.99. According to Büyüköztürk (2012), a Cronbach Alpha coefficient above 0.70 would be sufficient for reliability. Accordingly, it can be said that the reliability of the developed scale is quite high.

## Confirmatory Factor Analysis (CFA) Results

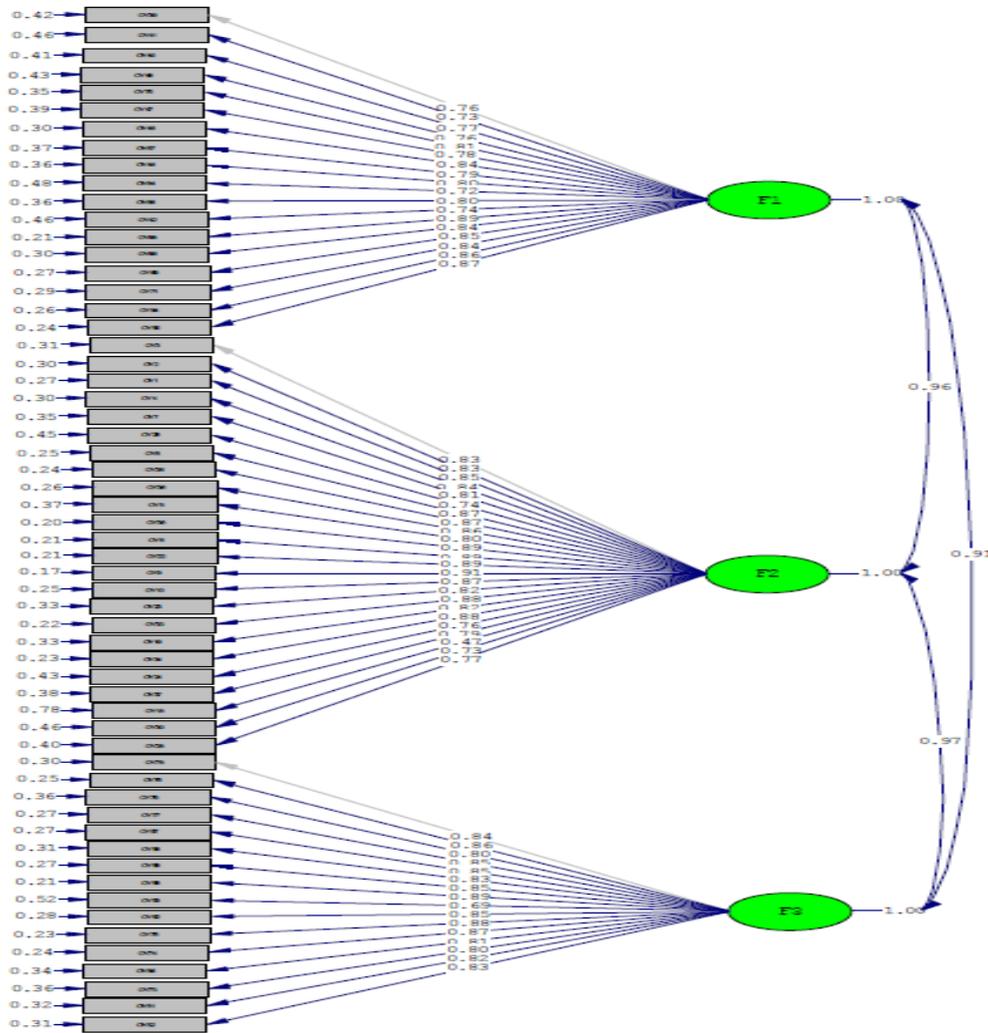
A CFA was performed to provide additional evidence for the scale developed on the Study Group 2 data. Accordingly, it was tested whether the three-factor model structure obtained as a result of CFA and EFA was confirmed or not. Before starting the CFA, the suitability of Study Group 2 data for factor analysis was first tested. For this, the Kaiser-Meyer-Olkin (KMO) coefficient was calculated and the Barlett Test of Sphericity was performed. As a result of the analyses made accordingly (KMO=0.970; 14399.340;  $p=0.00<0.05$ ), the results were obtained. The fact that the KMO value is higher than 0.90 and the Barlett Test of Sphericity is significant indicates that the variables have sufficient sample suitability for factor analysis (Leech, Barrett, & Morgan, 2005). In order to test whether there is a multivariate extreme value, Mahalanobis distances were examined, and it was seen that there were no extreme values. In addition, to test whether there is a multicollinearity problem between the items, the correlations between the items were examined. The correlation values between the items between 0.70 and 1.00 indicate a multicollinearity problem. In the simple correlation analysis, it was seen that the correlation values between the items were not above 0.70. Therefore, it has been noted that there is no multicollinearity problem. After providing the assumptions, CFA was used. The maximum likelihood estimation method was used in the estimation of the parameters in CFA. The suitability of the model to the data is tested in CFA. For this, different goodness-of-fit indices are used. The most frequently used fit index statistics in the evaluation of model data fit are  $\chi^2/sd$ , RMSEA, NFI, NNFI, CFI, GFI, and AGFI. The calculated  $\chi^2/sd$  ratio is less than 5, the GFI and AGFI values are higher than 0.90, the CFI, NFI and NNFI values are also higher than 0.90, and the RMSEA value is lower than 0.05, which are accepted as criterion values for model-data fit (Jöreskog & Sörbom, 1993; Marsh & Hocevar, 1988). However, GFI and AGFI values higher than 0.85 and RMSEA values lower than 0.10 are considered acceptable lower limits for model-data fit (Anderson & Gerbing, 1984; Marsh, Balla & McDonald, 1988). The fit index values obtained from the CFA for the fit of the model established for the "Self-Efficacy Belief Scale for Creating an Effective Learning Environment" developed within the scope of the research are shown in Table 5.

**Table 5. Creating an Effective Learning Environment Self-Efficacy Belief Scale Model Data Fit Indices**

Fit Indices	SEBSFCELE Scale	Limit Values
$\chi^2/sd$	1.74	$\leq 5$
RMSEA	0.061	$\leq 0.05$ or $0.05 \leq RMSEA \leq 0.08$
GFI	0.87	$\geq 0.85$
AGFI	1.00	$\geq 0.85$
CFI	1.00	$\geq 0.90$
NFI	0.98	$\geq 0.90$
NNFI	0.99	$\geq 0.90$

When Table 5 is examined, first of all, the fact that the  $\chi^2/sd$  value is less than 3 indicates that the model fits the data well. In addition, NFI, NNFI, CFI, GFI and AGFI values are very close to 1, indicating that the model fits the data very well. Accordingly, it can be said that each fit index value used in model data fit meets the criterion values. The figural representation of the measurement model obtained as a result of the CFA of the three-factor scale is presented in Figure 2.

**Figure 2. Path Diagram for the Measurement Model**



Chi-Square=4549.61, df=1592, P-value=0.00000, RMSEA=0.061

In Figure 2, there are standard factor loading values for the items and error variances for each item in the figural representation of the measurement model. When the load values of the items under each factor are examined, it is seen that the factor loading values of the items under the "First Factor" are between  $\lambda=0.73-0.89$  and the error values are between  $\epsilon=0.21-0.48$ . In the "Second Factor", it is seen that the factor load values of the items are between  $\lambda=0.47-0.91$  and the error values are between  $\epsilon=0.17-0.78$ . In the "Third Factor", it is seen that the factor load values of the items are between  $\lambda=0.69-0.89$  and the error values are between  $\epsilon=0.21-0.52$ . The fact that the factor load values of the items obtained as a result of CFA are higher than 0.32 and the error variances are lower than 1.96 indicates that the validity of the items is high (Çokluk, Şekercioğlu, & Büyüköztürk, 2012). According to these results, it can be said that the measurement model fits the relevant data well and adequately, and that the items in the model represent the relevant structures well. From this point of view, it was seen that the measurement model formed a valid model for the three-factor structure of the scale.

## Conclusion and Discussion

In this study, it was aimed to develop a valid and reliable measurement tool in order to determine the self-efficacy beliefs of pre-service teachers in creating an effective learning environment. First of all, an item pool of 79 items was created in line with the literature review and the opinions of students and experts. Unrotated principal component analysis was applied to the data set obtained from the application, without determining any factor number first. During the development of the scale, the criterion value for the items was taken as 0.32, and items with a factor load below this value were excluded from the scale (Tabachnick & Fidell, 2012, p.654). As a result, 21 of the 79 items had a factor load value of less than 0.32 and thus did not meet the criteria; they were removed from the scale, and the analyses resumed with the remaining 58 items. After removing a total of 21 items, EFA was repeated. At this stage, the Promax rotation method, one of the oblique rotation methods, was also used in order to see more clearly under which factor the items were placed. As a result of the re-analysis, a measurement model was formed in which 58 items were placed under three factors. The KMO coefficient was found to be 0.976 with the Promax rotation method, and it was significant as the Barlett Test of Sphericity ( $\chi^2=18354.29$ ;  $p<0.01$ ). It has been observed that these items reflect the three factors, namely "creating an emotional learning environment", "managing the learning process", "behavior management, cooperation and inclusive education", with regard to the self-efficacy beliefs of the pre-service teachers, which were taken into account in the preparation of the scale.

The upper-lower unrelated samples t-test performed to determine the distinctiveness of each item on the scale yielded significant results for all items ( $p \leq 0.01$ ).

A confirmatory factor analysis (CFA) was conducted to test whether the three-factor structure that emerged as a result of the exploratory factor analysis was confirmed. It was determined that the confirmatory factor analysis values showed a distribution within the reference value range shown as a criterion.

As a result of the tests performed to test the reliability of the scale, it is seen that the reliability coefficient obtained for the first factor is 0.97, 0.97 for the second factor, and 0.96 for the third factor. It was also observed that the reliability coefficient obtained for the total scale was 0.99. A high score on the self-efficacy scale indicates high self-efficacy belief, and a low score indicates low self-efficacy belief. The lowest score that can be obtained from the scale is 58, and the highest score is 290.

As a result of the validity and reliability analyses of the "Self-Efficacy Belief Scale for Creating an Effective Learning Environment", it can be said that the scale is a measurement tool with the necessary psychometric properties consisting of three factors that measures the self-efficacy beliefs of pre-service teachers in creating an effective learning environment.

When the literature on the subject is examined, it is observed that the studies mostly focus on effective learning environments and effective learning methods (Fisher, 2005; Field, 2005; Perks, 2013; Dunlosky et al., 2013). No scale development study was found for pre-service teachers' self-efficacy beliefs about creating an effective learning environment. For this reason, it is thought that studies that will contribute to the field in this direction are important. There are some limitations to this study. The data set of the study was limited to the opinions of prospective teachers studying at Gazi University. Working with pre-service teachers studying at different universities will contribute to the quality of the measurement tool. Another limitation is that there is no measurement tool in the literature that will create a criterion on the subject, and it is not possible to compare. It is recommended that researchers conduct studies on the study group formed by pre-service teachers from different universities. Studies can be conducted with different reliability calculation methods, such as test-retest for the reliability of the scale. In addition, scale adaptations can be made for teachers on duty.

## Declarations

### Conflict of Interest

No potential conflicts of interest were disclosed by the author(s) with respect to the research, authorship, or publication of this article.

### Ethics Approval

The formal ethics approval was granted by the Social and Human Sciences Research and Publication Ethics Committee of Gazi University.

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## Research and Publication Ethics Statement

The study was approved by the research team's university ethics committee of the Gazi University (Approval Number/ID: 2021/341). Hereby, we as the authors consciously assure that for the manuscript the following is fulfilled:

- This material is the authors' own original work, which has not been previously published elsewhere.
- The paper reflects the authors' own research and analysis in a truthful and complete manner.
- The results are appropriately placed in the context of prior and existing research.
- All sources used are properly disclosed.

Contribution Rates of Authors to the Article The authors provide equal contribution to this work.

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**APPENDIX 1. Three Factors and Items underneath the Factors as a Result of EFA**

Item No	Creating an Effective Learning Environment Self-Efficacy Belief Items
	<b>Creating an emotional learning environment</b>
39	I can treat students kindly and respectfully.
40	I can be a good model for students and reflect these characteristics in the classroom.
41	I can take care not to make comparisons and distinctions between students.
42	I can communicate effectively with unsuccessful and problematic students.
45	I can enable students to share their ideas and thoughts during the lesson so that they can use their thinking skills.
47	I can make students respect the different opinions of their friends.
48	I can create a classroom environment where students feel free
49	I can encourage students to help each other
50	I can resolve student conflicts with different methods and techniques (peer mediation, separate meetings with the parties, etc.).
54	I can ensure that the rules are applicable, rational and acceptable to the student.
64	I can state the responsibilities of students regarding their homework with clear rules.
65	I can assign flexible amounts of homework to students.
66	I can design assignments according to their purpose.
67	I can give feedback to students by checking their homework
68	I can keep my own problems and troubles away from the classroom environment.
69	I can control my anger even if I get angry with students.
70	I can listen to students' problems and try to find solutions.
71	I can focus on students' unacceptable behavior, not personality.
	<b>Managing the learning process</b>
1	I can schedule the lesson
2	I can use the time of the lesson effectively
3	I can schedule the activities appropriately while preparing the lesson plan.
4	I can arrange for time wasting situations in the lesson (attendance, signing the plan book, etc.)
5	I can prepare the materials to be used during the lesson in advance.
6	I can set rules with students and ensure they are followed.
7	I can choose methods suitable for the course content.
8	I can try to inculcate in students the habit of self-control.
9	I can take care to create a flexible education environment by taking into account the needs and expectations of the students.
10	I can leave activities such as announcement, educational arm work to the end of the lesson.
18	I can evaluate all the empty spaces in the classroom in an educational sense for students.
19	I can organize the classroom environment by taking into account the effect of colors on the student.
22	I can enrich the classroom with materials (tables, graphics, pictures, slogans, etc.) to attract students' attention and encourage the lesson.
23	I can make arrangements for easy access of students to all kinds of tools and equipment in common areas.
24	While preparing a lesson plan, I can focus on activities related to learning outcomes.

25	I can determine the appropriate strategies, methods and techniques to realize the gains determined in the plan.
26	I can design the course according to the level of readiness by checking the prerequisite knowledge and skills of the students.
28	I can prepare questions that attract students' attention to the lesson.
30	I can relate relevant examples to real life.
33	I can use approaches focused on students' cognitive, affective and psycho-motor learning.
34	When presenting content to students, I can repeatedly emphasize the main points and repeat the topics covered at regular intervals.
35	I can design instructional materials (drawings, tables, graphics, etc.) that will embody the content while presenting the content to the students.
36	I can use appropriate teaching methods and techniques while explaining the subject to students.
37	I can organize trip-observation studies on the subject for students.
	<b>Behavior management, collaboration and inclusive education</b>
51	I can manage students' negative behaviors in the lesson.
52	I can deal effectively with students' problems.
53	I can make students self-evaluate by thinking about their behavior in the classroom at the end of the day.
55	I can cooperate with parents in classroom management.
56	I can communicate with parents not only when there are problems with students but also in positive situations.
57	I can make home visits to parents.
58	I can cooperate with parents to develop students' study habits and attitudes.
59	I can create a successful dialogue system with parents.
62	I can teach students the strategies needed to take effective grades in class.
73	I can meet my colleagues frequently and have a dialogue about teaching practices.
74	I can design lessons appropriately, taking into account the individual differences of the students.
75	I can identify situations that prevent students from learning.
76	I can apply different methods and techniques in teaching practices to students with special needs.
77	I can spare more time for students with special needs.
78	I can ensure the participation of parents in the education process for students with special needs.
79	I can benefit from special education services in line with the abilities and interests of students with special needs.

