IJERE International Journal of Educational Research Review

International Journal of Educational Research Review

Development of Teachers' Views on Mixed and Single-Gender Education Scale

Mustafa Yüksel ERDOĞDU[1]

Article History:
Received 19.09.2022
Received in revised form 25.11.2022
Accepted
Available online 01.01.2023

The aim of this study was to develop "Teachers' Views on Mixed and Single-gender Education Scale". The study group consisted of 718 teachers in 18 different schools who volunteered to participate in the study in Küçükçekmece District of İstanbul. Both Exploratory and Confirmatory Factor Analysis were carried out for the validity of the scale. With Exploratory Factor Analysis, it was found that the scale consisted of two factors (positive views on single-gender education and positive views on mixed-gender education) and 18 items and the scale explained 63% of the total variance. When the fit index values of the scale were examined, it was found that the model had a good fit. In order to calculate the discriminative values of the scale items, mean scores of upper and lower groups were examined with t-test and it was found that all of the items were discriminative. Cronbach Alpha values calculated for the scale reliability were found to vary between .81 and .89.

Keywords: Single-gender education, mixed-gender education, confirmatory factor analysis

INTRODUCTION

As in the whole world, studies continue in Turkey to develop education, to improve educational activities and to ensure that students as learning individuals benefit from these activities at the highest level. In this context, contemporary education systems, which put the student at the centre, consider identifying and eliminating the barriers to learning as a priority policy and continuously conduct studies and research to improve this situation. In addition to this, as in many countries in the world, it is discussed in Turkey whether mixed-gender education or single-gender education is more effective in educational practices; however, it seems that there is still no consensus about reaching a final result. The main reasons for this may be the different results of studies conducted on the subject, the uncertainty on whether the effects of this education model will be addressed according to cognitive, social, or affective differences, and the differences of ideological, political, and religious perspectives on the topic.

Mixed-gender education is defined as female and male students receiving education together in the same environment, while single-gender education is defined as students with the same gender receiving education in the same environment (Akyüz, 2020; Erdoğdu, 2020; Karataş, 2012). Klein (1985) refers to single-gender education as "an invitation to discrimination" and describes single-gender education as inequality by its nature. Discussions on single-gender education and mixed-gender education in Turkey emerged for the first time in 1924 as a result of primary education graduate girls wanting to enrol in boys' high school as a result of not being able to find a school to attend (Akyüz, 2020). While the post-Republic transition to mixed-gender education in secondary schools took place during 1927-1928 academic year for the first time (Karamuk, 1973), mixed-gender education practices started in high schools following a very disputed process in 1930 (Kamer, 2017). When the starting point of mixed-gender education practices is considered in general, there were goals such as maintaining the continuity of republic and establishing equality of opportunity between men and women and within this context, this change mostly occurred with ideological reasons (Coşkun, 2018). According to the 1739 numbered National Education Constitutive Law, which is still in force today, it is essential to carry out mixed-gender education for girls and boys in schools. However, although the law also includes the expression that "some schools can be reserved for girls or boys only according to the type, opportunities and obligations of education", today single-gender education can be seen in only in vocational high schools.

The transition from single-gender education to mixed-gender education has been a difficult process in Turkey; however, limited number of studies has been conducted on the effects of this change. When these studies are examined in general, theoretical studies in which thoughts and historical process on mixed and single-gender education were discussed (Kamer, 2013; Kamer, 2017; Ulaş, 2012) and two qualitative studies (Altıntaş, 2018; Coşkun, 2018) on mixed-gender education have been conducted. A study conducted in Turkey by Erarslan and Rankin (2013) showed that students who attended single-gender education schools have more egalitarian attitudes about roles in family life when compared with students who attended mixed-gender education schools. According to a study conducted by Erdoğdu (2020), it was found that students studying in all-girls

[1]Istanbul Sabahattin Zaim University, myerdogdu@gmail.com, orcid.org/ 0000-0001-6403-5630

schools had higher school engagement levels than students who attended mixed-gender education schools or all-boys schools. It can be thought that the continuity of mixed or single-gender education expectations, which is the subject of discussion at the beginning of each academic year, is due to the limited number of research on the subject. In other words, conducting studies in which mixed or single-gender education is evaluated and discussed with all its aspects is very important in terms of solving these discussions.

In the United States of America, until the end of 19th century, the education was in the form of single-gender education. However, mixed-gender education was gradually introduced since it was expensive to run single-gender schools and due to the financial burden of establishing the required facilities and overstaffing (Butler, 1910; Kolesnik, 1969). Coleman (1961), who conducted studies on the effects of mixed-gender education in America for a long time, stated that mixed-gender education would be harmful for both increasing academic success and providing social adaptation. In the following years, Goodlad (1984) and Salomone (2003) expressed their thoughts which supported these views of Coleman. Hillary Clinton (2001) emphasized the efficacy of single-gender education in the American congress by saying "*There should be no barriers to single-gender education option in the state education system. We have to see the success of single-gender schools. These schools excite students and parents*"

While the American Civil Liberties Union, which advocated mixed-gender education, has stated that mixed-gender education contributes to the interaction of opposite sexes with each other (cited by Ogden, 2011), there are also studies which advocate that this education model will develop opposite sexes' understanding and respecting each other (Mendez, 2004), women and men have to learn to live together and therefore mixed-gender education provides children with good opportunities (Vail, 2002) and learning how the opposite sex thinks about, evaluates and reacts to events will be possible only through mixed-gender education (Kommer, 2006). In terms of the advocates of single-gender education, there are studies which have reported that learning styles of girls and boys are different (Caplice, 1994; Gurian & Ballew, 2003; Swain and Harvey, 2002); girls participate in educational activities more in single-gender classes (Gillibrand, 1999); girls have verbal and fine motor movements, while boys have visual spatial skills and therefore they should receive education in different environments (Salomone, 2006).

While studies conducted to show whether mixed-gender education or single-gender education is more effective have given different results; when considered in general, there are more studies which show that single-gender education is effective. A study conducted in England and Wales showed that students studying in single-gender, all-boys or all-girls classes were more successful in science lesson (Bell, 1989); in a study conducted in New Zealand, Scott (1991) found that students in all-girls schools had higher confidence and respect levels, while there was no evidence that they were academically more successful; it was also found that girls preferred only girls schools to protect from the threat and abuse of boys (Sax, 2005), girls and boys attending single-gender schools were more interested in many lessons when compared with their peers attending mixed-gender schools (Stables, 1990) and they were academically much more successful (Collins, Kenway, and McLead, 2000; Elam, 2009). There are also studies which concluded that students from mixed-gender education adapted easier to universities with mixed-gender education and were more successful when compared with students from single-gender schools (Hughes et al., 1991); positive changes occurred in selfless levels of students as a result of the conversion of two single-gender schools into mixed-gender schools, while no significant change was seen in terms of academic success (Marsh et al.; 1989); and which showed that single-gender education did not have a relative advantage over mixed-gender education (Byrne, 1993).

When the study results are examined in general, it can be said that different results will pave the way for larger number of studies to be conducted on the topic. When the results obtained are considered as a whole, the data were obtained from the achievement of students in the exams or from measuring their views and attitudes. However, no studies in which the views of teachers, who are one of the most important building blocks of learning and teaching, are taken and no measurement instruments measuring views on this issue have been found. It is expected that developing a scale on mixed and single-gender education will contribute to creating awareness about studies to be conducted on this topic, conducting in-depth studies to find out the efficacy of mixed and single-gender education based on teachers' views and showing the issue in an objective way.

METHOD

The developmental stages of Teachers' Views on Mixed and Single-gender Education Scale (TVMSES) and the characteristics of the study group are shown below.

Participants

Study group consists of 718 teachers who were working in 18 different schools in İstanbul Küçükçekmece district and who volunteered to participate in the study. 468 (65%) of the teachers in the study group were female, while 250 (35%) were male. 118 (16%) of the teachers had been teaching for 0-2 years, 195 (27%) had been teaching for 3-8 years, 138 (19%) had been teaching for 9-15 years and 267 (37%) had been teaching for 15 years and longer. 223 (31%) of our study group were primary school teachers, 389 (54%) were branch teachers, 106 (15%) were teachers of religious culture. While 272 (38%) of the teachers had taught in single-gender classes, 446 (62%) had never taught in single-gender classes.

Developing the scale

In the first stage of scale development, the literature was reviewed and studies in which the advantages and disadvantages of mixed-gender education and single-gender education were discussed were examined and 25 items were prepared. The suitability of the items in the prepared measurement instrument in terms of target language and expression was examined by 10 faculty members and content validity rate was found by deleting the items which were not thought to be suitable for the aim (Guillemin & Ferraz 2000). This rate was found by subtracting one from the rate of the total number of faculty members who responded positively to each item to the total number of faculty members. Three items with a content validity rate of lower than .80 was deleted and 22-item scale was made ready for a pre-trial application. Teachers' Views on mixed and single-gender education scale is a 5-Likert type scale and it is graded as "Totally agree, Agree, Neutral , Disagree , Totally disagree "

Pre-trial application: In order to determine the technical characteristics of a scale, it should be applied to a group that will represent the population that is targeted. For this purpose, the measurement instrument was applied to 28 teachers from different branches who were doing their master's degree at İstanbul Sabahattin Zaim University. During the application, there were no questions the teachers did not understand or expected explanations for and it was found that in general the teachers answered the questions in 15 minutes on average.

Procedure and data analysis

Before starting to apply the scales, necessary ethical and application (Istanbul Sabahattin Zaim University, protocol no: 2020/03, 27/03/2020) permissions were taken for the study. The teachers who participated in the study were informed about the aim of the study before the application and the measurement instruments were applied face-to-face to teachers who volunteered to participate in the study. The measurement instrument was applied to 732 teachers, before data analysis, the forms were examined and 14 forms which were not filled in or which were filled in randomly were not included in the study.

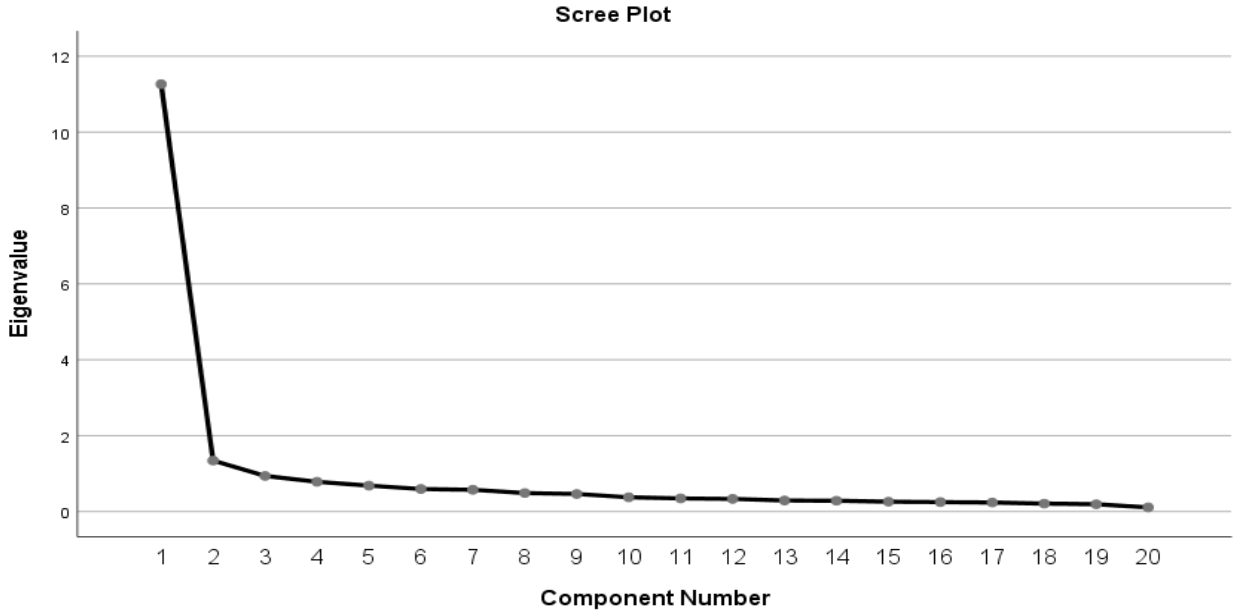
Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were first of all performed for the validity of the scale. For this purpose, 718 forms taken for data analysis were grouped in two equal halves and EFA was performed on 359 forms, while CFA was performed on the other 359 form. The aim of exploratory factor analysis (EFA) is to group items associated with each other in the same factor (Stevens, 2009), while the aim of confirmatory factor analysis (CFA) is to test the accuracy of the correlations and structures obtained (Çokluk et al., 2010). Exploratory factor analysis shows under which factor an item is according to item loads and factor load values' being .30 and higher is considered here as determinant (Klinie, 2011). In the analysis, varimax rotation technique was used to show the relationship of items with each other, to find out how many factors the scale had and to find out the factor structure (Pett, Lackey & Sullivan, 2003; Tabachnick & Fidell, 2007). Fit indices were calculated to test the efficacy of the structure found with CFA. In this context, in order to test the fit of the model, Chi-Square Goodness was calculated to test the fit of the model, Root Mean Square Error of Approximation (RMSEA) was calculated for covariance fit and Goodness of fit (GFI), which shows the ratio of covariance and variance to the measured variance and covariance, was calculated (Byrne, 2011; Hu & Bentler, 1999; Maiti & Mukherjee, 1991). In addition, goodness of fit index (GDF) of the analysis results obtained with CFA, normed fit index (NFI), which compares the Chi-square value of the model and Chi-square value of the zero model and finally adjusted goodness of fit index-AGFI were measured (Bollen, 1990). The

items included in the scale are expected to distinguish between those with the measured feature and those without. This gives supportive information about the validity of the scale (Büyüköztürk, 2011, Turgut & Baykul, 1992). In this context, 27% of the upper and lower groups were taken to calculate the discriminative values of the items in the scale and unrelated t test was used for the significance of differences between lower and upper groups. Cronbach Alpha values of the subscales were calculated for the reliability of the study.

RESULTS

This part includes validity, item analysis and reliability values of the developed scale. For exploratory factor, first of all the sample size of the developed scale should be within suitable limits. For this reason, Kaiser-Meyer-Olkin (KMO) value was calculated to test the suitability of the sample size and this value was found as ,96. This value is an indicator that the sample size of the scale is suitable for exploratory factor analysis. In addition, in order to test the statistical significance of the correlation matrix between items in the scale and to test the normality in the distribution of data, Chi-square values were calculated by using Bartlett test and it was found that the data obtained were suitable for factor analysis (X^2=6320,59, p<0.001). Next, exploratory factor analysis was conducted, and it was found that there were 20 items with a factor load higher than .30 and with high values in more than one factor.

In the analysis conducted to find out under which factor the items in the scale were grouped, it was found that the scale items were grouped under 2 factors with an eigenvalue higher than 1. When the scree plot below is examined, the scale consists of two factors.



In Figure 1, the scale has two factors since the items have low eigenvalue after the second point and the contribution of item variances was low. EFA results of the scale are in Table 1.

Following the rotation to clarify the other factors of the scale, since the correlation levels of two items were close, these items were considered as overlapping items and factor analysis was repeated. Analysis results with the remaining 18 items (Rotated Component Matrix) is given in Table 1.

Table 1: Exploratory factor analysis results of views on mixed and single-gender education

(Items)	(Communalities)	(Rotated Component Matrix)*	
		Loads in the first factor	Loads in the second factor
20	,783	,792	
19	,750	,766	
3	,659	,750	
4	,559	,736	
16	,712	,731	
24	,692	,717	
12	,744	,711	
22	,727	,710	
10	,494	,702	
25	,516	,695	
5	,259	,458	
6	,521		,688
1	,663		,685
15	,696		,680
13	,640		,679
11	,662		,648
2	,626		,634
18	,642		,619
Explained variance	63,02	39.99	23.03

*Values below ±0,30 were not shown.

As can be seen in Table 1, the first one of the subscales obtained as a result of EFA includes views on single-gender education and it consists of 11 items. Factor loads of the scale vary between .458 and .792 and explain 39.99% of the total variance. The other subscale includes views about mixed-gender education. This subscale has 7 items and factor loads vary between .619 and .688. The variance explained by this subscale was measured as 23.03%. As a result of EFA, the total variance explained by 18 items is 63%.

Item content analysis is made to show whether the items in the developed measurement instrument are consistent and stable, whether the items measure the features the scale tries to measure and to show whether it shows the difference between the items that have those features and those which do not (Anastasia & Urbina, 1997; Tavşancıl, 2010; Tezbaşaran, 1996). For this purpose, a 27% upper-lower group comparison was made to calculate the discriminative values of the 20-item Teachers' Views on Mixed and Single-gender Education Scale items and the results obtained were shown in Table 2.

Table 2: Discriminative values and t test results of all items included in the scale

Item	Group	X̄±S	t	p	Item	Group	X̄±S	t	p
20	Upper	4,88±,442	22,68	,000	25	Upper	4,97±,212	21,09	,000
	Lower	2,32±1,10				Lower	2,70±1,10		
19	Upper	4,83±,48	19,95	,000	5	Upper	4,98±,132	20,32	,000
	Lower	2,44±,1.16				Lower	2,76±1.13		
3	Upper	4,58±,91	16,06	,000	6	Upper	4,78±,626	18,67	,000
	Lower	2,39±1,09				Lower	2,54±1,09		
4	Upper	2,11±1,57	12,72	,000	1	Upper	4,82±,588	19,59	,000
	Lower	3,42±1,21				Lower	2,45±1.11		
16	Upper	3,95±1,73	15,52	,000	15	Upper	4,80±,598	20,24	,000
	Lower	2,52±1,19				Lower	2,35±1,12		
24	Upper	4,64±,73	17,98	,000	13	Upper	4,75±,719	21,07	,000
	Lower	2,33±1.13				Lower	2,19±1,05		
12	Upper	4,76±,60	15,85	,000	11	Upper	4,75±,837	19,32	,000
	Lower	2,71±1,21				Lower	2,24±1,08		
22	Upper	4,26±1,19	10,44	,000	2	Upper	4,68±,947	16,53	,000
	Lower	2,65±1,09				Lower	2,31±1,16		

10	Upper	4,80±,668	19,98	,000	18	Upper	3,75±1,47	11,05	,000
	Lower	2,33±,1,11				Lower	1,83±1,07		

As can be seen in Table 2, the difference between the upper and lower group means in all of the 18 items in the last form of the scale was in favour of the upper group. This result shows that all the items in the scale have discriminative values.

CFA was made to show the fit values of the two factors revealed by EFA and significance level of Chi-square (χ^2) value was calculated. As a result of the analysis made, Chi-square value [χ2=266,33 *df*=132, *p*<.01] was found to be significant. The ratio of Chi-square value to the degree of freedom was measured as 2.08. This value being between 2 and 3 shows that the model fit is within acceptable limits (Schermelleh et al.,2003). It is seen that the standardized coefficients which show the correlation of the factors obtained by CFA with the items vary between .26 and .88. Path diagram of the model obtained with CFA is shown in Figure-1.

When the fit index values of the scale were examined, the results were as follows: RMSEA=,05, SRMR=,04, CFI=0.98, GFI=0.93, AGFI=,91, NFI=,95 and IFI=0.98. When the CFA results obtained are examined as a whole, all fit indices are good (Browne & Cudeck, 1993; Byrne, 1998).

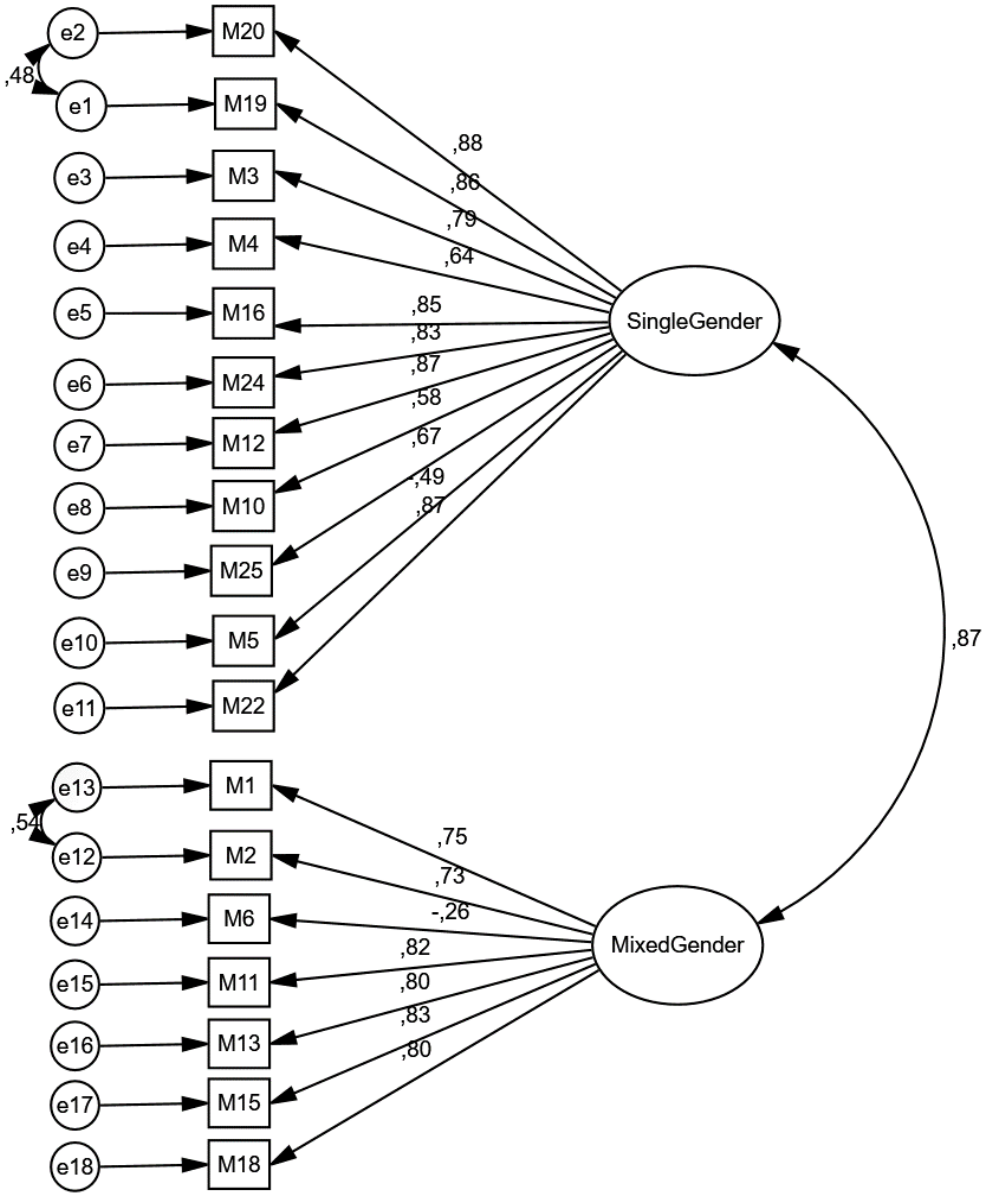


Figure 1. CFA Results

Findings regarding reliability

Cronbach Alpha values were calculated to find out the reliability of the subscales of views on Mixed and Single-gender Education. Cronbach Alpha value of single-gender education subscale was calculated as ,89, while Cronbach Alpha value of mixed-gender education subscale was calculated as ,81. Since the scale does not give a total score, reliability value for all the scale items was not calculated.

CONCLUSION and DISCUSSION

The purpose of this study is to develop a measurement tool to measure teachers' views on mixed and single-sex education. The construct validity of the developed scale was examined by EFA and CFA. Before EFA, KMO value was calculated to find out the sample size and the value obtained was measured as ,96. Chi-square value of the Barlett test applied to test the normality of data was found to be significant, χ^2=6320,59. Next, exploratory factor analysis was made and it was found that there were 20 items with a factor load higher than .30 and with high values in more than one factor. Following the rotation to clarify the other factors of the scale, since the correlation levels of two items were close, these items were considered as overlapping items and factor analysis was repeated. It was found that the scale was grouped in 2 factors with an eigenvalue higher than 1. High scores from the first factor indicate positive views on single-gender education, while high scores from the second factor indicate positive views on mixed-gender education. The first factor consists of 11 items and explains 39.99% of the total variance. The second factor of the scale consists of 7 items and measures 23.03% of the total variance. The variance explained by all items of the scale because of EFA is 63%. CFA was made to test to what extent the two-factor structure shown by EFA was compatible with the subscales.

As a result of the analysis, Chi-square value was found to be significant [χ2=266,33 *df*=132, p<.01]. The ratio of Chi-square value to the degree of freedom was measured as 2,08. This value being between 2 and 3 shows that the model is within acceptable limits (Schermelleh et al.,2003). It can be seen that the standardized coefficients which show the correlation between the factors obtained with CFA and the items vary between ,26 and ,88. Path diagram of the model obtained with CFA is shown in Figure 1. The fit index values of the scale are as follows: RMSEA=,05, SRMR=,05, CFI=0.98, GFI=0.93, AGFI=,91, NFI=,95 and IFI=0.98. When the CFA are examined as a whole, it can be seen that all fit indices are good (Browne & Cudeck, 1993; Byrne,1998; Schumacker & Lomax, 1996).

Item analysis was carried out to show whether the items in the developed measurement instrument were consistent and stable, whether the items measured the features that the scale was trying to measure and whether they showed the difference between those which had that feature and those which did not (Anastasia & Urbina, 1997; Tavşancıl, 2010; Tezbaşaran, 1996). According to the data obtained from the scale, the scores were listed from the highest to the lowest and t tests were made between scores of 27% upper group and 27% lower group. According to the data obtained, the differences between groups were found to be significant in favour of upper group in all of the 18 items in the scale. In other words, the differences between those which had the feature measured and those which did not were found to be significant.

Cronbach Alpha internal consistency of the subscales was examined for reliability study of the scale and Cronbach Alpha value of the first subscale, single-gender education, was found as ,89, while the Cronbach Alpha value of mixed-gender education subscale was found as ,81. Reliability value for the overall scale was not calculated since the scale did not give a total score. Benefiting from education opportunities is the most basic right of every human being. Contemporary educational systems that put students at the centre see students' awareness of their abilities and their effort to develop these at the highest level as the main goal. In this context, it is thought that it is important to organize educational conditions by considering all individual differences of each student. It can be said that one of these differences is gender. In this context, it is necessary to determine the mental, emotional, and social needs of students resulting from gender and to consider these in educational activities. Therefore, it is very important to take the views of teachers, who have the most important responsibilities in carrying out educational activities, in educational arrangements. For this reason, it is thought that the Teachers' Views on mixed and single-gender education scale developed in this scale will be an important instrument for studies which aim to plan education. The fact that no similar scales were found in literature and the expectation that the developed scale will be a pioneer in conducting new studies show the importance of this study. When the psychometric data of the scale are examined, the result that the reliability and validity values are acceptable and even at high levels shows that the scale can be used in studies conducted in Turkish culture. It should also be kept in mind that the results obtained from measurement

instruments will give healthier results when supported with other data such as observation and in-depth interviews.

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

Official ethics approval was approved by the Ethics Committee of Istanbul Sabahattin Zaim University. We conducted the study in accordance with the 1975 Declaration of Helsinki.

Funding

Financial support was provided from Istanbul Sabahattin Zaim University in the preparation of the research.

Research and Publication Ethics Statement

The study was approved by the research team's university ethics committee of the İstanbul Sabahattin Zaim University (Approval Number/ID: E 2510 /2020/06. Hereby, we as the authors consciously assure that for the manuscript "

- 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

Research is single-authored

REFERENCES

Akyüz, Y. (2020). *Türk eğitim tarihi*. *Ankara: Pegem Yayınları*.

Altıntaş, M. E. (2018). Yüksek din öğretiminde karma ya da tek cinsiyete dayalı eğitim üzerine nitel bir araştırma. *Hitit Üniversitesi İlahiyat Fakültesi Dergisi*, *17*(34), 373-406. https://doi.org/10.14395/hititilahiyat.488670

Anastasia, A., & Urbina, S. (1997). *Psychological testing* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Bell, J. F. (1989). A Comparison of science performance and uptake by fifteen-year-old boys and girls in co-educational and single-sex schools—APU survey findings. *Educational Studies*, *15*(2), 193-203. https://doi.org/10.1080/0305569890150209

Browne, M. W., & Cudeck, R. (1993). *Alternative ways of assessing model fit*. Sage Focus Editions, 154, 136-136

Butler, N. M. (1910). Education in the United States. New York: American Book Company.

Byrne, B.M. (1998). *Structural equation modeling with LISREL, PRELIS and SIMPLIS: Basic concepts, applications and programming*. Mahwah. New Jersey: Lawrence Erlbaum Associates. https://doi.org/10.4324/9780203774762

Byrne, E. M. (1993). *Women and science: The snark syndrome*. Falmer Press, Taylor and Francis Inc., 1900 Frost Road, 101, Bristol, PA 19007 (cased, ISBN-1-85000-654-7; paperback, ISBN-1-85000-655-5).

Caplice, K. S. (1994). *Case for public single-sex education,* The. *Harv. JL & Pub. Pol'y*, *18*, 227.

Clinton, H. (2001) *Karma eğitim mi tek cinsiyetli eğitim mi?* http://www.aljazeera.com.tr/al-jazeera-ozel/karma-egitim-mi-tek-cinsiyetli-egitim-mi.

Coleman, J. S. (1961). *The adolescent society*. New York: The Free Press.

Collins, C. W., McLeod, J., & Kenway, J. (2000). *Factors influencing the educational performance of males and females in school and their initial destinations after leaving school*. Canberra: Department of Education, Training and Youth Affairs.

Coşkun, A. (2018). Türkiye'deki karma eğitim uygulamasına yönelik öğretmen görüşleri. *Eğitim Bilim Toplum*, *16*(64), 43-93.

Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2010). *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları.* Ankara: Pegem Akademi. Doi 10.14527/9786055885670

Elam, J.H. (2009*) An examination of single-gender and coeducational classes: Their impact on the academic achievement of middle school students enrolled in mathematics and science at selected schools in Georgia.* https://ui.adsabs.harvard.edu/abs/2009PhDT.....50E/abstract

Erarslan, A. B., & Rankin, B. (2013). Gender role attitudes of female students in single-sex and coeducational high schools in Istanbul. *Sex Roles*, *69*(7-8), 455-468. Doi 10.1007/s11199-013-0277-0

Erdoğdu, M. Y. (2020). The roles of attitudes towards learning and opposite sex as a predictor of school engagement: mixed or single gender education?. *Palgrave Communications*, *6*(1), 1-9. https://doi.org/10.1057/s41599-020-0457-9

Gillibrand, E., Robinson, P., Brawn, R., & Osborn, A. (1999). Girls' participation in physics in single sex classes in mixed schools in relation to confidence and achievement. *International Journal of Science Education*, *21*(4), 349-362. https://doi.org/10.1080/095006999290589

Goodlad, J. I. (1984). *A place called school. Prospects for the future*. McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 10020.

Gurian, M., & Ballew, A. C. (2003). *The boys and girls learn differently action guide for teachers*. John Wiley & Sons.

Hughes, D., Lauder, H., & Strathdee, R. (1991). The university performance of pupils from state and independent schools in New Zealand. *Access*, *10*(1), 1-7.

Kamer, S. T. (2017). Karma eğitime ilişkin İhsan Sungu'nun görüşleri ve çeviri yazıları üzerine değerlendirme. *Cumhuriyet International Journal of Education*, *6*(1), 157.

Kamer, S. T (2013). *Türk eğitim sisteminde karma eğitime ilişkin fikirler, tartışmalar ve uygulamalar (1908-1950).* [Yayınlanmamış doktora tezi]. Ankara Üniversitesi.

Karamuk, Z. (1973). *Cumhuriyetin 50. Yılında Milli eğitimimiz*. İstanbul: Milli Eğitim Basımevi

Karataş, İ.H. (2012). Eğitimde fırsat eşitliği için karma eğitim mi? Ayrı eğitim mi? *Eğitime Bakış, 22, 50-53.*

Klein, S. S. (1985). *Handbook for achieving sex equity through education*. The Johns Hopkins University Press, 701 West 40th Street, Suite 275, Baltimore, MD 21211.

Kolesnik, W. B. (1969). *Co-education: Sex differences and the schools*. New York: Vantage Press.

Kommer, D. (2006). Boys and girls together: A case for creating gender-friendly middle school classrooms. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *79*(6), 247-251. https://doi.org/10.3200/TCHS.79.6.247-251

Marsh, H. W., Owens, L., Myers, M. R., & Smith, I. D. (1989). The transition from single-sex to co-educational high schools: teacher perceptions, academic achievement, and self-concept. *British Journal of Educational Psychology*, *59*(2), 155-173. https://doi.org/10.1111/j.2044-8279.1989.tb03088.x

Mendez, T. (2004). *Separating the sexes: a new direction for public education*. http://www.csmonitor.com/2004/0525/p11s02-legn.html.

Ogden, C. (2011). A *comparison of student performance in single sex education and coeducational setting in urban middle schools* http://digitalcommons.georgiasouthern.edu/cgi/viewcontent.cgi?article=1361&context=etd&sei-redir=1&referer=http

Pett, M. A., Lackey, N. R., & Sullivan, J. J. (2003). *Making sense of factor analysis: The use of factor analysis for instrument development in health care research.* London: Sage.

Salomone, R. (2006). Single-sex programs: Resolving the research conundrum. *Teachers College Record*, *108*(4), 778-802.

Salomone, R. C. (2003). *Same, different, and equal: Rethinking singlesex schooling*. New Haven, CT: Yale University Press.

Sax, L. 2017. *Why gender matters. What parents and teachers need to know about the emerging science of sex differences (II Edition).* New York: Harmony books.

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.

Schumacker, R. E. & Lomax, R. G. (1996). *A beginner's guide to structural equation modeling*. Hilsdale. *U.: Erlbaum*.

Scott, A. C. (1991). *A girls-only science class in a co-educational secondary school.* [Doctoral dissertation]. Victoria University of Wellington.

Stables, A. (1990). Differences between pupils from mixed and single-sex schools in their enjoyment of school subjects and in their attitudes to science and to school. *Educational Review*, *42*(3), 221-230. https://doi.org/10.1080/0013191900420301

Stevens, J. P. (2009). *Applied multivariate statistics for the social sciences*. (5th ed.): New York.

Swain, S. L., & Harvey, D. M. (2002). Single-sex computer classes: An effective alternative. *TechTrends*, *46*(6), 17-20.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.) Boston: Allyn and Bacon.

Tavşancıl, E. (2010). *Tutumların ölçülmesi ve SPSS ile veri analizi*. (4. Baskı). Ankara: Nobel

Tezbaşaran, A. (1996). *Likert tipi ölçek geliştirme*. Psikologlar Derneği Yayınları*:* Ankara.

Ulaş, A.H. (2012). *Karma eğitimin zararları.* .http://www.nurnet.org/karma-egitimin-zararlaribilimsel-arastirma/

Vail, K. (2002). Same sex schools may still get a chance. *The Education Digest*, *68*(4), 32.

ITEM	TEACHERS' VIEWS ON MIXED AND SINGLE-GENDER EDUCATION SCALE	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1.	Mixed-gender education increases academic achievement.					
2.	Classroom management is easier in mixed-gender education environment					
3.	Lessons are taught more effectively in single-gender classes					
4.	Students experience more reserve in mixed-gender education environment					
5.	Friendships are much stronger in single-gender education environment					
6.	Mixed-gender education environment increases competitiveness more when compared with single-gender education					
10.	Differences between learning levels are much higher in mixed-gender education environment					
11.	Mixed-gender education is more convenient in terms of children's personality and sexual development					
12.	Lessons should be taught in single-gender classes since girls and boys have different learning styles					
13.	Mixed-gender education increases the ability of different genders to understand each other					
15.	Mixed-gender education system is more useful in terms of different genders' learning to respect each other					
16.	Students are more driven to succeed in single-gender education environments					
18.	In mixed-gender education environments, students pay more attention to their behaviors (self-discipline)					
19.	Single-gender education environments increase students' self-confidence more					
20.	Single-gender education environments increase students' skills of self-expression					
22	Single-gender classes are much more effective in building the habit of studying together					
24	I believe that there will be less behavior problems in schools in a single-gender environment					
25	Mixed-gender education environment increases dating-like friendship relations					